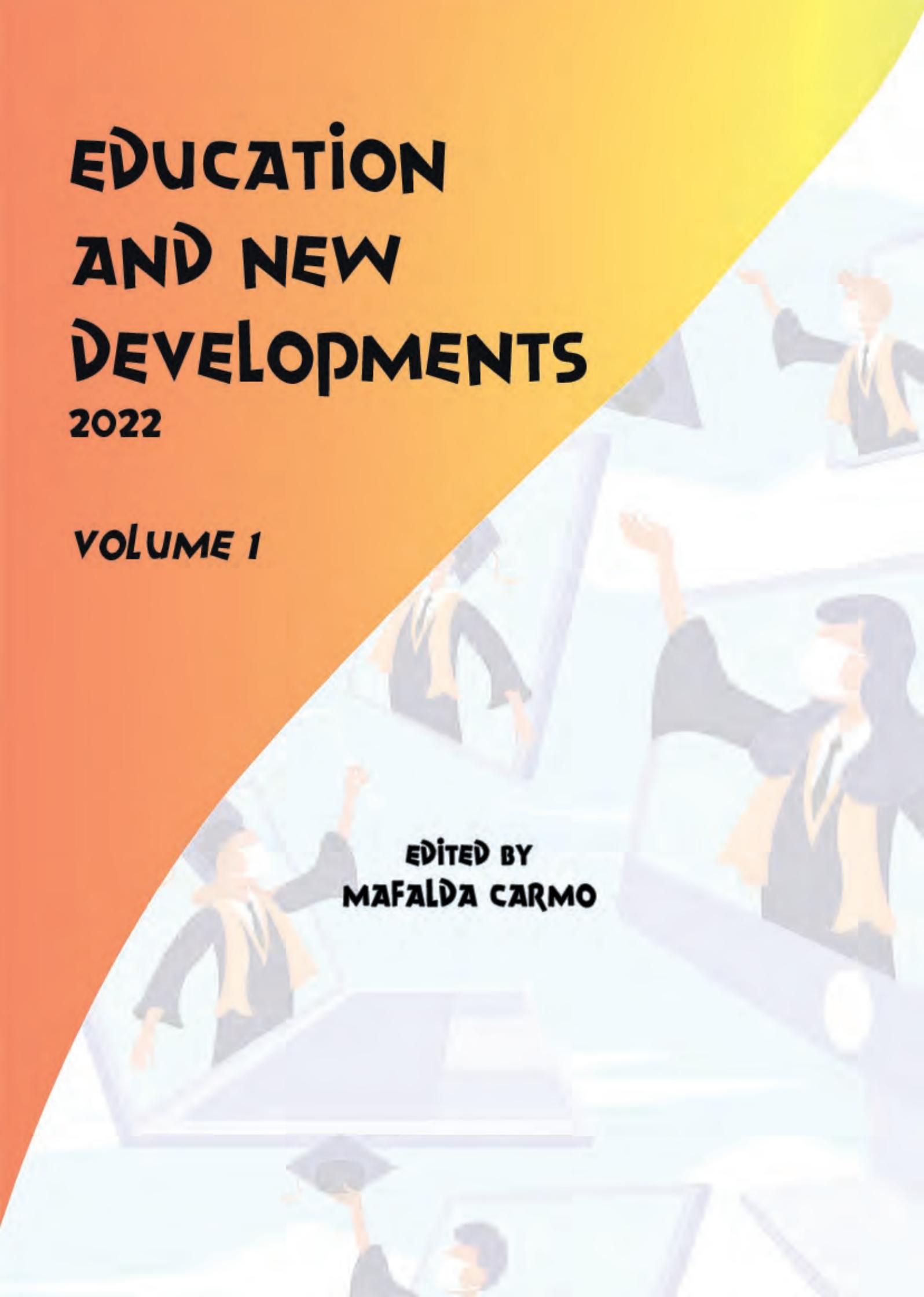


EDUCATION AND NEW DEVELOPMENTS 2022

VOLUME 1

**EDITED BY
MAFALDA CARMO**



Education and New Developments
2022

Volume 1

Edited by
Mafalda Carmo

Edited by Mafalda Carmo, World Institute for Advanced Research and Science (WIARS), Portugal

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FOREWORD

This book contains the full text of papers and posters presented at the International Conference on Education and New Developments (END 2022), organized by the World Institute for Advanced Research and Science (WIARS).

Education, in our contemporary world, is a right since we are born. Every experience has a formative effect on the constitution of the human being, in the way one thinks, feels and acts. One of the most important contributions resides in what and how we learn through the improvement of educational processes, both in formal and informal settings. The International Conference seeks to provide some answers and explore the processes, actions, challenges and outcomes of learning, teaching and human development. The goal is to offer a worldwide connection between teachers, students, researchers and lecturers, from a wide range of academic fields, interested in exploring and giving their contribution in educational issues. We take pride in having been able to connect and bring together academics, scholars, practitioners and others interested in a field that is fertile in new perspectives, ideas and knowledge.

We counted on an extensive variety of contributors and presenters, which can supplement our view of the human essence and behavior, showing the impact of their different personal, academic and cultural experiences. This is, certainly, one of the reasons we have many nationalities and cultures represented, inspiring multi-disciplinary collaborative links, fomenting intellectual encounter and development.

END 2022 received 790 submissions, from more than 45 different countries, reviewed by a double-blind process. Submissions were prepared to take form of Oral Presentations, Posters, Virtual Presentations and Workshops. The conference accepted for presentation 263 submissions (33% acceptance rate), from which, 233 submissions are published in full text in these volumes.

The conference also included:

- One Keynote presentation by Prof. Dr. Alan Singer (Ph.D., Department of Teaching, Learning and Technology, Hofstra University, Hempstead, NY, USA).
 - One Invited Talk by Prof. Dr. Elisa Bertolotti (Ph.D., Art & Design Department, University of Madeira; ID+ Research Unit; ITI/Larsys, Portugal) and Prof. Dr. Valentina Vezzani (Ph.D., Art & Design Department, University of Madeira; ID+ Research Unit; Paco Design Collaborative, Portugal).
- We would like to express our gratitude to our invitees.

This year we also counted on the support of "Madeira Promotion Bureau", contributing to the success of the event and providing a pleasant experience to all END 2022 participants. We would like to thank the "Madeira Promotion Bureau" for welcoming END 2022 to its beautiful island.

This conference addressed different categories inside the Education area and papers are expected to fit broadly into one of the named themes and sub-themes. To develop the conference program, we have chosen four main broad-ranging categories, which also covers different interest areas:

- In **TEACHERS AND STUDENTS**: Teachers and Staff training and education; Educational quality and standards; *Curriculum* and Pedagogy; Vocational education and Counselling; Ubiquitous and lifelong learning; Training programs and professional guidance; Teaching and learning relationship; Student affairs (learning, experiences and diversity; Extra-curricular activities; Assessment and measurements in Education.
- In **PROJECTS AND TRENDS**: Pedagogic innovations; Challenges and transformations in Education; Technology in teaching and learning; Distance Education and eLearning; Global and sustainable developments for Education; New learning and teaching models; Multicultural and (inter)cultural communications; Inclusive and Special Education; Rural and indigenous Education; Educational projects.
- In **TEACHING AND LEARNING**: Critical, Thinking; Educational foundations; Research and development methodologies; Early childhood and Primary Education; Secondary Education; Higher Education; Science and technology Education; Literacy, languages and Linguistics (TESL/TEFL); Health Education; Religious Education; Sports Education.

• In **ORGANIZATIONAL ISSUES**: Educational policy and leadership; Human Resources development; Educational environment; Business, Administration, and Management in Education; Economics in Education; Institutional accreditations and rankings; International Education and Exchange programs; Equity, social justice and social change; Ethics and values; Organizational learning and change, Corporate Education.

This is the Volume 1 of the book *Education and New Developments 2022* and it contains the results of the research and developments conducted by authors who focused on what they are passionate about: to promote growth in research methods intimately related to teaching, learning and applications in Education nowadays. It includes an extensive variety of contributors and presenters, who will extend our view in exploring and giving their contribution in educational issues, by sharing with us their different personal, academic and cultural experiences.

This first volume focus in the main areas of TEACHERS AND STUDENTS and TEACHING AND LEARNING.

We would like to express thanks to all the authors and participants, the members of the academic scientific committee, and of course, to our organizing and administration team for making and putting this conference together.

Hoping to continue the collaboration in the future.

Respectfully,

Mafalda Carmo
World Institute for Advanced Research and Science (WIARS), Portugal
Conference and Program Chair

Madeira, Portugal, 18 - 20 June, 2022

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KEYNOTE LECTURE

“WELCOME TO THE ANTHROPOCENE: TEACHING CLIMATE HISTORY – THERE IS NO PLANET B”

Dr. Alan Singer

Ph.D., Department of Teaching, Learning and Technology, Hofstra University, Hempstead, NY (USA)

Abstract

As climate transformation continues unabated because of human action and inaction, 2021 was a year of climate extremes. Levels of methane in the atmosphere increased by the largest amount since measurements began. The Arctic and Antarctic ices sheets and northern permafrost continued to melt and there were record wildfires across the globe. Meanwhile the burden of climate change falls hardest on the least developed economies that have the smallest carbon footprint and while scientific evidence of human caused climate change and the prospects for a catastrophic near future is overwhelming, climate denial supported by powerful financial fuel corporations stalls international action. Welcome to the Anthropocene. Climate cycles, both long and short-term are natural consequences of geological history, but there is no question that recent changes since the start of the Industrial revolution are caused by human action. A study of past climate changes provides scientific evidence to explain current transformations. It is questionable whether a globalized capitalist system or technological innovations can effectively address climate change. The debate in classrooms and the political realm should not be whether climate change is happening or how much it places human civilization at risk but over how societies and individuals must respond to stabilize climate and reverse the most damaging impacts.

Keywords: *Climate change, environment, teaching, activism.*

Humanity has a collective choice to make and it will not be an easy decision-making process because some individuals, nations, and corporations are much more powerful than others and they benefit from the current situation, or at least they think that they do. They horde short-term profit and either ignore or minimize long-term consequences. We are living in a climate emergency that threatens the decline and perhaps the collapse of civilization as we know it and humanity must decide if we will abandon fossil fuels to avoid a climate catastrophe. One reason I am delivering this paper today is to recruit you as intellectuals, educators, and activists in your home countries who can influence people and policy. This is an international struggle for the future of mankind.

Welcome to the Anthropocene, a newly named geological epoch defined by human caused climate change. According to Swedish teenage climate activist Greta Thunberg and the Intergovernmental Panel on Climate Change (IPCC), in 2019, humanity was less than 12 years away from tipping points that could produce a climate catastrophe threatening large parts of the Earth and human civilization. It is now three years later. If Ms. Thunberg and the IPCC were correct in 2019, and the most recent IPCC climate report suggests that they were, human civilization in in the midst of a climate emergency and an irreversible climate catastrophe is today less than nine years away (Thunberg 2019; IPCC 2022).

Like Greta Thunberg, I am scared, and you all should be also. I am seventy-two years old and I will most likely not live to witness the worst impacts of climate change, but my partner and I have four grandchildren and we worry about their futures and the futures of all young people. I don't want the legacy of my generation to be the destruction of human civilization.

Portugal is exceedingly vulnerable to climate change because of exposure to extreme meteorological events sweeping across the Atlantic Ocean, rising sea levels, and its proximity to the Mediterranean basin that will be susceptible to prolonged droughts and an enormous reduction in humidity. According to some climate projections, metropolitan Lisbon, currently home to 3 million people and the Portuguese capital, may be a desert by the year 2100 (TPN/Lusa 2021; Rathi 2016).

The face-to-face component of this conference is taking place in the beautiful city of Funchal, located on the Portuguese Madeira Archipelago in the Atlantic off of the coast of West Africa. According to a 2004 study, annual precipitation in Madeira, with a population of about 250,000 people, will decrease

by up to 35% by the end of the 21st century, especially on the southern coast where Funchal is located, making it hotter and drier and causing serious water stress (Santos *et al* 2004).

In addition, a Senior Scientist at IPCC Working Group III warns that people on Madeira should anticipate that rising sea levels will “promote erosion of the entire coastal region and eventually landslides” and that “increasingly longer, drier summers” may also “increase the occurrence and risk associated with forest fires” (Pereira, 2020).

Madeira is not the only Portuguese site threatened by climate change. In Portugal the peak wildfire season usually starts in early July and continues until October. Prior to the 1980s, individual fires on the Portuguese mainland never destroyed more than 10,000 hectares or 100 square kilometers, about 40 square miles. In the first two decades of the 21st century, two wildfires burned over 20,000 hectares, 200 square kilometers, about 80 square miles. In 2017, a record year for wildfires in Portugal, half a million hectares of Portuguese eucalyptus and pine forests burned, 5,000 square kilometers, about 200 square miles, killing 121 people. During the 2020 wildfire season there were almost 10,000 individual wildfires destroying about 700 square kilometers or 270 square miles of forest (Faget 2020).

Uncontrolled wildfires are occurring across the globe caused by rising temperatures and shifts in rain patterns resulting from 250 years of burning fossil fuels during the Industrial Era. In 2017 and 2018 wildfires devastated areas in Portugal, Greece, California and British Columbia. In 2020, fires raged for months in Australia, Siberia, and in the Brazilian Pantanal, the world’s largest tropical wetland, and California had its worst fire season in recorded history with an area larger than the state of Connecticut enveloped in flames. Six of the twenty largest wildfires in modern California history occurred in 2020. On one day in September 2020, multiple mega-fires were burning more than three million acres of forest and millions of Californians were exposed to smoke and toxic air. The U.S. Pacific Northwest burned in 2020 and again in 2021. These fires were so intense they generated tornado strength winds and caused or contributed to rolling electrical blackouts during triple-digit heat waves, dangerous chemicals entering ground water and aquifers, and insurance companies canceling homeownership policies (Leonard 2022).

As climate transformation continued unabated because of human action and inaction, 2021 was a year of climate extremes. The IPCC’s sixth assessment report, released in March 2022, was written by over 250 scientists from almost seventy countries and spelled out how bad the approaching climate catastrophe will be. United Nations Secretary General António Guterres called it “an atlas of human suffering and a damning indictment of failed climate leadership.” According to the report, climate change is happening more rapidly than expected with increasingly devastating results (Guterres 2022).

The average global temperature has increased by 2° F since the start of the 19th century Industrial Revolution with the mass burning of fossil fuels. International cooperation is required to address the climate emergency, but the world remains divided into independent, sovereign, competing nation-states that emerged in the 18th and 19th centuries and cooperation, regulation, and reduced greenhouse gas emissions remain voluntary even after international climate conferences and agreements signed at Rio in 1992, Kyoto in 1997, and Paris in 2015. While some United States Presidents have agreed to abide by the guidelines, the U.S. has never formerly endorsed them, which would require a highly unlikely two-thirds vote of the U.S. Senate (IPCC 2022).

Key findings of the IPCC report include that in 2019 alone, storms, floods and extreme weather produced 13 million climate refugees in Asia and Africa; Millions of people are at risk of hunger and malnutrition as heat and drought kill crops and trees; Mosquitoes carrying diseases like malaria and dengue are spreading into new areas including in the United States; Half the world’s population faces severe water scarcity at some point during the year (Plumer and Zhong 2022).

Climate change affects different regions of the Earth differently. Warming in regions above the Arctic Circle in Siberia, Alaska, and Canada has increased twice as fast as in other areas of the planet. The temperature in the Eastern Siberia town of Verkhoyansk reached 38° C (100° F) in June 2020. It was the hottest Arctic Circle temperature ever recorded. Permafrost, permanently frozen ground in the Northern Hemisphere, contains vast amounts of carbon accumulated from dead plants and animals over the course of hundreds of thousands of years. Estimates suggest that permafrost could hold twice as much carbon as there currently is in the Earth’s atmosphere. Rotten organic material is exposed as permafrost thaws. A broad thaw caused by global warming would release the stored carbon into the atmosphere as carbon dioxide (CO₂) and methane (CH₄), another greenhouse gas. The release would trigger even greater planetary warming and more thawing. To understand the process, leave frozen chicken on the kitchen counter. You will soon have a puddle of water and eventually the chicken will start to smell as it decomposes. Warming leads to more warming until there is a tipping point with rapid and irreversible change. Ice sheets melt, ocean currents shift, coastal regions flood, the oceans release dissolved greenhouse gases, and civilization as we know it ends (Schädel 2020; BBC 2020).

Another region where climate change will have dire consequences is the Amazon Rainforest in equatorial South America. The Amazon River is almost 4,000 miles long and runs roughly along the equator eastward from the Andes Mountains to the Atlantic Ocean. Its immense tropical rainforest, containing about

half of the Earth's remaining rainforests, is 2.6 million square miles in size with 1.4 billion acres of dense forest and covers approximately 40% of the land area of South America. The rainforest extends into seven countries, Brazil, Bolivia, Peru, Ecuador, Colombia, Venezuela, Guyana, Suriname, and one European colony, French Guiana, although most of its acreage is in Brazil. Brazil is the fifth-largest country in the world, it's the seventh most populous, and it has the eighth-largest economy. Sixty-two percent of the country is forested and less than 10% is considered arable. Brazil's carbon footprint ranks the country thirteenth in the world for contributing CO₂ to the atmosphere, China, the United States, and India rank 1, 2, and 3. Economic expansion by Brazil continually puts it at loggerheads with global environmental concerns because it would come at the expense of the rainforest, which has been described as the "lungs of the planet" (Rice 2019; WWF; CIA; De Bolle 2019).

Because of its size and location, the Amazon Rainforest is home to about 25% of the Earth's biodiversity and plays important roles in several of the planet's natural cycles that influence climate. Its plants and trees annually absorb 2 billion tons of carbon dioxide, approximately 5% of CO₂ emissions. Nearly 100 billion tons of carbon is stored in the Amazon's trees, which equates to almost 400 billion tons of carbon dioxide that is kept out of the atmosphere.

The Amazon is gradually losing its ability to recover from droughts and land-use changes and scientists worry it is approaching a tipping point where it will be replaced by grassland. It has already shifted from a CO₂ sponge to a CO₂ emitter. Eventually an additional 90 billion tons of heat-trapping carbon dioxide would be emitted into the atmosphere. As water evaporates from the tropical rainforest, the Amazon Rainforest also acts as a giant cooling system moderating temperatures and providing rainfall in South America and sub-Saharan Africa (Rice, 2019). As the Amazon Rainforest is defoliated, much of the Earth's Southern Hemisphere will be dramatically impacted (Fountain 2022, A5; NOAA 2021).

In Southwest Asia, a major global conflict region, temperature is increasing at nearly twice the rate of the world overall and temperatures are rising at a faster rate. By 2100, average temperatures there are expected to increase by up to 4° C degrees, exacerbating water shortages, creating enormous health risks for the area's people, and further undermining regional stability (Haas and Drukman 2021).

Meanwhile nations and corporations act as if there was an unlimited amount of time to adjust. None the world's leading economies, I repeat none, including the entire G20, is meeting carbon reduction commitments they made in the 2015 Paris climate agreement.

This is after climate pledges by Russia, Iran and Saudi Arabia were deemed "critically insufficient," pledges by Australia, Brazil, Canada, China and India "highly insufficient," and pledges by the United States, the European Union, Germany and Japan were ranked "insufficient." The only country to meet its target for carbon reduction was the African nation of Gambia, which already had an infinitesimally small carbon footprint. At the same time, according to the United States National Oceanic and Atmospheric Administration, in 2021 levels of methane gas in the atmosphere increased by the largest amount since measurements began. While there is less methane in the atmosphere than there is carbon dioxide, as a green house gas methane has a greater impact on global warming (Milman 2021; Zhong 2022).

Major companies continue to be guilty of practices that will decimate the human environment. Microsoft claims to be committed to a "carbon negative" future, but between June 2020 and June 2021, its carbon emissions rose by over 20% because of the construction and operation of new data centers and the manufacture and use of its electronic devices. The semiconductor industry is also highly energy intensive, a typical factory has a carbon footprint equivalent to a small city. While all-electric cars emit far fewer greenhouse gases than either gas-fueled or hybrid cars, they still leave a carbon footprint. Because they draw from the local power grid, if electricity is generated by coal-fueled plants, they could even have a greater carbon footprint than a hybrid car. Bitcoin is the cryptocurrency that hopes to pioneer a cashless and possibly greener financial future. The problem is that the greenhouse gas emitted while generating the electricity needed to power Bitcoin computers is greater than the amount produced by New Zealand or Argentina. A Bitcoin transaction has a carbon footprint equivalent to over 700,000 credit card purchases (Ewing and Boudette, 2021, A1; Zafar, 2019; China Water Risk, 2013; Tabuchi and Plumer, 2021, B5; Sorkin, 2021: B1; Eavis 2022, B3; SCOTUS Blog 2022).

Friday, April 22, 2022 was Earth Day. As the impending climate catastrophe draws closer, Earth Day in the United States has gone mainstream, becoming a feel-good holiday stripped of serious messages, much like Mother's day. The White House issued a Presidential proclamation declaring "For the future of our planet, for our health, and for our children and grandchildren, we must act now. Let us stand united in this effort to save our planet and, in the process, strengthen our economy and grow more connected to each other and the world we share." The U.S. Commerce Department Office of Sustainable Energy and Environmental Programs posted Happy Earth Day greetings on its website and its newsletter included photographs from its 2022 Earth Day Photo Challenge (White House 2022; U.S. Department of Commerce 2022).

In recent years, corporate America jumped on the Earth Day bandwagon in embarrassingly small ways. Schick introduced a new sustainable razor for people experiencing "Greentimidation." SodaStream

started a campaign to save a million baby sea turtles. Uber riders in Miami, Los Angeles and Washington can win free, nature-inspired rides. The Wrangler Westward 626 Earth Day jeans are made from organic cotton and feature eco-friendly finishes. BMW North America ran an ad featuring an all-electric car. Samsonite recycled used luggage as coasters (Napolitano 2022; Houston 2022).

Disney has an annual Earth Day celebration at its Animal Kingdom theme park outside Orlando, Florida to “honor the magic of nature through family-friendly experiences and specialty offerings.” The Earth Day specialty items Disney was selling included “water bottles, tumblers, reusable bags, and a limited-edition trading pin featuring Te Fiti from *Moana* and a cuddly plush inspired by the species that call Disney’s Animal Kingdom theme park home” (Disney 2022).

From the banal to outrageous, in 2019 the petro-company Koch Industries posted a video for Earth Day on its Facebook page celebrating the fossil fuel company’s “pollution prevention practices” with the line “You love the Earth. So do we.” In 2021, ExxonMobil, one of the all-time leading polluters and a spreader of climate denial misinformation for decades, released a video celebrating its eco-friendliness with claims that its employees are “work[ing] tirelessly to reduce emissions and move towards a low-carbon future” (Taft 2022).

Climate denial plays on a general public misconception of what is meant by a scientific fact. In colloquial language, a “fact” must be 100% true and unchanging, something that basically never happens. For scientists, a fact is something that is overwhelmingly supported by the evidence that we have available, but scientists are always willing to change what they consider to be facts if new evidence appears. For scientists, human induced climate change is a fact. For climate deniers, unless there is 100% certainty, they dismiss the fact of human induced climate change and the impending climate catastrophe as mere opinion and as an excuse not to take immediate action (Singer 2022).

Even if the world’s nations and corporations finally make deep cuts in greenhouse gas emissions, the risk of extreme wildfires will continue to increase. Scientists project a 14% increase in extreme wildfires by 2030, 30% by 2050, and 50% by 2100. These fires, once rare, are burning longer, hotter, and more intensely, making firefighting and fire control virtually impossible. By 2100, we will witness extreme wildfires in Arctic tundra as plant material now trapped in permafrost melts and dries. Previously wet regions like tropical rainforests in Indonesia and the Amazon will be at greater risk (UNEP 2022).

One of the reasons that the world’s dominant economic powers have treated climate change so cavalierly is that the burden of climate change falls hardest on the least developed economies and people living in countries with the smallest carbon footprint. They are not responsible for global warming, but suffer its worst consequences. The average American produces about 17.6 tons of carbon dioxide a year, almost ten times the carbon footprint of the average person living in India, although India ranks right behind the United States as the world’s third largest CO₂ emitter. Globally, the average CO₂ emission per person is 4.79 tons. In Vietnam the per capita CO₂ footprint is 2.2, the Philippines 1.22, Yemen .94, Sri Lanka .88, Pakistan .87, Bangladesh .47, Nigeria .44, Kenya and Sudan .33, Mozambique .21, Tanzania .18, Madagascar .12, Chad .11, and Mali .09. Vietnam, the Philippines, Sri Lanka, Bangladesh, Nigeria, Madagascar, and Mozambique each face severe coastal flooding. Yemen, Pakistan, Kenya, Sudan, Tanzania, Chad, and Mali record temperatures and desertification (Dennis, Mooney, and Kaplan, 2020; Worldometer).

Lagos, one of the fastest growing cities in the world where the population is expected to reach 25 million by 2050, is at “extreme” risk. The city is located on the Gulf of Guinea and as sea levels rise there will be coastal erosion and potable drinking water will be contaminated by seawater. Haiti will also be impacted by rising sea levels and the salinification of water needed for agriculture. Haiti is also especially vulnerable to hurricanes that will grow in intensity as the oceans warm (Princewill 2021; Climatelinks).

Manila in the Philippines is another densely populated coastal city that is already susceptible to flooding and has ineffective drainage and sanitation systems. Virtually the entire Philippines archipelago is at risk of flooding and salinification. Small island nations like Kiribati, Vanuatu and Tuvalu located in the Pacific Ocean and the Maldives and the Solomon Islands in the Indian Ocean are in danger of completely disappearing as sea levels rise (Amnesty International UK; Thomas 2020).

As temperatures heat and water dries up, wars have ripped apart countries in the Sahel region of Africa and in Yemen on the Arabian Peninsula as desertification has increased competition for already limited water supplies. These include the Darfur conflict where water scarcity pitted herders against farmers after rainfall was between 30-75% below expected levels. Fighting in Mali, Burkina Faso, Niger, Nigeria, Ethiopia, and Somalia where droughts displace millions of people is often attributed religious differences, but the clashes are often rooted in underlying climate changes that pit people against each other in competition for diminishing resources. Of 20 countries located in the Sahel region, at least 12 have been plagued by ongoing warfare (Law 2019; Mulhern 2020).

Extreme heat also affects the poorest and most vulnerable populations in the United States, especially older Americans. A study published in March 2020 estimated that between 2010 and 2020 as many as 12,000 people died each year from heat-related ailments, 80% of who were older than age 60. In

Houston, Texas, where the average temperature rose by more than 3.5° F between 1970 and 2020, sweat “pools” in the boots of Mexican-American day-laborers working outdoors in the hot and humid summer heat and many suffer from heat exhaustion. Because of what is known as the “urban heat island” phenomenon, Brownsville, Brooklyn, one of the poorest neighborhoods in New York City, has average daytime temperatures about 2° F higher than the city average because there are few parks and trees and asphalt pavement absorbs and hold onto the heat (Shindell *et al* 2020; Mohajerani, Bakaric, and Jeffrey-Bailey 2017; Senguata 2020).

The world is already seeing climate vast migration within and between countries. Almost 8 million people from Southeast Asia have already trekked to the Middle East, Europe, and North America. Millions of Africans have abandoned Sahel farmland and migrated to coastal areas. Semiarid regions of Guatemala in Central America will grow more desert like as annual rainfall there declines by as much as 60% and the push north into the United States, El Norte, will grow larger and larger. It is estimated that by 2070, about 20% of the currently inhabitable regions of the Earth will no longer being habitable, impacting billions of people. Parts of China and India will become so hot that people will die just by going outside. As climate migration increases more affluent countries, facing their own climate issues, will erect higher barriers to keep out the desperate, denying entry because climate migrants are not considered refugees under current international law (Lustgarten 2020).

Climate cycles, both long and short-term are natural consequences of geological history, but there is no question that changes since the start of the Capitalist Industrial Revolution in the 18th century are caused by human action and unregulated economic activity. Capitalists argue that when market conditions are right, new technologies will emerge to slow or ever turn back climate change, allowing human civilization time to adjust. However, it is questionable whether a globalized capitalist system with competing nation-states and corporations or technological innovations can effectively address climate change (Singer 2022).

I am most familiar with politics in the United States where a bill proposed by President Joseph Biden to cut U.S. greenhouse gas emissions to half of 2005 levels by 2030 was blocked in the U.S. Senate by Republicans who were joined by Democrat Joe Manchin (W.Va.) whose family business invests in power plants that use “dirty” coal, coal that is highly polluting because it contains large amounts of impurities. Meanwhile, the rise in gas prices because of the Russian invasion of Ukraine led to calls for greater fossil fuel production, further jeopardizing the environment, and in April 2022, the U.S. Interior Department announced it would sell the rights for additional oil and gas drilling on public land (Silverman 2022; Davenport 2022).

Something I find even more threatening to the future of the environment and the Earth, the United States Supreme Court, which has a rightwing anti-regulatory anti-science majority, is considering a case, *West Virginia v. Environmental Protection Agency*, that will decide whether the national or federal Environmental Protection Agency even has the legal authority to regulate greenhouse gas emissions and limit the climate impact of coal companies (Joselow 2022).

But increased fossil fuel production and a shift to highly polluted fuel sources did not just happen in the United States. As China’s economy slumped from the double-whammy of COVID-19 restrictions and oil and natural gas delivery interruptions following the Russian invasion of Ukraine, it increased the use of coal in its electrical power plants and importing of coal, including from Russia, despite international calls for a boycott. Prior to these decisions, China already was responsible for the largest increase in carbon dioxide emissions in 2021 (Sengupta 2022).

The debate in classrooms and the political realm should not be whether climate change is happening or how much it places human civilization at risk but over how societies and individuals must respond to stabilize climate and reverse the most damaging impacts and it cannot be limited to just academic discussion. In the United States, teachers are expected to promote responsible civic action as part of preparation for life in a democratic society. I suspect there are similar curriculum expectations in most if the economically developed liberal world and I would like to hear from you about what is permitted in your countries (NCSS 2013).

The alternative to climate action in the classrooms and in the streets is the iconic scene in the last frame of the 1968 movie *Planet of the Apes* where the character played by Charlton Heston breaks down after realizing that the planet they have landed on, a planet where human civilization has perished, is the Earth.

In 1967, Reverend Martin Luther King, Jr. posed the question “where do we go from here?” to American civil rights activists. We need to ask and answer they question about today’s climate emergency (King 1967). Our first job as teachers and academics is to LEARN and where possible to conduct research. Our second job is to TEACH about the climate emergency to help spur activism. We have a responsibility to PROPOSE climate solutions and to LOBBY for new laws. But we already know there are powerful forces aligned against us so we must be willing to join PROTESTS our selves and through our actions

REFUSE to be complicit with those who are destroying human civilization, always remembering there is NO planet B.

If you would like to read more about the Anthropocene, the climate emergency, and the science behind the impending climate catastrophe, consider my recent book, *Teaching Climate History: There is NO Planet B* by Routledge Press. I am not going to focus on the Greenhouse Gas effect and the science of climate change during this presentation, but I will if you ask follow-up questions (Singer 2022).

References

- Amnesty International UK. "Philippines Country Most at Risk from Climate Crisis," *Amnesty International UK*. <https://www.amnesty.org.uk/philippines-country-most-risk-climate-crisis>.
- BBC, 2020. "Arctic Circle Sees 'Highest Ever' Recorded Temperature," *BBC News*, June 22, 2020. <https://www.bbc.com/news/science-environment-53140069>.
- CIA. "Brazil," *The World Factbook*. <https://www.cia.gov/the-world-factbook/countries/brazil/>.
- China Water Risk. 2013. "8 Things You Should Know About Water & Semiconductors," *CWR*, July 11, 2013. <https://www.chinawaterrisk.org/resources/analysis-reviews/8-things-you-should-know-about-water-and-semiconductors/>.
- Climatelinks. "Haiti, At a Glance," *USAID*. <https://www.climatelinks.org/countries/Haiti>.
- Davenport, C. 2022. "Biden Plans to Open More Public Land to Drilling," *New York Times*, April 15, 2022. <https://www.nytimes.com/2022/04/15/climate/biden-drilling-oil-leases.html>
- De Bolle, M. 2019. "The Amazon is a Carbon Bomb: How Can Brazil and the World Work Together to Avoid Setting It Off," *Peterson Institute for International Economics, Policy Brief 19-15*, October 2019. <https://www.piie.com/publications/policy-briefs/amazon-carbon-bomb-how-can-brazil-and-world-work-together-avoid-setting>.
- Dennis, B., Mooney, C., and Kaplan, S. 2020. "The World's Rich Need to Cut Their Carbon Footprint by a Factor of 30 to Slow Climate Change, U.N. Warns," *Washington Post*, December 9, 2020. <https://www.washingtonpost.com/climate-environment/2020/12/09/carbon-footprints-climate-change-rich-one-percent/>.
- Disney. "An Earth Day Celebration at Disney's Wild Kingdom Theme Park," *Walt Disney World 50*. <https://disneyworld.disney.go.com/events-tours/animal-kingdom/earth-day-celebration/>
- Eavis, P. 2022. "Microsoft's Pursuit of Climate Goals Runs into Headwinds," *New York Times*, March 11, 2022, B3. <https://www.nytimes.com/2022/03/10/business/microsoft-climate-carbon-emissions.html>.
- Ewing, J. and Boudette, N. 2021. "Chip Shortage Creates Chaos for Car Makers," *New York Times*, April 24, 2021, A1. <https://www.nytimes.com/2021/04/23/business/auto-semiconductors-general-motors-mercedes.html>.
- Faget, J. 2020. "Portugal struggles to get forest fires under control," *DW*, September 24, 2020. <https://www.dw.com/en/portugal-struggles-to-get-forest-fires-under-control/a-55039934>.
- Fountain, H. "Study Finds Amazon Is Less Resilient to Threats of Drought and Logging," *New York Times*, March 8, 2022. <https://www.nytimes.com/2022/03/07/climate/amazon-rainforest-climate-change-deforestation.html>
- Guterres, A. 2022. "António Guterres (UN Secretary-General) to the Press Conference Launch of IPCC Report," United Nations, February 28, 2022. <https://media.un.org/en/asset/k1x/k1xcijxjhp>
- Hass, S. and Drukman, Y. 2021. "Israel Warming Up Almost Twice as Fast as Rest of World, Data Shows" *YNET News*, January 11, 2021. <https://www.ynetnews.com/environment/article/rjdyrxt8f>.
- Houston, A. 2022. "Earth Day 2022: Initiatives from Brands that Stood Out," *The Drum*, April 22, 2022. <https://www.thedrum.com/news/2022/04/22/earth-day-2022-initiatives-brands-stood-out>
- IPCC. 2022. "Climate Change 2022: Impacts, Adaptation and Vulnerability," *IPCC Sixth Assessment Report*. <https://www.ipcc.ch/report/sixth-assessment-report-working-group-ii/>.
- Joselow, M. 2022. "Supreme Court Leak Strikes Fear Among Environmental Lawyers," *Washington Post*, May 4, 2022. <https://www.washingtonpost.com/politics/2022/05/04/supreme-court-leak-strikes-fear-among-environmental-lawyers/>.
- King, Jr., M. L. 1967. *Where Do We Go from Here: Chaos or Community?* New York: Harper & Row.
- Law, T. 2019. "The Climate Crisis Is Global, but These 6 Places Face the Most Severe Consequences," *Time*, September 30, 2019. <https://time.com/5687470/cities-countries-most-affected-by-climate-change/>.
- Leonard, D. 2022. "Risk of Uncontrollable Wildfires Will Rise and Spread Globally, United Nations Warns," *Washington Post*, February 23, 2022. <https://www.washingtonpost.com/weather/2022/02/23/wildfire-increase-climate-report-united-nations/>.
- Lustgarten, A. 2020. "The Great Climate Migration," *New York Times*, July 23, 2020. <https://www.nytimes.com/interactive/2020/07/23/magazine/climate-migration.html>

- Milman, O. 2021. "Governments Falling Woefully Short of Paris Climate Pledges, Study Finds," *The Guardian*, September 15, 2021. <https://www.theguardian.com/science/2021/sep/15/governments-falling-short-paris-climate-pledges-study>.
- Mohajerani, A., Bakaric, J., and Jeffrey-Bailey, T. 2017. "The Urban Heat Island Effect, Its Causes, and Mitigation, with Reference to the Thermal Properties of Asphalt Concrete," *Journal of Environmental Management*, 197, 522-538. <https://www.sciencedirect.com/science/article/pii/S0301479717303201>.
- Mulhern, O. 2020. "Climate Change and Conflict in Africa," Earth.org, December 11, 2020. https://earth.org/data_visualization/climate-change-and-conflict-in-africa/.
- Napolitano, E. 2022. "How Brands are Celebrating Earth Day 2022," *AdAge*, April 22, 2022. <https://adage.com/article/marketing-news-strategy/earth-day-2022-brand-campaigns/2413326>.
- NCSS. 2013. *College, Career, and Civic Life (C3) Framework for Social Studies State Standards*. Silver Spring, MD: National Council for the Social Studies.
- NOAA. 2021. "Deforestation, warming flip part of Amazon forest from carbon sink to source," *NOAA Research News*, July 14, 2021. <https://research.noaa.gov/article/ArtMID/587/ArticleID/2778/Deforestation-warming-flip-part-of-Amazon-forest-from-carbon-sink-to-source?fbclid=IwAR3vo9Qgld1N6H8ODxnhffL3olgiHtlPeqmA58yQ4xfBFyN9ELHm2YQRoZA>.
- Pereira, J. 2020, January 7. "Madeira vulnerable to rising seas," *Madeira Island News Blog*. <https://www.madeiraislanddirect.com/blog/2020/01/madeira-vulnerable-to-rising-seas/>.
- Plumer, B. and Zhong, R. "Climate Change is Harming the Planet Faster Than We Can Adapt, U.N. Warns," *New York Times*, February 28, 2022. <https://www.nytimes.com/2022/02/28/climate/climate-change-ipcc-report.html>.
- Princewill, N. 2021. "Africa's Most Populous City is Battling Floods and Rising Seas. It May Soon Be Unlivable, Experts Warn," *CNN*, August 1, 2021. <https://www.cnn.com/2021/08/01/africa/lagos-sinking-floods-climate-change-intl-cmd/index.html>.
- Rathi, A. 2016, October 31. "Lisbon will likely be in the middle of a desert by 2100 if we don't mitigate climate change," *Quartz*. <https://qz.com/823360/lisbon-will-likely-be-in-the-middle-of-a-desert-by-2100-if-we-dont-mitigate-climate-change/>.
- Rice, D. 2019. "What Would the Earth be like Without the Amazon Rainforest?" *USA Today*, August 28, 2019. <https://www.usatoday.com/story/news/nation/2019/08/28/amazon-rain-forest-what-would-earth-like-without-it/2130430001/>.
- Santos, F. *et al.* 2004, January. "Climate Change Scenarios in the Azores and Madeira Islands," *World Resource Review*, v. 16 n. 4. <http://idlcc.fc.ul.pt/pdf/SantosEtalWRR2004.pdf>.
- Schädel, C. 2020. "The Irreversible Emissions of a Permafrost 'Tipping Point,'" *Carbon Brief*, December 2, 2020. <https://www.carbonbrief.org/guest-post-the-irreversible-emissions-of-a-permafrost-tipping-point>.
- SCOTUS Blog. 2022. "West Virginia v. Environmental Protection Agency," *SCOTUS Blog*. <https://www.scotusblog.com/case-files/cases/west-virginia-v-environmental-protection-agency/>.
- Senguata, S. 2020. "Here's What Extreme Heat Looks Like: Profoundly Unequal," *New York Times*, August 8, 2020. <https://www.nytimes.com/interactive/2020/08/06/climate/climate-change-inequality-heat.html>.
- Sengupta, S. 2022. "China Doubles Down on Coal," *New York Times*, April 19, 2022. <https://www.nytimes.com/2022/04/19/climate/china-greenhouse-emissions-climate.html>.
- Shindell, D. *et al.* 2020. "The Effects of Heat Exposure on Human Mortality Throughout the United States," *GeoHealth* 4 n. 4, March 26, 2020. <https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2019GH000234>.
- Silverman, E. 2022. "Climate Activists Protest in D.C.: 'Our Futures are at Stake'," *Washington Post*, April 22, 2022. <https://www.washingtonpost.com/dc-md-va/2022/04/22/dc-protest-earth-day-climate/>.
- Singer, A. 2022. *Teaching Climate History: There is No Planet B*. New York: Routledge.
- Sorkin, A. 2021. "It's Not Just Bitcoin that's Huge: So is it's Carbon Footprint," *New York Times*, March 10, 2021. <https://www.nytimes.com/2021/03/09/business/dealbook/bitcoin-climate-change.html>.
- Tabuchi, H. and Plumer, B. 2021. "No Tailpipe Doesn't Mean No Emissions," *New York Times*, March 3, 2021, B5. <https://www.nytimes.com/2021/03/02/climate/electric-vehicles-environment.html>.
- Taft, M. 2022. "7 Bonkers Corporate Earth Day Campaigns," *Gizmodo*, April 22, 2022. <https://gizmodo.com/worst-corporate-earth-day-campaigns-1848824703>.
- Thomas, A., Martyr-Koller, R. and Pringle, P. "Climate change and small islands: more scientific evidence of high risks," *Climate Analytics*, July 20, 2020. <https://climateanalytics.org/blog/2020/climate-change-and-small-islands-more-scientific-evidence-of-high-risks/>.
- Thunberg, G. 2019, January 25. Address at World Economic Forum: Our House is on Fire," *Iowa State University Archives of Women's Political Communication*. <https://awpc.cattcenter.iastate.edu/2019/12/02/address-at-davos-our-house-is-on-fire-jan-25-2019/>.

- TPN/Lusa. 2021, August 13. "Portugal one of the most vulnerable to climate change," *The Portugal News*. <https://www.theportugalnews.com/news/2021-08-13/portugal-one-of-the-most-vulnerable-to-climate-change/61659>.
- UNEP. 2022. "Spreading like Wildfire: The Rising Threat of Extraordinary Landscape Fires," *United Nations Environment Programme*, February 23, 2022. <https://www.unep.org/resources/report/spreading-wildfire-rising-threat-extraordinary-landscape-fires>
- U.S. Department of Commerce. 2022. Happy Earth Day!" *U.S. Department of Commerce*, April 22, 2022. <https://www.commerce.gov/news/blog/2022/04/happy-earth-day>.
- White House. 2022. "A Proclamation on Earth Day, 2022," *The White House*, April 21, 2022. <https://www.whitehouse.gov/briefing-room/presidential-actions/2022/04/21/a-proclamation-on-earth-day-2022/>.
- Worldometer. "CO2 Emissions Per Capita." <https://www.worldometers.info/co2-emissions/co2-emissions-per-capita/>
- WWF. "Amazon Facts," World Wildlife Federation <https://www.worldwildlife.org/places/amazon>.
- Zafar, R. 2019. "Apple A13 for iPhone 11 has 8.5 Billion Transistors, Quad-Core GPU," *wccftech.com*, September 10, 2021. <https://wccftech.com/apple-a13-iphone-11-transistors-gpu/>.
- Zhong, R. 2022. "Methane Emissions Soared to a Record in 2021, Scientists Say for The Second Year In A Row, Concentrations Of The Potent Planet-Warming Gas," *New York Times*, April 8, 2022, A17. <https://www.nytimes.com/2022/04/07/climate/methane-emissions-record.html>.
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Biography

Dr. Alan Singer, Ph.D., is a social studies educator and historian in the Department of Teaching, Learning and Technology at Hofstra University, Long Island, New York. He is a former New York City high school teacher and regularly blogs on *Daily Kos* and other sites on educational and political issues. Dr. Singer is a graduate of the City College of New York and earned a Ph.D. in American history from Rutgers University. His most recent book is *Teaching Climate History: There is NO Planet B* (Routledge, 2022). In the book he traces the Earth's climate history looking at natural cycles and transitions to explain the science behind impact of human caused climate change during the Industrial Era and the threat of an impending climate catastrophe. Dr. Singer is also the author of is the author of *Education Flashpoints* (Routledge, 2014), *Teaching to Learn, Learning to Teach: A Handbook for Secondary School Teachers, 2nd edition* (Routledge, 2013), *Social Studies for Secondary Schools, 4th Edition* (Routledge, 2014), *Teaching Global History, 2nd Edition* (Routledge, 2020), *New York and Slavery, Time to Teach the Truth* (SUNY, 2008), and *New York's Grand Emancipation Jubilee* (SUNY, 2018). He is the co-author of *Supporting Civics Education with Student Activism* (Routledge, 2021).

INVITED TALK

LEARNING BY WALKING. EDUCATIONAL EXPERIENCES IN THE OUTDOORS TO DEVELOP A (DESIGN FOR) SUSTAINABILITY MINDSET

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Abstract

The island of Madeira is attracting an increasing number of tourists from all over the world who are drawn to it by the lush diversity of its natural subtropical landscapes and ecosystems. With the local economy focusing most of its investments on the tourism sector, the island's biodiversity is already being endangered due to the increasing pressure on the balance between the cohabitation of humans and other living species (Bertolotti & Vezzani, 2021). Islands like Madeira are vulnerable territories and, as such, require the application of new methods and tools to help them transition towards regenerative and distributive systems that would make local economic growth more sustainable and ethically just towards nature, communities and ecosystems.

This talk will share some of the learning experiences we have been developing since 2018 through several international design research actions on the island, and in our teaching at the BA in Design at the University of Madeira. These include a series of exercises structured to train the designer's ability to change perspective with a post-anthropocentric sensitivity (Braidotti, 2016; Puig Della Bellacasa, 2017; Escobar, 2018; Fuad-Luke, 2022). Living and working on a peripheral and island territory allows us to observe and reflect on the challenge of sustainability and sustainable development from a unique angle. From an island perspective it is easier to think about boundaries, and therefore to visualise the aspects of circularity, interrelation and interdependence (Borgnino, 2022). In the context of design education for sustainability we consider it to be fundamental to reflect on the complexity of interrelations that exist among different natural elements and ecosystems. For this reason, our methods are based on the idea of learning outdoors in contact with nature, and bringing together people from different disciplinary backgrounds to develop, through the action of walking, a shared consciousness about challenges to a specific landscape and its communities (human, plant and animal). Finally, the talk is an opportunity to reflect with the audience on some of the challenges we encounter as (design) educators trying to switch towards a more bio-inclusive approach that would allow future generations to contemplate and build a more sustainable and just world.

Biography

Elisa Bertolotti works with storytelling, the moving image, and communication design. With a PhD and postdoc from Politecnico di Milano, she is currently teaching at the University of Madeira, Portugal. She considers that listening, poetry, having fun and collaborative making, play a central role in her work. At this time, Elisa is experimenting with ways of changing points of view in design in a post anthropocentric perspective, through forms of collaboration with different disciplinary fields, and using walking and movement outdoors as ways of learning.

Valentina Vezzani has got a PhD in Design, and a MSc in Service Design. She is Assistant Professor in Design at University of Madeira and co-founder of Paco Design Collaborative. Her research and teaching interests are in the field of strategic design, service design, sustainable development, social innovation. She believes in collaboration and participation as fundamental tools to solve today's problems, and design as a creative approach to build communication bridges.

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& Mariana Coronha*

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ORAL PRESENTATIONS

NEW PERSPECTIVES ON THE ACQUISITION OF LANGUAGE SKILLS

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Abstract

Reading, writing, speaking and listening – the four foundational skills of language learning have been constantly reassessed over time. When we learn a new language, we firstly learn to listen, and read then speak, and finally write. Therefore, traditionally, we consider that the student first acquires skills of receiving the newly acquired language (listening and reading) and, later, skills of producing that language (speaking and writing), thus gradually turning from consuming a foreign language, to delivering it. Thus, language teachers insist on practicing all four language skills to ensure that both the spoken (listening and speaking) and written (reading and writing) aspects of the language are developed at the same level. However, experiencing the pandemic with all the imposed major switches that needed to be done in education proved changes in the way communication skills are acquired under these specific circumstances. Our research, conducted with foreign students learning Romanian Language during the last academic year, made us understand that teachers need to adapt their teaching tools and cope with new challenges imposed by the reversal of the ratio between the volume of online or asynchronous activity and the onsite ones, according to the traditional model. At the same time, we need to consider the fact that both teachers and students have been forced to redefine and understand how public and private spheres interact during online courses. Nevertheless, through this article, our intentions are to analyze the way in which the students' perception on the way of learning foreign languages has changed due to new social imperatives that have tipped the scales in terms of acquiring oral communication skills to the detriment of written communication skills, but have also changed perspectives on other satellite skills needed for an effective communication such as cultural and social skills.

Keywords: *Language skills, distractors, communion, private discourse, public discourse.*

1. Premises

All the modern language teaching strategies take into consideration the four main skills that have to be registered in progress while the process of language acquisition is completing. In order to obtain an objective evaluation of this progress, the rates have been standardized according to four major skills: listening, reading, speaking and writing.

First of all we need to accept the fact that speakers constantly adapt their skills and, more than that, generations change their perspective on learning in accordance with technologies used in acquiring and refining these skills. Thus, in a retrospective view, we may see that mankind started with audio and experimental learning in contouring listening abilities, while reading or writing comprehension was not needed for a long period of time as written documents is to be associated with the economic, cultural and social evolution of the community. This first communicating skill triggered the second one, own observation about the world needing to be shared by means of speaking. Later, within expanding communities, the need for communication was getting more and more complex, this way reading and writing gained in popularity and turned from prerogative of the privileged classes/aristocrats to the fundamental right to education and the fight against illiteracy. Popularity of reading and writing started to grow as people's need of distance communication (either in space or in time) became of great importance in social interaction. Statistical data, registered in 1975, showed that adults spent 45% of their time in listening, 30% in speaking, 16% in reading, and 9% in writing (Weirauch, & Swanda, 1975). Consequently, all the four skills became compulsory in communicating by means of a certain natural language.

The evolution of communicating needs prove that the first two skills turned from skills uttered in direct interaction, to mediated interaction (radio, telephone, TV, internet, etc.), these ways registering not only a perpetual diversification of contexts for listening and speaking, but also a diversification of

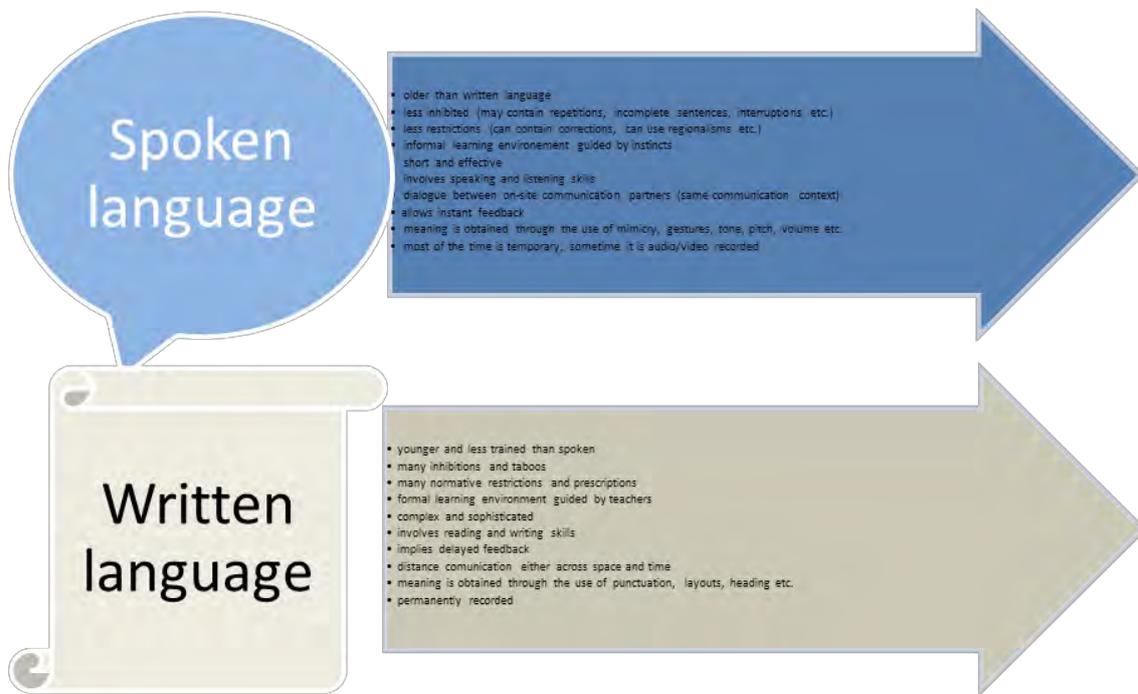
distractors needing either to be anticipated and prevented, or dealt with instantly in order to allow the transfer of information among participants.

As previously stated, the latter two skills (reading and writing) were meant from their very beginning to mediate indirect communication, thus supplying time or space gaps between speakers (Khan, 2021). The least spectacular evolution seems to be registered with the reading skills which represent the ability of interpreting and decoding signs; while the signs evolved from being engraved as cave walls representations and nowadays we can speak about signs on virtual walls, delivering online messages. Mankind started practicing reading while interpreting pictures marked on stone, then, as the writing systems diversified consistent with communicating needs it required more and more refined abilities in decoding messages. This way, numerous writing and encoding systems were created and the need to read/decode them expanded in accordance, till the peak when people understood that a worldwide known and accepted encrypting code is needed so as every speaker, no matter the languages he/she can utter, could be able to properly assign the same meaning to a predefined message, starting from traffic signs, to emoticons and so on.

Thus we can see that language skills can be associated to two fundamental groups: spoken skills – longer practiced in mankind history, and the first to be acquired independently – and written skills – more recent, and not of common use, needing specialized guidance.

All in all, if we are to summarize the literature analyzing language skills we can put it in a nutshell as presented in the chart below:

Figure 1. Synthetic view spoken/written language.



Considering the fact that the language skills are related to each other by both direction (in or out) and method of communication (spoken or written), we can see that they work in pairs from “consuming” the language, while listening and reading, to “producing” that language, while speaking and writing it.

Table 1. Input and output of language skills.

	INPUT/RECEPTION		OUTPUT/PRODUCTION
Spoken	listening	→	speaking
Written	reading	→	writing

Our main goal in teaching Romanian language to foreign students is to motivate them into stepping forward from consuming the target language at A1 level, to producing it. Nevertheless, the pandemic context made us re-evaluate our perspectives on the teaching-learning process, due to the fact that the tests applied to the students at the end of module A1 showed that they have successfully solved the listening and reading tasks, without any major barriers in correctly decoding the oral messages and the written ones, but failed in achieving maximum scores in speaking and writing tasks.

2. State of art

In order to better understand the differences between spoken and written skills in our attempt to anticipate and overcome difficulties that students can encounter while learning second or third languages, we need to accept the fact that digital practice (digital learning included) has changed people's attitude, in general, and students', in particular, towards communication, by leveling the differences between spoken and written as compared to the traditional/classical standards. For example, written language is supposed to be more strict and keen to regulations and norms, while spoken is generally accepted as free from restrictions as long as the speaker is subjected to different variables (state of mind, state of health, culture, education, practice, etc.) that represent arguments for breaking rules (either voluntarily or involuntarily). Still, the teaching practice of recent years has proved to us that written language in virtual media is rapidly cancelling the differences mentioned above due to the fact that people's need for instant, efficient and brief communication made them fusion. Thus we can see that virtual communication platforms allow interrupting speakers with written messages, in chat rooms, that are parallel to speaking sessions. Nowadays media favors both instant sending and withdrawing a written message, which was not to happen with traditional writing that was supposed to last as a proof. Thereby, the internet network facilitates real time communication either spoken or written. More often than not, written messages in instant communication are no longer complex and sophisticated, but rather short and effective, allowing instant feedback and most of the time being temporary – the send/unsend option being at hand for everybody. Simultaneously, the meaning is acquired somehow similar as in speech, through the use of paralanguage - mimicry, gestures, tone, pitch, volume etc. which are the attributes of the spoken are now comprised in images or emoticons that are to be the key in decoding messages, while traditional attributes of written messages, such as punctuation, layouts, heading, capitalizing, etc. are reevaluated with different utility or even ignored (coma, for example, is quite absent in instant messages).

When tackling the idea of inhibitions that were supposed to provide people from expressing themselves freely in writing, this is no longer an issue of virtual communication as the limits between public and private spheres were erased since the person either speaking or writing on virtual channels feel protected by their comfort zone, most of the time sending public messages from private backgrounds.

So, the key element we need to pay attention to in teaching is that the online activity has blurred the boundaries between public and private sphere (Meyrowitz, 1985), allowing the fusion of the two, consequently, students' interest in learning language issues that are not reflected into everyday practice is even lower than before the Covid 19 pandemic.

3. Study case

In designing the online language courses we had start from the fact that our students may interact with real life Romanian language either in direct interaction with native speakers or via YouTube, TikTok, individual blogs, etc. where natives speak and write freely and the odds for them to visit virtual libraries and get access to standard language through consecrated literature are less than those of them reading social media and watching vloggers on personal channels.

Therefore, the greatest challenge with virtual teaching and learning process throughout pandemic was to decide if standard language is to prevail in our teaching strategy or if we had to make a concession and get closer to the real language environment that students will feel alive and familiar with.

The real fact is that spoken language is rarely taught in classes, most of the language courses being designed to follow written aspects and literary language (Armstrong, & Ferguson, 2010). Nevertheless, there are numerous circumstances when students do not encounter, in real life conversations, certain utterances that are described as standard and they have difficulties in understanding everyday speaking which is, in fact, fundamental for their integration into students' community.

For example, there are a few Romanian numerals which differ in pronunciation so much when we compare their normative form to the real life speakers' utterance that are not re-cognoscible by students learning Romanian as foreign language. Numerals such as 11, 12, 13, 14, 15, 16, 17, 18, 19 are rendered in speech according to their written form, considering the fact that – at least in theory, according to linguistic customs – Romanian is a phonetic language. The real state of fact is that no native would ever pronounce these numbers in compliance to this regulation, even if they turn to the standard when writing official/public documents. Therefore, most often than not, our students hear UNȘPE [unSHpe], instead of UNSPREZECE, DOIȘPE [doiSHpe], instead of DOISPREZECE, etc. Even simple Romanian phrases, i.e. *Sunt acasă* (engl. *I am at home*) / *Nu sunt acasă* (engl. *I am not at home*), need to be presented to students in double version as they would never hear them at their fellow Romanian colleagues in the dormitories as they are taught at language courses. The frequency of popular way of expressing, i.e. *Îs acasă* or *S-acasă* / *Nu-s acasă*, put students into intriguing contexts, being forced, most

of the time, to fix in mind 2 variants: one to comply with faculty assignments, another to integrate in the age group and in the community of interests.

Based on these observations, we considered it necessary to consider among our teaching tools video and audio sequences that reproduce popular speech to create a close to reality linguistic environment for students to feel as familiar as possible to the real speaking contexts, but we had to emphasize that the written version of the Romanian language it is somehow strict and that the rules for drafting the texts which they will produce in order to address the authorities or to answer the examinations must be known and observed.

As a result of this approach, students were much more receptive to the reading and listening tasks, but also less reluctant to adopt the rules of standard language, as long as their need for phatic communion with their fellow Romanian students was met.

4. Conclusion

Even if online courses have swept the lines between public and private sphere, students can be motivated to respect each other's comfort zone and privacy so that the educational purpose of Romanian language courses is achieved, as long as the teaching strategies used in the design of the Romanian language course take into account their needs for communication and linguistic integration, but also cultural and social in the academic environment in which they will study in the coming years.

References

- Armstrong, E., & Ferguson, A. (2010). Language, meaning, context, and functional communication. *Aphasiology*, 24(4), 480-496. doi: 10.1080/02687030902775157
- Khan, H. (2021, April 11). *Online learning vs Onsite learning: Pros and Cons*. Message posted to pinnacleeducation.ae
- Meyrowitz, J. (1985). *No Sense of Place: The Impact of Electronic Media on Social Behavior*, N. Y.: Oxford University Press.
- Weirauch, J. D., & Swanda, J. R. (1975). Examining the Significance of Listening: An Exploratory Study of Contemporary Management. *Journal of Business Communication*, 13(1), 25-32. doi: 10.1177/002194367501300103

TEACHERS' MATHEMATICAL CONTENT KNOWLEDGE AND STUDENTS' PROGRESSION IN LEARNING OF FRACTION AND PROPORTION

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Abstract

Proportional reasoning causes considerable difficulty for students. One reason for this is, that a lack of basic understanding of fractions in earlier years, causes difficulties in the middle years. Moreover, learning of fractions and proportion is a long-term process and students encounter it continuously from grade 1 to 9. It is also difficult to teach, and teachers' mathematical content knowledge plays a crucial role in students' learning of mathematics. The purpose of this study is to analyse the effects of teaching, and the influence of teachers' mathematical content knowledge about fractions and proportion on students learning in progression from grade 4 and 5 to grade 8. The method contains pre- and post-tests for 86 students, classroom observations, checking students' written solutions and interviews of 35 selected students after the post-test. The intervention includes construction of educational materials (EM), teachers participating in seminars-training related to EM and teacher's implementation of EM. The EM contains tasks for students and a teachers' guide with aims and goals for teaching and a theoretical background. Tools for analysis were a methodological design, *Variation theory*, and a theoretical approach, *Mathematical Content Knowledge for Teaching*. In focus of the analysis was students learning in progression, related to variation and crucial aspects of learning. Findings from this study shows that teachers' mathematical content knowledge and their ability to identify the objects of learning and apply this in teaching is very important for students' learning and progression in their learning. Most students showed an ability to learn, but their performance was intimately linked to teachers' perception of the crucial aspects in teaching, and variation. Moreover, anomalies in students' perceptions of basic concepts caused obstacles in their learning. Some anomalies seem to have followed students from middle School to grade 8. Finally, the study illustrated how anomalies arise if misconceptions are not noticed by teachers. The outcome of the study can explain more about crucial steps in teaching and learning of fraction and proportion. The study pay attention to challenges in mathematics teaching.

Keywords: *Mathematical content knowledge, fraction and proportion, variation, progression and learning.*

1. Introduction

Many of the problems that students are supposed to solve, from middle school and on, are related to ratio and proportion. At the same time proportional reasoning causes considerable difficulty for the students (Dole & Shield, 2008). One reason for this is, that lack of basic understanding of ratio in early years may cause difficulties in the middle years and lack of ratio knowledge in adult life (Behr et al., 1992). According to Ohlsson (1988) proportion, ratio and fractions are connected to each other. At the same, learning of fractions is complicated because its "many related but only partly overlapping ideas" (p. 53). To sum up, fractions are a difficult to learn and learning of ratio and proportion is a long-term process that assumes a continuity from grade 1 to 9 (Hackenberg & Lee, 2015). As different aspects of fraction and proportion are introduced during different school years, usually by different teachers, there is an urgent need of a long-term planning to secure a continuity in teaching and learning. "In general, the researchers found that teachers with a relatively weak conceptual knowledge of mathematics tended to demonstrate a procedure and then give students opportunities to practice it. Not surprisingly, these teachers gave the students little assistance in developing and understanding of what they were doing" (Kilpatrick et.al., 2001, p. 377).

Since Schulman (1986) there are theories of *mathematical knowledge for teaching* and *mathematical quality of instruction*. However, like Ronda and Adler (2019) we do not find empirical answers to important questions: “It is a common view that teacher’s knowledge of mathematics relates to the mathematics made available to learn in instruction. However, there are only a few studies that provide empirical evidence and explanation of how this knowledge is implicated in instruction” (p. 257). Livy and Vale (2011) offer another interesting aspect of this. They start with Ma (1999) who emphasizes that in order to teach mathematics in a successful way, a teacher needs *a profound understanding of fundamental mathematics*. However, that is not enough. It also requires a capacity of identifying “mathematical components within a concept that are fundamental for understanding and applying that concept” (Chick et. al, 2006, p. 299). This means that teachers’ mathematical content knowledge plays a crucial role in in students’ learning of mathematics (Ball et.al., 2004; Livy & Vale, 2011).

2. The Present study

The purpose of the study is to analyse effects of teaching and teachers’ mathematical content knowledge about fraction, ratio and proportion, on students’ learning, from grade 4 and 5 to grade 8 in progression.

3. Theoretical approach and Design

3.1. Mathematical content knowledge and teaching

The concept of *Mathematical Content Knowledge* has by Ball, Thames and Phelps (2008), been split up into two main components *Subject Matter Knowledge* (SMK) and *Pedagogical Content Knowledge* (PCK). Moreover, SMK includes three different dimensions: *Common content knowledge* (CCK), *Specialised content knowledge* (SCK) and *Knowledge at the mathematical Horizon* (HCK) (p. 403). This means, that teachers need to understand mathematical concepts, as well as mathematical methods and connections between different part of school mathematics, to partition a content and adapt it to a student’s pre-knowledge and ability. This is in turn a condition for keeping a focus on “the object of learning” and to offer a suitable variation of the content, from a lower to a higher level of difficulty. At the same time, it is important to be aware of, that mathematics taught the during earlier school years, is often based on preliminary, more perceptible, concepts. It is important that such preliminary concepts are gradually developable into correct mathematical concepts. This means that it is not enough for teachers to understand the mathematics they are just teaching. They also need to understand it in such a way, that the content can be unpacked and developed during later school years (Hill et al., 2008). This makes demands on teachers’ ability to overview the progression in students’ learning from grade 1 to grade 9. Against this background, it is important to be aware of, that lack of mathematical content knowledge, like subject matter knowledge, can never be compensated by experiences from practice (Ball & Bass, 2000).

3.2. Variation theory and the object of learning

According to Marton (2015), learning takes place when a student is “capable of being simultaneously and focally aware of other aspects of a phenomenon” (p. 142). In other words, the purpose of teaching is to plan and carry through activities that make it possible for the student to “constitute the object of learning”. For learning to take place, some crucial aspects of the object of learning need to vary, while others need to remain constant. From a teacher’s point of view, this requires a good survey of and insight in the actual content as well as opportunities to identify students’ multiple conceptions of an actual phenomenon. If not, it is neither possible to present a content that enables students to find crucial aspects of the objects of learning, nor to offer them a relevant variation. This means that teachers’ SMK is crucial for their ability to teach and thus for their students’ ability to learn. This is the core of variation theory, and its application of teaching and learning in praxis (Marton & Pang, 2006; Marton, 2015).

Marton (2015) emphasizes that “the object of learning is constituted in the course of learning” (p. 161). To study how an object of learning is understood it is important to relate this to a certain aspect. Inspired by Pong and Morris (2002), researchers have chosen the following aspects: *The expected object* (EO1): What students are expected to learn. *The intended object* (IO): What teachers intend to teach according to the chosen object of learning. *The manifest object* (MO): How the object of learning is related to what really was mediated in the classroom. *The experienced object* (EO2): What the students experienced from teaching. By studying these aspects of the object of learning, it is possible to analyse the quality of interesting aspects of teaching and learning.

3.3. Design of the educational materials

To achieve the purpose of this study an intervention approach was used. The intervention assumed construction of educational materials, EM1 for grades 4 and 5 and EM2 for grade 8 (constructed by researchers), teachers' participation in a seminars-training connected to EM1 and EM 2, and observation of teachers work to implement it. EM1 deals with fractions as equivalent classes and extension of fractions, part-part, part-whole, whole-whole and explanations of how to apply ratio and proportion in problem solving (Suggate, Davis & Gouldning, 2009). EM2 deals with algebraic concepts of ratio and proportionality, and how to use algebraic concepts in problem solving (Ohlsson, 1988). The aim and goal of all tasks for teaching in the EM1 and EM2 are described in detail with focus on crucial aspects of the object of learning, variation of concepts and how to use them in problem solving.

4. Methods

4.1. Participants and data collection

The study included four classes and four teachers who were rated as highly successful by their principals: T1 (21 students) and T2 (20 students) from grade 4, T3 (19 students) from grade 5 and T4 (26 students) from grade 8. The classes were chosen from four schools situated in different suburbs of Stockholm. The reason for this choice of grades was, that rational numbers and proportion are formally introduced in grades 4 or 5 and that algebraic concepts of ratio and proportionality are more formally handled in grade 8. The study was implemented during five or six lessons. Two weeks before that, the teachers were invited to a seminar, where aims and goals were introduced, and the teachers got access to their EM1 or EM2. One week before the study was carried out in a class, the students got a pre-test. During the study all communication between teachers and students were recorded by video and with an extra microphone on the teacher. One week after the study the students got a post-test and a sample of them were interviewed. Collected data was transcribed, categorized, thematized and analysed according to a methodological design and a theoretical approach. The results were structured and categorized according to our four aspects of the object of learning (Pong and Morris, 2002).

5. Results

5.1. Observations of Teaching in grades 4 and 5

The EM1 for grades 4 and 5 contained tasks about extending fractions and fractions as equivalence classes. As an example, the students solved tasks about part-whole and extending of fraction. In this case the crucial aspect was, that when the whole is doubled (tripled), the part will also be doubled (tripled) like in $\frac{2}{3} = \frac{2 \cdot 2}{2 \cdot 3} = \frac{3 \cdot 2}{3 \cdot 3}$. To abstract (verbalise) this, students were expected to continuously explain and discuss this process. Teacher T1 was able to structure and carry out such a teaching with focus on the object of learning (IO). The teacher spent almost an hour to ensure that her students understood the basic concepts and after that the teaching went on without problems (EO2). In class T2 and T3, teachers had difficulties in perceiving the object of teaching (IO). In their teaching every single task was treated isolated from its concept and context. Obviously, teachers T2 and T3 were neither able to find the object of learning nor to offer their students any appropriate variation. The result of this was that instead of discussing the idea behind part-whole, extending of fraction or equivalence classes, students were encouraged to guess and after that filling in a number in the numerator when the denominator was doubled or tripled (EO2).

The quality of the communication between teacher and students (MO) was different in the three classrooms. Teacher T1 had focus on the content and guided her class gently towards the chosen objectives. The students were continuously invited to reason about how and why they obtained their answers (EO2). The communication in T2's and T3's classes was mainly student centred at the expense of content. They often questioned "How did you think?", however without any connection to the actual concept and context. In their communication it was more important that every student had a chance to give an answer than to give them adequate feedback to their answers. Moreover, many students were often answering at the same time and were often just guessing (EO2). One consequence of this was that students often took over the initiative and guided the communication in a wrong direction. Another consequence was that there were insufficient possibilities for a real discussion or reasoning (EO2).

5.2. Observations of Teaching in grade 8

The EM2 for grade 8 included tasks dealing with ratio in problem solving like "During a sale the prices were reduced with 10%. Bob paid 63 euro for a pair of shoes. What was the price before the sale?". The aim was to introduce and discuss the concept of proportionality in problem solving and different

possibilities to carry out the calculation with different methods (MO). However, teacher T4 directly established “that the best method was” to use the formula $x = \frac{630}{0,90}$ without any explanation of this method/formula and with no focus on the objects of learning or the concept of proportionality (MO). Moreover, there was no possibilities for students to reason about different methods during the lessons (EO2), and there was no variation at all (IO). The main teaching strategy T4 was in fact to discuss just one safe method, cross-multiplication, without explaining when, how and why to use it (MO).

An analysis of the communication in T4’s class shows (MO), that the teaching had no focus on the concept of ratio or proportionality. Moreover, most of the teaching was of a kind called “piloting”. For an example, teacher T4 wrote $\frac{2}{3} = \frac{x}{12}$ on the board and then asked: “How much is 2 times 12” followed by cross-multiplication: $2 \cdot 12 = 3x$. There was no space for students of drawing any conclusions themselves or to reason about different methods (EO2), because teaching T4 did not invite the students to such activities, just piloted them past the crucial aspects of the object of learning.

5.3. Students’ knowledge about fractions and proportion

5.3.1. Tests in grades 4 and 5 and 8. The pre-test in grades 4 and 5 showed that some of the students already had some knowledge about fractions and proportion, while most of them had more unstructured and confused perceptions. The post-tests showed that T1’s students solved most of the tasks correctly (EO2), while most of T2’s and T3’s students failed (EO2). A noteworthy observation, which got confirmed during the interviews is, that most students in class T2 and T3 really tried to solve the tasks, but did not understand the concept or context (EO2).

The pre-test in grade 8 showed, that most of the students were able to solve simple tasks on proportion and proportionality but had difficulties with problem solving that presume knowledge about fractions, ratio, proportion and algebraic concepts. The post-tests showed that students had a total focus on calculation, not on significance or concept. For example 11 av 26 students were not able to solve tasks like $\frac{2}{5} = \frac{6}{x}$ or solve a task like “A flagpole gives a shadow that is 6 meters long. Moa who is 1,50 meter tall gives a shadow that is 1 meter long. How tall is the flagpole?”. However, the most remarkable was, that none of the students made an outline of the situation with the flagpole. This result confirms what we observed during the observations and the interviews of students, a total focus on calculation, not on concepts or context (EO2).

Another interesting observation was, that many students in grade 8 had the same perceptions of concepts and the same types of misconceptions about fractions and proportion, that were found among the students in classes T2 and T3 in grades 4 and 5. Our interpretation of this is, that teachers T2, T3 were unable to perceive the students’ misconceptions. When teacher T4 met such students from middle School, T4 was not able to apprehend their problems. Consequently, the teacher tried to solve the situation by teaching procedural formulas fitting for solving predictable problems.

6. Discussion

The purpose of this study was to analyse the effects of teaching in relations to teachers’ mathematical content knowledge of fractions and proportion, and to the progression in students learning from grade 4 and 5 to grade 8. The study showed an obvious connection between teachers’ mathematical content knowledge and students’ learning and progression in learning (Ball et al., 2008). Most students showed an ability to learn, but their performance was intimately linked to teachers’ perception of crucial aspects in teaching, and its variation. In most classes, teachers’ mathematical content knowledge was not sufficient to implement EM1 or EM2, despite all preparation (Ball & Bass, 2000). Moreover, in most classes, the teachers offered a very limited space for students in reasoning and identifying the objects of learning and their crucial aspects (Marton, 2015; Pong and Morris, 2002). In addition, anomalies in students’ perceptions of basic concepts caused obstacles in their learning. Moreover, some anomalies seem to follow students from middle school to grade 8 (Hill et al., 2008).

7. Conclusions

To sum up, findings from this study show that teachers’ mathematical content knowledge and their ability to identify object of learning and apply it in the teaching with focus on mathematical concepts is of vital importance for students learning and progression in learning. Finally, the study also shows how anomalies in students’ conceptions may arise if teachers are not aware of earlier misconceptions. The outcome of this study can explain more about crucial challenges in teaching and learning of fraction, ratio and proportion and give support in developing teaching and learning in this area.

References

- Ball, D. L., & Bass, H. (2000). Interweaving Content and Pedagogy in Teaching and learning to Teach: Knowing and Using Mathematics. In J. Boaler (Eds.), *Multiple Perspectives on Mathematics Teaching and Learning* (pp. 83- 104). Westport, Conn: Ablex Publishing.
- Ball, D.L., Bass, H., & Hill; H.C. (2004). Knowing and using mathematical knowledge in teaching: Learning what matters. In A. Buffgler & R. Lausch (Eds.), *Proceedings for the 12th Annual Conference of the South African Association for Research in Mathematics, Science and Technology Education* (pp. 51-65). Durban: SAARMSTE.
- Ball, D. L., Thames, M. H., & Phelps, G. (2008). Content knowledge for teaching. What makes it special? *Journal of Teacher Education*, 59(5), 389-407.
- Behr, M., Harel, G., Post, T., & Lesh, R. (1992). Rational number, ratio and proportion. In D. A. Grouws (Eds), *Handbook of research on mathematical teaching and learning* (pp. 296-333). New York: Macmillan.
- Chick, H. L., Baker, M., Pham, T., & Cheng, H. (2006). Aspects on teachers' pedagogical content knowledge for decimals. In J. Novotna, H. Moraova, M. Kratka & N. Stehlikova (Eds.), *Proceedings of the 30th Conference of the International Group for the Psychology of Mathematics Education, Vol 2*, 297 - 304. Charles University in Prague.
- Dole, S., & Shield, M. (2008). The capacity of two Australian eighth-grade textbooks for promoting proportional reasoning. *Research in Mathematics Education in Australasia 2012-2015*, 10(1), 19 – 35. doi:10.1080/14794800801915863
- Hackenberg, A. J. & Lee, M. E. (2015). Relationships between students' fractional knowledge and equation writing. *Journal for Research in Mathematics Education*, 46(2), (pp. 196 – 243).
- Hill, H., Ball, D., & Schilling, S. (2008). Unpacking Pedagogical Content Knowledge: Conceptualizing and Measuring Teachers' Topic-Specific Knowledge of Students. *Journal for Research in Mathematics Education*, 39 (4), 372-400.
- Kilpatrick, J., Swafford, J., & Findell, B. (Eds.). (2001). *Adding it up: Helping children learn mathematics*. Washington: DC: National Academy Press.
- Livy, S. & Vale, C. (2011). First year teachers 'mathematical content knowledge: methods of solution for ratio question. *Mathematics Teacher Education and Development Journal* (pp. 22 – 43). Research Group for Australasia: Melbourne.
- Ma, L., (1999). *Knowing and Teaching Elementary Mathematics*. Mahwah New Jersey: Lawrence Erlbaum Associates.
- Marton, F., (2015). *Necessary conditions of learning*. London: Routledge.
- Marton, F., & Pang, M. F. (2006). On Some Necessary Conditions of Learning. *The Journal of the Learning Sciences*, 15, pp. 193-220.
- Ohlsson, S., (1988). Mathematical Meaning and Applicational Meaning in the Semantics of Fractions and Related Concepts. In J. Hiebert and M. Behr (Eds.), *Research agenda for mathematics education: number Concepts and Operations in the Middle Grades* (pp. 55-92). Virginia: National Council of Teachers of Mathematics. Lawrence Erlbaum Associates.
- Pong, W.Y., & Morris, P. (2002). Accounting for Differences in Achievement. In F. Merton and P. Morris (Eds), *What matters? Discovering critical conditions of classroom learning* (pp. 9- 17). Gothenburg: Gothenburg Studies in Education Sciences.
- Ronda, E., & Adler, J. (2019). Subject matter knowledge and the quality of mathematics made available to learn: some hypotheses. *Proceedings of the 43th Annual Meeting of the International Group for the Psychology of Mathematics Education*, 3, 257- 264.
- Schulman, L., (1986). Those who understand: Knowledge growth in teaching. *Educational Researcher*, 15(2), 4-14.
- Suggate, J., Davis, A., & Goulding, M. (2009). *Primary Mathematical Knowledge for Primary Teachers*. (Third Eds.). London: David Fulton Publishers Ltd.

COMPARISON OF BURNOUT LEVELS OF EDUCATORS/TEACHERS IN THE PRE-PANDEMIC AND PANDEMIC PERIODS OF COVID-19

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Abstract

Evidence suggests that the mental health and psycho-psychopathological consequences of the COVID-19 pandemic in the general population include an increase in symptoms of anxiety and depression, addictive behaviors, and psychological distress (Osváth, 2021; Galea, Marchant & Lurie, 2020). The prevention and mitigation of negative effects require the development and application of general and specific methods that support mental hygiene. Psychological distress due to the epidemic affects the risk of burnout in helping professionals, as it significantly increases the level of emotional exhaustion and depersonalization and reduces the feeling of personal effectiveness (Mion et al, 2021).

At the 2021 International Conference on Education and New Developments, we presented our research, in which we involved the staff of the Somogy County Pedagogical Service, mainly special education teachers. The 116-person sample was conducted with a version of the Maslach Burnout Inventory developed for educators (Maslach Burnout Inventory-Educator's Survey) in the pre-COVID-19 pandemic period. In our presentation, we present the results of a survey conducted in December 2021 with a large proportion of the study population. Based on our knowledge from the literature, we expected that the level of burnout would increase in the study population, despite the institution's mental hygiene and burnout prevention strategy, but our hypothesis was not confirmed. Subjects achieved the highest scores on the three subscales of the questionnaire in the emotional exhaustion subscale and the lowest scores on the depersonalization subscale in the present study. However, based on their answers to our question, 81% of respondents felt that the COVID-19 pandemic had a negative impact on their mental health.

Keywords: *Burnout syndrome, COVID-19 pandemic, mental hygiene, burnout prevention and intervention by teachers.*

1. Introduction

Abbreviations: COVID-19 = coronavirus disease 2019, World Health Organization

1.1. Impact of the COVID-19 pandemic on mental hygiene and burnout

Burnout syndrome is a change in your relationship to work that manifests itself in clinical signs of emotional exhaustion, depersonalization, and decreased personal effectiveness. It mainly affects those who work with emotionally saturated human relationships in the course of their work, so in addition to doctors, health professionals, pastors, and social workers, it can also have a significant impact on teachers (Bordás, 2010). The neurological, mental health, and psychological consequences of the coronavirus infection and the COVID-19 pandemic have become increasingly known over the past two years, with the help of research. Already during this first wave, researchers drew attention to the fact that the epidemic has not only acute and prolonged somatic, but also mental hygiene and psychological effects, as well as an increase in the incidence of psychopathological problems and mental disorders (Galea, Merchant & Lurie, 2020; Sher, 2020). We need to focus not only on learning about indirect and direct effects, but also on how we can prepare for the prevention and effective treatment of these effects.

1.2. Acute and long-term effects of coronavirus infection

Acute psychopathological complications of viral infection include organic psycho syndromes such as various disorders of consciousness and delirium (Osváth, 2021). Accurate identification of psychopathological symptoms in the acute phase helps to predict the prognosis and develop an adequate treatment plan for the patient (Rozzini, Bianchetti, Mazzeo et al., 2020). In addition to the long-term cardiovascular and pulmonary complications of coronavirus infection, attention should also be paid to the psychological and neurological consequences (Panariello, Cellini, Speciani et al., 2020). Stress

experiences associated with infection may present at the clinical level as anxiety, depressive disorders, and post-traumatic stress disorder (Rogers, Chesney, Oliver et al., 2020). In addition, fear of infection - or infection of others - pain, symptoms, and experiences related to hospital treatment, especially intensive care unit treatment, can cause significant distress (Sher, 2020). Significant psychological distress was observed among recovered patients, especially women and the elderly. Adequate emotional regulatory function plays an important role in coping with psychological distress and thus in overall recovery (Janiri, Kotzalidis, Giuseppin et al., 2020).

1.3. Mental health effects and prevention options in the COVID-19 pandemic

The uncertainty and unpredictability of the course of the COVID-19 pandemic is a significant anxiety-increasing factor. The associated constant sense of threat increases the level of stress both on an individual level and in general (Zalsman, Stanley, Szántó, 2020). The so-called “Coronary phobia” refers to an adjustment disorder in which symptoms include sleep disturbance, dizziness, loss of appetite, and abdominal discomfort (Asmudson & Taylor, 2020). The underlying causes of psychiatric symptoms include social isolation, insecurity, fear of deteriorating existential status, and unusual changes in living conditions (Osváth, 2021). According to a study by Czeisler et al. (2020) in the United States, psychological distress is primarily caused by anxiety about an infection, fear of losing one’s job, and financial problems. Risk groups for the psychological problems caused by the COVID-19 pandemic include the elderly, university students, the mentally ill, health care workers, families, and the disadvantaged living in poor conditions (Osváth, 2021).

The prevention and treatment of anxiety-depressive symptoms is aided by the acquisition and application of methods to improve emotional regulation, effective emotion management, and stress relief, such as relaxation techniques, yoga, meditation, and exercise (Taquet, Quoidbach, Fried et al. 2021). More broadly, improving the efficiency of mental health, psychiatric and addiction care systems, making crisis intervention services widely available may be a preventive strategy in a pandemic situation, but it would be essential to provide credible information on how to deal with the epidemic and to adapt to changing living conditions (Gunnel, Appleby, Arendman et al., 2020; Niederkrotenthaler, Gunnel, Arensman et al., 2020).

2. Goals

The aim of our research is to compare the burnout rate of teachers between the period immediately preceding the COVID-19 pandemic and the fourth wave of the epidemic in Hungary. The comparative study was carried out among the employees of a special public education institution - the Somogy County Pedagogical Service - as teachers. In both the previous and the current study, we used the teacher version of the Maslach Burnout Inventory (MBI, Maslach Burnout Inventory) questionnaire (MBI-ES). In the second study in December 2021, we supplemented this with a question about the impact of the pandemic on mental health.

3. Methods

3.1. Presentation of pedagogical specialist services

The task of pedagogical professional services in Hungarian public education, defined by educational management, is to contribute to the fair, high-quality, efficient, and effective operation of educational processes (Education Office, 2013). To ensure this, from birth to the end of compulsory schooling, support services are provided to clients of all ages, their parents, and teachers in nine areas of responsibility. These are: expert committee activities; special education counseling, early development and care; speech therapy care; educational consultancy; further education and career counseling; physiotherapy; conductive pedagogical care; school psychological and pre-school psychological care, and the care of highly gifted children and students (EMMI Decree 15/2013 on the operation of pedagogical professional service institutions).

3.2 Study participants

Employees of the Somogy County Pedagogical Service working as teachers participated in the study. At the time of the study, 171 people worked at the institution, 126 of whom completed the questionnaire. The youngest filler was 26 years old and the oldest 63 years old at the time of filling. There were 8 male and 118 female respondents.

3.3. Presentation of the test procedure

The survey took place in December 2021, only the staff of the Somogy County Pedagogical Service took part in it, the survey was conducted in the form of an online questionnaire. Sampling was

performed at random. All completed questionnaires could have been used in the study. Data were recorded in a Microsoft Excel spreadsheet, and these spreadsheets were used for analysis.

The *teacher's version of Maslach's Burnout Questionnaire* (MBI-Educator's Survey) was used in the study. The questionnaire consisted of 22 items, each scored between 0 and 6 points, depending on how often the respondent felt the statements (0: never - 6: every day). The questions of the questionnaire can be divided into three subscales: Emotional Exhaustion, Depersonalization, and Personal Accomplishment. The clinical questionnaire was supplemented by two questions in which we sought to answer the extent and direction of the COVID-19 pandemic in the mental health status of the respondents.

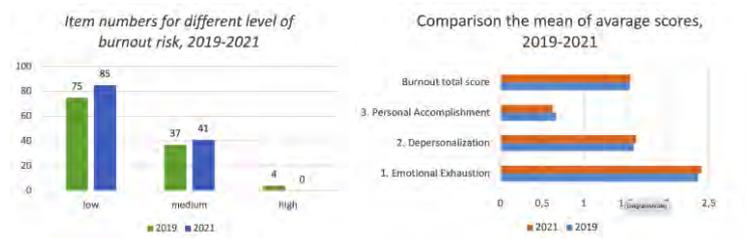
3.4. Research questions

1) Did the burnout level of the teachers of the Somogy County Pedagogical Service change during the COVID-19 pandemic? 2) Did the mean value of the emotional exhaustion subscale increase during the COVID-19 pandemic? 3) Does age affect the burnout level of teachers in the Somogy County Pedagogical Service in the 2021 study? 4) Did the COVID-19 pandemic affect mental health of the teachers of the Somogy County Pedagogical Service?

4. Results

The descriptive statistics of the obtained data is representative for the staff of the Somogy County Pedagogical Service. The 126 randomly selected individuals represent 73.68 percent of the study population. Upon evaluating the questionnaire, the results are classified into three categories based on the obtained total scores: low, medium, high risk of burnout/involvement. A comparison: burnout (left) and mean scores (right), in 2019 vs in 2021 is shown in Figure 1:

Figure 1. Different levels of burnout risk (2019 vs 2021) and average scores.

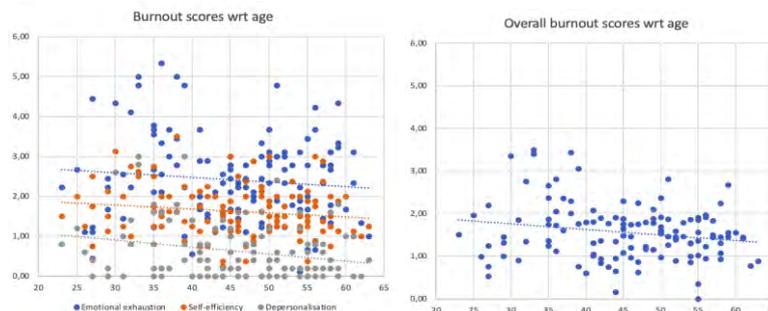


Thus, the answer to our first researcher's question is that the level of burnout of the teachers of the Somogy County Pedagogical Service did not change between the pre-COVID-19 pandemic period and the present-day pandemic period.

In response to the second researcher question, we conclude that the mean value of the emotional exhaustion subscale did not increase significantly during the COVID-19 pandemic.

Looking for the answer to our third research question – about examining the respondents' scores on the subscales in relation to their age - we concluded that age does not affect the level of burnout in any of the subscales and in the whole questionnaire: contrary to expectations, the result even improved slightly with age. The results can be seen in Figure 2:

Figure 2. Burnout values vs. age (subscales – left, overall – right).

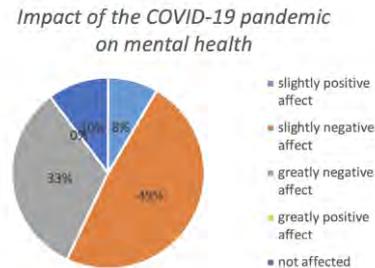


Analyzing the answers to the questionnaire in detail, we found that the highest mean value was measured in the following two questions of the Emotional Exhaustion subscale.

1. By the end of the day, I feel exhausted.
2. I feel like I work too hard.

Interestingly, according to the two supplementary questions, their (subjective overall) judgement is different. Corresponding to our fourth research question, the COVID-19 pandemic had a small negative effect on the mental hygiene in 49%, a large negative effect in 33%, small positive improvement in 8%, and no change in 10%. The results are shown in Figure 5.

Figure 3. Impact of the COVID-19 pandemic on mental health.



5. Conclusions

In our research, we compared between October 2019 and December 2021 the level of burnout of teachers of the Somogy County Pedagogical Service. During this period, an unexpected crisis, the COVID-19 pandemic, arose around the world. Based on the literature reviewed and our hypotheses, we also expected that the level of burnout in the institution would increase because of the pandemic. However, based on the responses to the Teacher Version of the Maslach Burnout Questionnaire, our study results have shown that the level of burnout did not change significantly, neither in the full questionnaire nor in the subscales. The level of burnout has not changed significantly with age either, it even decreased slightly in the case of older colleagues. In our supplementary question to the Maslach questionnaire, to assess the subjective extent and direction of their mental health status affected by the COVID-19 pandemic, 82% of respondents reported a negative change, only 10% reported slight improvement, and 8% felt being unaffected by the pandemic. In our view, the slight discrepancy between the results of the main questionnaire and the supplementary questionnaire indicates that, although working conditions have deteriorated significantly over the past two years, the level of burnout has not changed and has remained low in the institution, however, the private effects of the pandemic, the difficulties and losses within family significantly affects the subjectively judged mental health status of the employees. Therefore, the current institutional strategy should not focus on the psychoeducation of burnout, but on trauma processing, emotional support, and the reduction of anxiety.

From 2020, we launched an institutional mental health program at the Somogy County Pedagogical Service. As a part of this, lectures and workshops included psychoeducation about burnout syndrome to raise awareness of the symptoms of burnout and to help colleagues self-reflect on their own possible burnout. The program is ongoing. In addition, we organized individual counseling and, if necessary, therapeutic support for the employees, and we also launched autogenic training relaxation groups. The management of the institution gives special support to the programs of the member institutions and the whole institution with the intention of team building. Due to the impact of the COVID-19 pandemic on mental health, we will continue to prioritize further support for the latter in our mental health program in the coming period.

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References

- 15/2013. *EMMI Decree on the Operation of Educational Service Centers*. in Hungarian: 15/2013. EMMI rendelet a pedagógiai szakszolgálati intézmények működéséről. Retrieved May 23, 2021, from: https://net.jogtar.hu/j_ogszabaly?docid=a1300015.emm
- Asmundson GJ, Taylor S. (2020). Coronaphobia: fear and the 2019- nCoV outbreak. *Journal of Anxiety Disorders*, 70. (March 2020), 102196. Retrieved 01.12.2022., from: <https://www.sciencedirect.com/science/article/pii/S0887618520300104?via%3Dihub>

- Bordás A. (2010). Burnout syndrome in foreign and domestic literature. In Hungarian: A kiégés-szindróma a külföldi és a hazai szakirodalomban. *Educatio*. 19. (4). 666-672. Retrieved 01.20.2022., from: http://epa.niif.hu/01500/01551/00054/pdf/educatio_EPA01551_2010-4_Kutkozben3.pdf
- Czeisler MÉ, Lane RI, Petrosky E, et al. (2020). Mental health, substance use, and suicidal ideation during the COVID-19 pandemic: United States, June 24–30. *Morbidity and Mortality Weekly Report*. 69 (32). 1049–1057. Retrieved 01.22.2022., from: <https://www.cdc.gov/mmwr/volumes/69/wr/mm6932a1.htm>
- Galea S, Merchant RM, Lurie N. (2020). The mental health consequences of COVID-19 and physical distancing: the need for prevention and early intervention. *JAMA Internal Medicine*. 180. (6). 817–818. Retrieved 01.12.2022., from: <https://jamanetwork.com/journals/jamainternalmedicine/fullarticle/2764404>
- Ge F, Wan M, Zheng A, et al. (2020). How to deal with the negative psychological impact of COVID-19 for people who pay attention to anxiety and depression. *Precision Clinical Medicine*. 3(3). 161–168. Retrieved 01.13.2022., from: <https://academic.oup.com/pcm/article/3/3/161/5861360>
- Gunnell D, Appleby L, Arensman E, et al. (2020). COVID-19 suicide prevention research collaboration. Suicide risk and prevention during the COVID-19 pandemic. *The Lancet Psychiatry* 7(6). 468–471. Retrieved 01.13.2022., from: [https://www.thelancet.com/journals/lanpsy/article/PIIS2215-0366\(20\)30171-1/fulltext](https://www.thelancet.com/journals/lanpsy/article/PIIS2215-0366(20)30171-1/fulltext)
- Janiri D, Kotzalidis GD, Giuseppin G, et al. (2020). Psychological distress after COVID-19 recovery: reciprocal effects with temperament and emotional dysregulation. An exploratory study of patients over 60 years of age assessed in a post-acute care service. *Frontiers in Psychiatry* 11. 590135. Retrieved 01.22.2022., from: <https://www.frontiersin.org/articles/10.3389/fpsy.2020.590135/full>
- Mion G., Hamman P., Saleten M., Plaud B., Baillard C. (2021). Psychological impact of the COVID-19 pandemic and burnout severity in French residents: A national study. *The European Journal of Psychiatry*. 35. 173-180. Retrieved 01.17.2022., from: <https://www.elsevier.es/en-revista-european-journal-psychiatry-431-pdf-S0213616321000203>
- Niederkrötenhaler T, Gunnell D, Arensman E, et al. (2020). International COVID-19 Suicide Prevention Research Collaboration. Suicide research, prevention, and COVID-19. *Crisis* 41. (5). 321–330. Retrieved 01.21.2022., from: <https://econtent.hogrefe.com/doi/10.1027/0227-5910/a000731>
- Oktatási Hivatal (2013). *Megújul a szakszolgálati rendszer*. Retrieved 12.25.2021., from: https://www.oktatas.hu/koznevelés/projektek/tamop3110_oktatasiranyitas/projekthirek/megujul_szakszolgálati_rendszer
- Osváth P. (2021). Psychological Outcome of COVID-19 Pandemic. How can we prepare for a psychdemic crisis? In Hungarian: A COVID-19 pandémia mentálhigiénés következményei. Hogyan tudunk felkészülni a pszichodémiás krízisre? *Orvosi Hetilap*. 162. (10.) 366-372. Retrieved 01.14.2022., from: <https://akjournals.com/view/journals/650/162/10/article-p366.xml>
- Panariello F, Cellini L, Speciani M, et al. (2020). How does SARS-CoV-2 affect the central nervous system? A working hypothesis. *Frontiers in Psychiatry* 11. 582345. Retrieved 01.19.2022., from: <https://www.frontiersin.org/articles/10.3389/fpsy.2020.582345/full>
- Rogers JP, Chesney E, Oliver D, et al. (2020). Psychiatric and neuropsychiatric presentations associated with severe coronavirus infections: a systematic review and meta-analysis with comparison to the COVID-19 pandemic. *The Lancet Psychiatry* 7(7). 611–627. Retrieved 01.19.2022., from: [https://www.thelancet.com/journals/lanpsy/article/PIIS2215-0366\(20\)30203-0/fulltext](https://www.thelancet.com/journals/lanpsy/article/PIIS2215-0366(20)30203-0/fulltext)
- Rozzini R, Bianchetti A, Mazzeo F, et al. (2020). Delirium: clinical presentation and outcomes in older COVID-19 patients. *Frontiers in Psychiatry* 11. 586686. Retrieved 01.20.2022., from: <https://www.frontiersin.org/articles/10.3389/fpsy.2020.586686/full>
- Sher L. (2020). The impact of the COVID-19 pandemic on suicide rates. *QJM: An International Journal of Medicine* 113 (10). 707–712. Retrieved 01.20.2022., from: <https://academic.oup.com/qjmed/article/113/10/707/5857612?login=true>
- Taquet M, Quoidbach J, Fried EI, et al. (2021). Mood homeostasis before and during the coronavirus disease 2019 (COVID-19) lockdown among students in the Netherlands. *JAMA Psychiatry* 78. (1). 110–112. Retrieved 01.19.2022., from: <https://jamanetwork.com/journals/jamapsychiatry/fullarticle/2768363>
- Zalsman G, Stanley B, Szántó K, et al. (2020). Suicide in the time of COVID-19: review and recommendations. *Archives of Suicide Research*. 24. (4). 477–482. Retrieved 01.22.2022., from: <https://www.tandfonline.com/doi/full/10.1080/13811118.2020.1830242>

EXPLORING SELECTED SETSWANA DRAMA TEXTS AS THE PRINCIPLE OF UBUNTU/BOTHO IN EDUCATIONAL CONTEXT

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Abstract

Talking about the importance of Ubuntu/Botho in any educational system “Authentic humanism consists in permitting the emergence of the awareness of full humanity, as a condition and as an obligation, as a situation and as a project”. To inculcate a sense of values at schools, is intended to help young people achieve higher levels of moral judgement. This belief is that education does not exist simply to serve the market, but to serve society, and that means instilling in students a broad sense of values that can emerge only from a balanced exposure to the humanities as well as the sciences. Enriching the individual in this way is, by extension, enriching the society. This carries the involvement within the teaching and assessment of Setswana drama texts with third year (BEd) students. Ubuntu is a Nguni term while Botho is a Setswana term from the Southern African region that means a belief in a universal relationship of sharing that connects all humanity. The researcher takes note of the key element of Ubuntu/Botho, understood as “motho ke motho ka batho” (in Setswana). The English translation of this expression is “a human being is a human being because of other human beings”. The participants in this study were 24 BEd students from the language department. The comprehensive analysis includes data gathered from students: peer observation and interviews. Text analysis was used to analyse and interpret qualitative data obtained through interviews and observations with the aim of investigating the principle of Ubuntu/Botho in the characters of the two drama texts and how could students apply Ubuntu/Botho in their teaching to illustrate each theme.

Keywords: Drama texts, principles of Ubuntu/Botho, Setswana, educational context.

1. Introduction

The educational upshot of this paper’s argument is that South Africa’s educational policy framework not only places a high premium on Ubuntu/Botho, which it conceives as human dignity, but it also requires the schooling system to promote Ubuntu/Botho-oriented attributes and dispositions among the students. The drama text should form a meaningful whole. Students are advised to use an entire text rather than a section of a text. This is essential because the texts contribute to understanding the text, and an excerpt does not always depict the contexts adequately. The texts must relate to the theme dealt with, such as the elements of Ubuntu/Botho in selected drama text. The main point is the thinking reader who notices all the different factors that determine and influence written communication in the character i.e., tone, persuasive, power, purpose, target group, expertise, background, sources consulted, and responses.

Studying literature expands students’ knowledge of people, they learn to appreciate and understand the views and behaviour of others and to evaluate their own behaviour in relation to that of the characters in the text. Van Tonder (1994:54-60) explains that students should feel involved in what they are reading, this involvement is only possible if individual students experience the reading activity as something personal and if they have an opportunity to express what they feel about what they read.

According to Mangwegape (2019) it is important to determine the general behaviour of the characters in the selected Setswana drama texts as revealed through character’s actions and to what extent the characters maintain or contravene the core values and principles of Ubuntu/Botho. The characters as actors in the development of theme and conflict in drama texts be the key figures for the success or failure of the philosophy of Ubuntu in the above-mentioned drama texts where the student could discuss various works simultaneously in class. The best is to allow students to work in groups and to get each group to do a different drama textbook. Then give a set of general questions to be answered in the group (or by each individual group member).

2. Ubuntu/Botho as an educational value

Nkondo's concern about the role of Ubuntu/Botho in education should be noted that South Africa's Department of Education's (DoE) (2001:12) report, *Manifesto on Values, Education and Democracy* identifies ten fundamental values in the South African constitution that pertain to education. These are democracy, social justice and equity, equality, non-racism, and non-sexism, ubuntu (human dignity), an open society, accountability, the rule of law, respect and reconciliation. The report states that Ubuntu/Botho embodies the concept of mutual understanding and the active appreciation of the value of human difference (DoE, 2001:3). It posits that out of the values of Ubuntu/Botho and (human dignity) flow the practices of compassion, kindness, altruism and respect, which are at the very core of making schools places where the culture of teaching and the culture of learning thrive (DoE, 2001:14).

Another report of the DoE (2001:10), *Values, Education and Democracy* proposes that education should equip young people with values such as honesty, integrity, tolerance, diligence, responsibility, compassion, altruism, justice and respect which are deemed necessary for a democratic livelihood. The report states very clearly that the schooling system should actively promote these values. It posits that, and educational philosophy of a democracy should develop intellectual abilities and critical faculties among children and young adults in schools. It deems this necessary, first, because a democratic society flourishes when citizens are informed by a grasp of their history and of current affairs, where nothing is beyond question, and where ideas are explored to their fullest extent (DoE, 2001:6). Second the report states that such an educational philosophy should include all learners irrespective of their backgrounds

The following should be pursued when students are taught to disseminate the elements of Ubuntu/Botho to learners at school. Kuhn (1989: 89-92) states that:

- The emotional component should be developed. Students' affective (emotional life) development is enhanced by the fact that they enter or transfer themselves to the situations, feelings, thoughts, or actions of the characters in the text.
- Students should be able to verbalise their response to and their stance (attitude to, preference for or rejection of) towards the text. As readers, the learners' feelings are important, they are free to like or dislike a text, to attach their own interpretation to it.
- It is necessary to expand students' experiential world. They should be guided to notice relationships between the text and their life world, or between the text and other books to which they have recently been introduced.
- Students should eventually be able to read independently and to absorb, process and judge information from any text on their own.

This paper will discuss the elements of Ubuntu/Botho as depicted in the following drama texts: *Botsang Rre* (Ask my father) by GS Gaetsewe (1991) and *Kaine le Abele* (Caine and Abel) by G Mokae (1995). This paper will explore the extent to which characters maintain and /or contravene the principles of Ubuntu/Botho. It is therefore important to determine the general behaviour of the characters in the selected Setswana drama texts as revealed through character's actions and to what extent the characters maintain or contravene the core values and principles of Ubuntu/Botho. The characters as actors in the development of theme and conflict in drama texts be the key figures for the success or failure of the philosophy of Ubuntu in the above-mentioned drama texts where the teacher could discuss various works simultaneously in class. The best is to allow learners to work in groups and to get each group to do a different drama textbook. Then give a set of general questions to be answered in the group (or by each individual group member).

3. Literature review

Ubuntu/Botho articulates social interdependence and a deep rootedness in community (Adonis, 2008; Chachine, 2008). The notion of social interdependence is central to theologian and philosopher Mbiti's (1971) maxim we are because you are and since you are, definitely I am. As Eze (2016:192) believes that humanity is not embedded in a person solely as an individual but that it is also bestowed upon people in relation to those around them. Furthermore, Gade (2012:487) explore the view that Ubuntu/Botho is a moral quality of a person and phenomenon through which persons are interrelated. It is a kind of empathy, compassion and a divine element that warns people against doing evil. Letseka (2000:180) argues that Ubuntu/Botho has normative implications in that it encapsulates moral norms and values such as "altruism, kindness, generosity, compassion, benevolence, courtesy, and respect and concern for others". For Letseka (2000:188), persons living in communities that embrace Ubuntu/Botho would be marked by a commitment to treating others with a sense of Ubuntu/Botho, which entails treating them with justice and fairness. Broodryk (2002:13) conceives Ubuntu/Botho as a comprehensive ancient African worldview based on the values of humanness, caring, sharing, respect, compassion, and associated values. Ubuntu is particularly important to South Africa's young democracy where is struggling to comprehend the enduring legacy of

apartheid, which left it fractured and with no shared moral discourse. As Morrow (2007:7) points out, “apartheid was a form of the politics of difference in that it deliberately prevented the development of social cohesion and hindered the development of a shared moral discourse”. On the other hand, South Africa is attempting to mobilise its peoples to embrace the constitutional values of non-racialism, non-sexism, non-discrimination, and respect for freedom, human rights and dignity. Therefore, the promotion of Ubuntu/Botho through education is critical for South Africa given that the country has only just emerged from a political era that was marked by civil strife, racial segregation and discrimination, subordination and domination, and exclusion.

4. Methodology

4.1. Participants

The participants in this study were 24 BED students. Our comprehensive analysis includes several different sets of data gathered from students: peer observation and self-reflective statements, a focus group and interviews. All data were collected in accordance with an approved ethics protocol. We analysed all qualitative data according to the two prescribed drama texts: Botsang Rre (Ask my father) and Abele le Kaine (Abel and Caine), reflective practice and conceptual expansion, and looked for the principle of Ubuntu/Botho in the characters of the two drama texts and where students mentioned applying in their teaching. We each independently analysed the data, then together reviewed and agreed on the data we had coded to each theme and selected quotes to illustrate each theme.

5. Results and discussion

The peer observation of teaching activity allowed students to experience first-hand how the lecturer presented discipline-specific content and engaged students in the learning process. Observation enabled the lecturer to reflect on her own teaching practice, as the lecturer could relate the material and experiences to her own classroom. Students revealed changes on how the principles of Ubuntu/Botho could be implemented in their teaching and ways in which they intended to change, in their teaching.

Students found great benefit in being able to see the values and the principles of Ubuntu/Botho features in the two drama texts. Ten students spoke or wrote about the importance of disseminating the principles of Ubuntu/Botho to learners in schools enabling contextually meaningful reflection on their teaching for example:

Students showed by quoting examples from the Setswana drama texts that they can determine the general behaviour of the characters’ actions and to what extent the characters maintain or contravene the core values and principles of Ubuntu/Botho.

The exercise was also important in terms of the content... I think sharing contributes a lot with regard the principle of Ubuntu/Botho to the South African context. Within an Ubuntu environment, it is normal to donate to those with no income, the disabled, and influences the orphans in a spirit of sharing. I regard respect as one of the principles of Ubuntu. Respect applies to the way elders are treated, what I know is elders are regarded as wise people due to the knowledge they have acquired over the year. The principles of Ubuntu/Botho are maintained in the selected Setswana drama texts by showing respect. Thinking of that, the student is referring to Boikobo when he did not want to be rude to the Minister who was expecting a response from him when he was tying the knot. He responded by saying “ask my father.

If the characters in the drama contravene the principles of Ubuntu/Botho. For example, Boikobo’s father (the birth father) was selfish to send his children to Boikobo to take care of them. He knows very well that Boikobo has never approved Seikokobetso to be his wife, he never stayed with her after the marriage that was arranged by his father, suddenly, he sees three children that he does not know and told that they are his children.

Human rights is one of the principles of Ubuntu, humanness is protected by the highest legal authority, and he further says the constitution is characterized by its Ubuntu/Botho influences. I believe that Human Rights play a big role as far as the principles of Ubuntu is concerned. For example, in Botsang Rre (Ask father) Boikobo has the right to choose a partner for getting married. His father (Goitsenna) was adamant that Boikobo will marry Seikokobetso because according to his culture, fathers choose marriage partners for their children. It is heart-breaking because Boikobo does not have a say, instead he refers the answers that was asked by the minister to his father by saying ‘ask father’. In Kaine le Abele Pule, the elder brother to Katlego, hated his brother to the extent that he did not want Katlego to marry Jo-Anne because she’s white, he was influencing their mother not to accept Jo-Anne Katlego’s fiancé in their home. He was forgetting that, in Setswana we say: “Pelo e ja serati...” meaning the heart goes to the person you love, irrespective of colour.

The main characters fail to maintain the principles of Ubuntu/Botho, in the two selected drama texts. They both meet with disaster and tragedies as a result of a disregard for the core principles of Ubuntu/Botho.

6. Conclusion

In this paper, Ubuntu/Botho is a philosophy and a way of life that has held society together due to its beliefs practices, which have consequently put the main character at the centre of all things. There is a clear concept of morality in Ubuntu/Botho which contradicts the manner of behaviour which is often prevalent today. Ubuntu/Botho has values that are concerned with both the character and behaviour of a person in the drama texts. Furthermore, a person has rights to be respected, and is to be helped, protected, and shown compassion and love. There should be no discrimination when it comes to respecting these rights, one qualifies because one is a human person.

References

- Adonis, C.K. (2008, July). Trans-generational trauma and humiliation, its potential implications for political forgiveness in post-apartheid South Africa. Paper presented at the International Peace Research Association Global Conference, University of Leuven, Belgium.
- Broodryk, J. (2002). *Ubuntu: Life lessons from Africa*. Pretoria: Ubuntu School of Philosophy.
- Chachine, I.E. (2008). *Community, justice, and freedom: Liberalism, communitarianism, and African contributions to political ethics* (Doctoral dissertation, Department of Theology, Studies in Faith and Ideologies, Uppsala University, Sweden). Retrieved from <https://www.diva-portal.org/smash/get/diva2:172042/FULLTEXT01.pdf>
- Department of Education (DoE). (2001). *Manifesto on values, education and democracy*. Pretoria: Department of Education.
- Eze, M. (2016). *Intellectual history in contemporary South Africa*. Cham: Springer.
- Gade, C.B.N. (2012). What is Ubuntu? Different interpretations among South Africans of African Descent. *South African Journal of Philosophy*, 31(3), 484-503.
- Gaetsewe, G.S. (1991). *Botsang Rre*. Harrington House, Cape Town: Oxford University Press.
- Letseka, M. (2000). African philosophy and educational discourse. *African voices in education* (pp.179-193). In P. Higgs, N.C.G. Vakalisa, T.V. Mda & N.T. Assie-Lumumba (Eds.), Cape Town: Juta.
- Mangwegape, B.K. (2019). *Reflections of Ubuntu/Botho principles in selected Setswana drama texts* (Doctoral dissertation). University of the Free State.
- Mbiti, J.S. (1971). *African traditional religions and philosophy*. New York: Doubleday.
- Mokae, G. (1995). *Kaine le Abele*. Pinelands, Cape Town: Maskew Miller Longman (Pty) Ltd.
- Morrow, W. (2007). *Learning to teach in South Africa*. Cape Town: HSRC Press.

EXTRACURRICULAR ACTIVITIES IN TEACHING ROMANIAN LANGUAGE AS A FOREIGN LANGUAGE

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Abstract

Teaching Romanian as a foreign language is a new and challenging field of activity in education in Romania, a field that is growing with the arrival in our country of many students from neighboring countries or as far away as possible, people belonging to other cultures, civilizations, ethnicities, religions, which bring with them their own mentality and vision of the world. Formal and curricular activities are important for language, morpho-syntactic acquisitions regarding the Romanian language, but for the student to develop optimally and to integrate in the new society in which he entered to continue his studies, it is necessary to implement extracurricular activities complementary to the others. These are meant to develop students other skills necessary to continue their studies in a new country in educational contexts different from those in their home country by interacting with both Romanians and other colleagues as foreign to the Romanian language and culture as them. The projects and activities of linguistic and cultural integration of foreign students are defining for the development of the intercultural communication competence that must be developed for them. This paper aims to highlight the impact that extracurricular activities in the field of dramatic art contribute to the development of students both linguistically and from the perspective of expressing emotions, feelings in order to overcome the cultural blockages inherent in a foreign country.

Keywords: *Acquisitions, cultures, extracurricular, linguistically, mentality.*

1. Introduction

Extracurricular activities, by their very definition, presuppose some learning objectives, and, as long as they are well outlined, the educational function of these actions achieves its purpose, manifesting itself in plenary. When it comes to developing language skills, but also discursive and intercultural communication to foreign students, formal and non-formal content and activities must be alternated, and extracurricular activities are clearly highlighted in the non-formal sphere. These take place in well-defined coordinates, most often in the form of a project or independent activity. The present study highlights the way in which the Forum Theater, The Community Service Project or The Living Library contributes to the development of the intercultural dimension of communication, providing linguistic elements, but also attitudinal-behavioral discursive skills. The preparatory year for Romanian as a foreign language is an eloquent space for what we can call cultural diversity: "Cultural diversity in the educational environment is an extraordinary source of progress and innovation in terms of teaching methodology, but also pedagogical relationships and communication." (Pricope, M., p. 11). Thus, in such a context, the pedagogical mastery must take into account several variables, the extracurricular contributing to a real progress.

Forum Theater is a well-known non-formal method, which involves the idea of interactions between the actors, but also the possibility of sharing some concepts. However, this method, in order to be used in the case of B2 speakers, must be made accessible, simplified, adapted to the needs of foreign students. If in the case of the native speaker the method was addressed to a disadvantaged community, in the case of a foreign speaker, the method concerns him directly, not because he would be vulnerable, but especially because he more or less goes through a cultural shock due to unknown situations. Thus, the students bring on stage crumbs from everyday reality, concrete, life situations, sometimes harsh, all these metamorphosed from various angles. The foreign student can always intervene on artistically reflected behaviors, and that "STOP" can mean a reversal of the situation, the end being moralizing. The

conclusions drawn at the end could highlight the fact that if the decision-maker had been involved, the final situation would have been different. Therefore, the play resumes, the scenes are remade, the spectator students can be inserted in the story, they can be actors at any time, they can take over the coordinates of the action, so that they can see the best solution, the most suitable ending. The Forum Theater applied to foreign students, and not only, should not bring together the features of a real theater show, it is not even recommended to take place in a performance hall or to be done through interaction with professionals. This activity takes place in a classroom, familiar, decorated and personalized taking into account the particularities of the group, in which everyone can express themselves freely, without fear, to overcome some fears, some complex, to then integrate optimally into the adoption community. Interesting is the way in which the Forum Theater is applied, on the one hand, to the group of foreign students, and, on the other hand, to the group of native students/pupils, as well as to a heterogeneous group, consisting of both foreigners and Romanians. Surprising will be the perception of the foreigner towards the life situation he exposes, the situation lived in a foreign country, the way Romanians will perceive the same real situation exposed on the "stage" and the way the heterogeneous team manages to change the end, because it gathers subjective perceptions, objective perceptions, not involved, detached.

This method is a unique opportunity to speak publicly about a problem encountered in the context of reality, to develop oral expression, critical thinking, why not, to develop empathy, openness to the different, to accept it, to tolerate it, or, why not, to correct his mistakes. Thus, the ending can be different every time, thus generating civic behaviors, optimally developing communication skills and dramatization skills, contributing to the spontaneity and naturalness of the foreign speaker. The learning experience through Forum Theater is relevant because it relies on experiential learning contributing to the cohesion of the group, each finding easier its place, role, understanding, in the future, how to deal with problems, but also helping it to be more understanding with others that he considered perhaps insensitive to his situation, careless, passive, learning to think from another perspective. In this context, students not only face culture shock, but also become more responsible for what happens to them or what does not happen to them precisely because they did not take action at the right time or because they themselves had preconceptions, stereotypes.

The Community Service Project is another extracurricular, non-formal activity, also defining for language acquisitions, but especially for redefining the personality of foreign students in a different than familiar environment, when they have to integrate into another community, initially, the academic one, and, later, in the social one. Beyond the systematization of Romanian language skills, the project also comes with the development of management and leadership skills, because team members learn to communicate assertively with each other, interact to set roles at the group level, set goals / tasks, then some categories of activities that must be implemented within a well-established timeframe. They become, therefore, more pragmatic, more responsible, themselves for their actions, but also for those of their peers in the country where they arrived and with whom, more recently, they interact. The academic community that they form themselves becomes itself a context of learning. As the phrase that defines this type of activity also captures, The Project of Service Learning for the benefit of the community is a method that involves, in the case of foreign students, the systematization of Romanian language knowledge, also helping them to integrate in the community, optimally identifying and solving problems. Supported by teachers, students identify the needs of their community, initially analyze potential solutions, position themselves around a common goal, and act according to a plan. With the help of a reflection diary, the progress in learning is noted: how many new words in Romanian have been assimilated, what positive attitudes have been formed, what is the way of involvement at the community level.

The Living Library is a non-formal learning method that has been chosen to be used in preparatory courses for students in the Preparatory Year as a complementary method of systematizing language acquisition, but also to highlight the intercultural and multicultural dimension of learning. Through this project-type activity, respect for human dignity is promoted, attention is drawn to diversity in all its forms of manifestation, and dialogue between people is cultivated. The specificity of the Living Library is given by the fact that, on the shelves, the books are represented by people, in this context the students from the mentioned academic program who encounter preconceptions, stereotypes and who initiate a conversation or even more with the reader, detailing his story. The Living Library is a normal library, the reader-student borrows the book for an hour, reads it, establishes a dialogue with it and returns it to be borrowed by the next reader. When the activity of this type was designed, the learning objectives that became of the library were taken into account, the environment in which the action took place, the way of selecting the "book", promoting the elements in the library, establishing and scoring the degree of relevance that this method had on the works, but also on the lecturers.

2. Objectives

The paper aims to capture how some extracurricular activities also contribute to the development of oral and written communication skills, but also to the development of discursive communication skills, as they form attitudes, facilitating the expression of both foreign language ideas on which educators assimilate, as well as the expression of feelings that go beyond communication barriers, the impact that sometimes generates the inability to formulate an idea for fear of making mistakes. Often, when the student tries to express himself in the language he is learning from scratch, sometimes he feels the fear of not making a mistake, of not making disagreements, of not pronouncing erroneously. Therefore, The Forum Theater, as a non-formal method of cultivating certain attitudes and the service project, for the benefit of the small community, respectively of the group of students, contributes both to the acquisition of a casualness in expression, but also to the plenary manifestation of each personality, which in a foreign country, comes in contact with the Other who is different in terms of culture, religion, mentality. Thus, not only the idiom is unknown, but also the customs of the new people are an enigma, and, not infrequently, the traditions, the habits of colleagues, of those who study together are also unknown. Cohesion at the level of intercultural groups is more difficult to achieve, they are heterogeneous and extremely different, consequently, a common code of communication is not enough, the Romanian language, a multitude of cultural and emotional elements are needed, which foreign students must to find them in each other, but also in those in the local community with which they come into contact, with the native speakers. Therefore, the present case study proposed two categories of activities: extracurricular activities such as Forum Theater and Service Project for the benefit of the academic community, at a small level, of the group of foreign students and extracurricular activities such as Living Library and impact projects, in collaboration with native speakers, so that they feel an integral part of the adoption community as well. Thus, these types of activities have as objective an initial integration in the academic group in which any student carries out their daily activity and a subsequent integration in the social environment in the country where they arrived, in this case, in Romania. Intercultural communication theorists Samovar L. and Porter R. consider the interpersonal environment to be all the more relevant when it comes to developing intercultural competence, as a culture learns, focuses on symbol, perpetually metamorphoses.

3. Methods and results

The three types of extracurricular activities presented above were attended by the 50 students from the Preparatory Year of Romanian as a Foreign Language, during the month of May, from the academic year 2020-2021. The methods were applied towards the end of the academic year for students in the Preparatory Year, when they have already reached the language level B1, B1+. All three categories of activities aim at systematizing the knowledge of the Romanian language, as well as the development of life skills, intercultural communication, discursive skills, project management, but also group management. The greatest needs of these educators are those related to integration, socialization, transcendence of language barriers, fears.

The Forum Theater targeted the five groups of 10 students, the teams were created randomly, using 5 colors red, yellow, blue, white, purple. Each student drew a ticket and, depending on the color selected, it was associated with the intended group. For all the groups, a problem was formulated for their members to represent on the "stage": I. A foreign student encounters difficulties with the native speakers, because, still, he does not know the Romanian language, and also no language of international circulation, reaching to avoid contact with them and becoming isolated; II. A Congolese student cannot adapt to the conditions in the dormitory, she has a different time zone in her home country than that of her roommates, she often gets into conflict situations with them because they constantly have different activities and cannot rest, they learn some because of others; III. A student from Egypt considers the administrative rules in Romania far too complicated and often gets into problematic situations with public servants; IV. A student came later to classes for objective reasons and faces hostile attitudes from colleagues who are impatient with him to regain his language skills, he tends to isolate himself; V. Students of the Muslim religion find that there is no place of worship for their religion in the city where they are going to study and they acutely feel this lack, they feel misunderstood, they consider this aspect defining for them and cannot conceive of deviating from the weekly home routine. The five problem situations were assigned to each group, each of the students who was initially a spectator had the opportunity to intervene and become an actor. The problem situation did not target any of the team members, so that any dose of subjectivity is eliminated, the educators can think detached, not directly involved, which is the optimal solution for resolving internal or external conflicts of the main actors. Satisfaction was commensurate with the involvement because the "songs" were performed many times until the end was a satisfying one,

and the students in the "stories" were optimally integrated into the adoption society. The activity had a second part, more concentrated, the five teams had among the members not only foreign students, but also native speakers, from partner institutions in Romania, who had in turn, both the role of the spectator and the role of the protagonist for to observe the difference between the end obtained by the teams made up only of foreign students and the one obtained both by the heterogeneous teams. It was found that the involvement of native speakers changed the end to a small extent, the purpose being to integrate everyone in society among other foreign students, but also among locals only that the mentality and vision of those who are part of the adoptive community differed. They clarified, thus, that some perceptions of foreigners may be related to prejudices, stereotypes, or even a false impression, things easily knowing an adequate solution.

The Living Library is a selected method to complete the didactic strategy to develop skills of foreign students, intercultural, discursive, but also to determine a change in vocabulary, but also in the sphere of fluency in communication. The five teams described above in this study also participated in this activity, except that in this context 5 of the teammates are the lecturers and the other 5 are the books. In order for the teams to gain consistency, each team level determined how they divided their roles. The students briefly presented their experience, life, so that the book in the library is relevant to the learning objectives of this action. Each team had, therefore, a book that highlighted the success in one field, another that surprised the failure and the constructive way to start again, the third "work" focuses on the life of a student who has adapted very easy to the conditions imposed by the new climate, the fourth visa unadapted to the current environment and the diligent efforts to integrate, the fifth "book" captures the life of a student who came from another continent and talks about his large successful family at home, himself wanting to follow in the footsteps of his father and siblings to embrace his medical career.

The Living Library was an opportunity to observe how students are able to present their stories in the language they have recently learned, how they have made their speech accessible so that they can be understood by others. Also, each of the five readers had a personal view of the book they were reading, when they exposed the content of the book and could see differences in perspective generated either by the way they understood the story from the "book" read, or the way in which they perceived the meaning of the terms in Romanian. At the end of the activity, a joint activity was carried out with the 50 students, each of them presenting the impressions from this type of action, the lesson learned, as well as the words assimilated during the meetings within this activity.

Learning through Community Service Projects is relevant both for the sedimentation of Romanian language knowledge and for the development of project management and leadership skills. The five teams had the mission to meet to assign roles at the group level, then identify the problem at the community level, the causes and effects. Subsequent meetings focused on formulating the project idea, designing objectives and setting activities. The five teams had the following project ideas: I. Creating a relaxation space for the breaks from classes; II. Arranging a garden in the space outside the space where the courses take place; III. Providing a defining space for the image of their group with relevant aspects of learning throughout the year; IV. Equipping a mini-library with books from Romanian and mother culture; V. Arranging a place where students can leave letters/ notes with their wishes on how to improve the life of a foreign student in Romania, in Galați, suggestions, hopes that will be sent later to the competent people who can generate a change in this regard. At the end of the two weeks, during which the 5 teams had the task to formulate the project idea but also to implement it, they received a Reflection Journal to capture the linguistic, behavioral, attitudinal, group and project management acquisitions. The reflection journals can be kept to themselves or shared with others in the final stage.

REFLECTION JOURNAL

1. What are the 10 important words of the Romanian language that you used frequently during the meetings with the project team?
.....
.....
2. What did you find out about yourself as a member of a project team? What was your role?
.....
.....
3. What has been the change you have made in the community with your team and what are the benefits for the whole academic group?
.....
.....

4. Make a top 10 of the values promoted by your team in the implementation of this project.
.....
.....
5. What did you learn new about the Other different from you, whether he is a native speaker of the Romanian language or a foreign speaker like you, in the interactions within the activities proposed at extracurricular level?
.....
.....

4. Conclusions

In conclusion, extracurricular activities such as Forum Theater, Living Library, Community Service Learning Project contribute to the sedimentation of Romanian language skills, level B1 +, B2, developing, equally, life skills necessary for foreign students both their socio-linguistic integration in the academic community, but also in the new social community with which he came into contact. They also acquire emotional comfort, well-being, overcome linguistic and ethnic barriers, realize the uniqueness of each, but also the natural diversity that surrounds them and that has become more than ever part of their lives. Critical thinking, empathy, tolerance, self-respect and fellowship are also values cultivated through these actions which also aimed at cultivating a strong intercultural component.

References

Dițulescu, I., Tudorache A. L., Colceag C., Neagu M., Ionescu D., (2010) Teatru Forum pentru comunitate. Metodă nonformală de intervenție în lucrul cu grupuri dezavantajate. București.

Nicola, I. (1996). Tratat de Pedagogie Școlară. București: Editura Didactică și Pedagogică.

Pânișoară, I. O. (2004). Comunicarea eficientă. Metode de interacțiune educațională. Iași: Polirom.

Pricope, M. (2018). Dezvoltarea competenței de comunicare interculturală a studenților străini – Factor al comunicării eficiente în mediul educațional. București: Editura Universitară.

Peterson Brooks. (2004). Cultural Intelligence: A guide to Working with People from Other Cultures. Maine, USA: Intercultural Press.

Risager, K. (2007). Language and Culture Pedagogy: From a National to a Transnational Paradigm, Buffalo, New York: Multilingual Matters.

EMPOWERING PRINCIPALS TO LEAD AND MANAGE PUBLIC SCHOOLS EFFECTIVELY IN THE 21ST CENTURY

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***“Education is the most powerful weapon which you can use to change the world”
(Nelson Mandela, 1994)***

Abstract

Globally, education systems have been affected by radical social, political and economic changes. Although school principals play a pivotal role in improving student learning and attaining educational outcomes, they work under strenuous conditions to deal with multifaceted transformational issues. Principals experience great difficulty in coping with numerous changes, partly because they are inadequately prepared for their leadership position, or simply lack the necessary skills, knowledge and attitudes to lead and manage schools effectively and efficiently. Fundamentally, principals should be empowered to effectively deal with challenges facing them in the 21st century. Using qualitative research, this study explored the importance of promoting a culture of professional development that will prepare principals to confront education challenges and obstacles facing them. Fifteen principals were selected to determine their perceptions and experiences of how they were prepared and professionally developed to lead and manage schools. Findings revealed that in South Africa, there is no formal preparation for aspiring or practicing principals taking on leadership and management positions, and very few in-service professional development programmes are available. There is a dire need for education authorities to introduce compulsory training and development programmes for aspiring and practicing school leaders to lead and manage their schools successfully.

Keywords: *Change management, continuing professional development, curriculum leadership, instruction, principalship, professionalization, qualifications, training.*

1. Introduction

In many emerging economies in developing countries, substantial investments have been made in education, with the hope of generating a highly skilled labour force and high proportion of employment. Despite these investments, there is growing concern globally that many public schools are not functioning at their optimum, and that learner performance is generally of a low standard. However, many nations around the world have undertaken wide-ranging reforms of curriculum, instruction, and assessment, with the intention of better preparing principals for the educational demands of life and work in the 21st century (Bush, 2005; Russell & Cranston, 2012). The rapid rate at which changes have taken place, and are still taking place, together with the increased volume of administrative work, has placed principals under enormous pressure (Kinney, 2009). Managing change is complex, and usually an elusive process. Perhaps one of the major changes in the principalship has been the range of expectations placed on them and these expectations have been moved from the demands for management and control to the demand for an educational leader who can foster professional development among staff (Mestry & Grobler, 2004; Steyn, 2002). Bottery (2016:98) argues that principals find themselves working extra hours, “not just on weekday evenings but also at weekends and during school holidays, [...] where the job becomes unsustainable if they do not”.

Many practicing principals lack basic leadership and management training prior to and after their entry into principalship (Bush & Oduro, 2006; Heystek, 2016). Tsukudu and Taylor, (1995, cited in Bush & Oduro, 2006:362) assert that “head teachers come to headship without having been prepared for their new role. As a result, they often have to rely on experience and common sense”. However, such are the demands being made upon leaders and managers now, including head teachers, that acquiring expertise

can no longer be left to common sense and character alone; leadership and management development support is needed (Bush & Oduro, 2006; Mestry & Singh, 2007).

Principals, head teachers and deputy principals are normally held accountable for students' academic performance. Goslin (2009) argues that principals tend to overlook their responsibilities of curriculum or instructional leadership, because they are not fully aware of their primary task, or they are too busy attending to their administrative duties, and either resolving conflicts among role players or maintaining student discipline. There is thus a dire need for principals to be empowered and professionally prepared for their roles as heads of schools, and to continually enhance their skills, attributes and competencies through structured continuing professional development (CPD) programmes.

2. Aim and objectives of the study

The primary aim of this study was to explore the perceptions and experiences of practicing principals of their professional development, and how this enhanced their leadership roles. This aim was encapsulated by the following objectives, namely to:

- advance a clear understanding of continuing professional development and its importance for principals; and
- empower principals to become effective leaders as a result of gaining access to and participating in formal CPD programmes.

3. Research design and methodology

An interpretivist qualitative research methodology brought to the forefront the varied experiences and perceptions of principals of their preparation for leadership positions and participation in professional development programmes. Standardised open-ended qualitative questionnaires followed by individual interviews were the main data-gathering tools used to explore the unique nature of principals' experiences and perceptions of CPD. The standardised open-ended interviews were structured in terms of the wording of the questions that allowed the participants to contribute as much detailed information as they desired (Gall, Gall & Borg, 2003; Kvale, 2007). The individual interviews allowed the researcher to clarify participants' responses and to delve deeper in order to gather data-rich feedback from the sampled principals (Creswell, 2007). The interviews allowed principals to communicate areas of concern about their professional development and provided the researcher with opportunities to request clarification. Purposive sampling methods were used to select fifteen principals of public primary and secondary schools in three education districts in the Gauteng Province of South Africa: Gauteng West, Gauteng East and Johannesburg Central. The sampled participants included males and females who had served as principals for more than three years at these schools. These principals headed schools that were situated in inner cities, townships and affluent suburbs.

Data were analysed for content, broadly using Tesch's method of open coding (Creswell, 2014) to identify themes or categories. Tesch's method provided a systematic approach to the analysis of the qualitative data. The data was reviewed to establish value, depth and richness. Data was analysed by reading the transcriptions, giving attention to patterns and commonalities, while validity was established. The data was then linked with the research aims and objectives, to establish whether these had been achieved. Lincoln and Guba's (1985) norms of trustworthiness, namely, credibility, transferability, dependability, and confirmability (Shenton, 2004) were considered relevant for this study. Prolonged engagement, triangulation, member checks and peer debriefing were used to promote confidence that the researcher had accurately recorded the phenomena under investigation (credibility). Transferability was addressed through purposive sampling and through the provision of rich descriptions, which allowed the researchers to gain a proper understanding of the phenomenon under investigation. Regular checks were done with the participants to ensure the accuracy of data collection (member checks), that is, transcription of interviews was given to each participant to verify (Shenton, 2004).

4. Discussion of findings

The findings indicate that leadership preparation and training are central to school effectiveness and school improvement. The participants unanimously agreed that they were appointed as principals without having any professional training or formal preparation for their principalship position. In South Africa, there are no rigorous criteria for educators to be appointed as school principals (Bush, Kiggundu & Moorosi, 2011; Townsend & MacBeath, 2011). Currently, South Africa is one of the few countries that do not require a compulsory and specific qualification for principalship (Van der Westhuizen & Van

Vuuren, 2007), unlike countries such as the UK and US, that have national qualification structures in place (Quong, 2006; Walker & Qian, 2006. This implies that a post level one teacher may be appointed as principal on the recommendation of the school governing body (SGB), without having any leadership and management qualifications or experience (e.g. passing through the ranks of head of department or deputy principal).

The Ministry of Education has made numerous attempts to raise the professional standards and competencies of school principals by formulating the South African National Professional Qualification for Principalship (DoE, 2004). This draft policy identifies several key principles that ought to inform a national professional qualification for existing and aspiring principals. More recently, the South African Standards for Principalship (SASP) (Department of Basic Education (DBE), Republic of South Africa, 2014) has been sent out for public comments with the hope of making the Standards for Principalship, legislation. Government should, in collaboration with various education stakeholders, enforce the SASP as policy. The DoE recognises the current lack of a co-ordinated system to meet these identified needs and is therefore seeking to develop and implement a system of career pathing for education leaders and managers, and a framework of leadership and management development processes and programmes. It is envisaged that these will be built upon agreed understanding of the core purposes of the leadership roles, the key functions within these, the values which underpin them, and the personal and professional attributes required to carry out the role. The key functions in line with the core duties and responsibilities of the principals are clearly described in the IQMS policy document.

From responses of the participants, it is evident that the education districts attach very little importance to the CPD of principals. Most of the workshops facilitated by education districts deal with disseminating policy matters relating to curriculum changes and administrative matters instead of focusing on the needs of principals. Principals therefore seek other agencies (e.g. universities and NGOs) to access relevant professional development programmes to enhance their skills and knowledge to effectively lead and manage schools. The Ministry of Education consider CPD for educators to be crucial and has subsequently entrusted SACE with the management of CPD in public and independent schools (SACE, 2013). SACE emphasises that like all professionals, teachers and SMTs (including principals) require deep knowledge, which is continuously updated and widened, and which involves complex skills that need to be continually adapted to new circumstances. As part of a process, each educator will have a personal Professional Development Portfolio (PDP) developed according to SACE guidelines.

The third theme dealt with self-evaluation. The participants explained the purpose of a self-evaluation, namely, to inform them of their personal goals and the need for professional development. Piggot-Irvine (2010) asserts that although the complexity of the principal's role provides challenges for such principal development, there is an increasing awareness of approaches worthy of consideration. For example, the principal's self-evaluation on instructional leadership determines whether the principal satisfactorily develops and implements a school improvement plan that results in increased learner achievement; working with teams to develop realistic and attainable goals regarding learner achievement; implementing a system for monitoring learner progress and staff performance on an ongoing basis; providing feedback to staff for continuous improvement and growth; and selecting instructional programmes that meet specific school needs. If deficiencies in any of these attributes are noted, then professional development in these specific areas are required. It is evident that progressive principals take the initiative of arranging their own professional development programmes, based on needs, instead of relying on the Department's 'one size fits all' professional development programme.

5. Conclusion

From this study it can be established that principals can make significant contribution to schools' achieving the educational goals and improving learner performance, if they are adequately prepared for their leadership role. This can be achieved by ensuring that aspiring and practicing principals are exposed to structured CPD programmes, based on needs analysis. For principals to cope with the demands of the 21st century, innovative leadership development programmes help prepare school leaders to apply creative approaches that address the broader roles and responsibilities of leaders and the purpose of schooling, and to use core technologies to achieve intended outcomes. Participating in structured CPD programmes will enable principals to make autonomous decisions, adapt teaching programmes to local needs, promoting teamwork among teachers, and engaging in teacher monitoring, evaluation and professional development. CPD programmes empower them to set strategic direction and develop school plans and goals, and to monitor progress by using data to improve practice.

References

- Bottery M 2016. Educational leadership for a more sustainable world. London, UK: Bloomsbury Academic.
- Bush T, Kiggundu E & Moorosi P 2011. Preparing new principals in South Africa: the ACE: School leadership programme. *South African Journal of Education*, 31(1):31–43. Available at http://www.sajournalofeducation.co.za/index.php/s_aje/article/view/356/236 . Accessed 11 October 2016.
- Bush T & Oduro GKT 2006. New principals in Africa: preparation, induction and practice. *Journal of Educational Administration*, 44(4):359–375. doi: 10.1108/09578230610676587
- Creswell JW 2007. *Qualitative inquiry & research design: Choosing among five approaches* (2nd ed). Thousand Oaks, CA: Sage Publications.
- Creswell JW 2014. *Research design: Qualitative, quantitative, and mixed methods approaches* (4th ed). Thousand Oaks, CA: SAGE Publications, Inc.
- Department of Basic Education (DBE), Republic of South Africa 2014. The South African Standard for Principalship. *Government Gazette*, No. 37897. 7 August. Pretoria: DBE. Available at http://www.gov.za/sites/www.gov.za/files/37897_g_en636.pdf. Accessed 12 October 2016.
- Department of Education (DoE) 2004. South African National Professional Qualification for Principalship (SANPQP). Directorate: Education Management and Governance Development. Concept paper, September.
- Education Labour Relations Council (ELRC) 2003. *Integrated Quality Management System*. Centurion, South Africa: ELRC.
- Gall M, Gall JP & Borg WR 2003. *Educational research: An introduction* (7th ed). Boston, MA: Allyn & Bacon.
- Goslin KG 2009. How instructional leadership is conveyed by high school principals: the findings of three case studies? A paper presented at the International Congress for School Effectiveness and Improvement, Canada.
- Guskey TR 2002. Professional development and teacher change. *Teachers and Teaching Practice*, 8(3):381–391. doi: 10.1080/135406002100000512
- Heystek J 2016. African perspectives. In P Pashiardis & O Johansson (eds). *Successful school leadership: International perspectives*. London, UK: Bloomsbury.
- Kinney P 2009. Instructional practices. *Principal Leadership*, 9(7):48–51.
- Kvale S 2007. *Doing interviews*. Thousand Oaks, CA: Sage Publications Ltd.
- Lincoln YS & Guba EG 1985. *Naturalistic inquiry*. London, UK: Sage Publications.
- Mandela N 1994. *Long walk to freedom*. New York, NY: Little, Brown and Company.
- Mestry R & Grobler BR 2004. The training and development of principals to manage schools effectively using the competence approach. *International Studies in Educational Administration*, 32(3):2–19.
- Mestry R & Singh P 2007. Continuing professional development for principals: A South African perspective. *South African Journal of Education*, 27(3):477–490. Available at http://www.sajournalofeducation.co.za/index.php/s_aje/article/view/112/35. Accessed 11 October 2016.
- Quong T 2006. Asking the hard questions: being a beginning principal in Australia. *Journal of Educational Administration*, 44(4):376–388. doi: 10.1108/09578230610676622
- Russell D & Cranston N 2012. An examination of professional development offerings for school leaders in one large education system. *Leading and Managing*, 18(1):1–18.
- South African Council for Educators (SACE) 2013. *The CPTD management system handbook*. Pretoria, South Africa: SACE. Available at <http://www.sace.org.za/upload/files/CPTD%20Handbook.pdf>. Accessed 20 April 2016.
- Shenton AK 2004. Strategies for ensuring trustworthiness in qualitative research projects. *Education for Information*, 22(2):63–75.
- Starr K 2009. Confronting leadership challenges: Major imperatives for change in Australian education. In NC Cranston & LC Ehrich (eds). *Australian school leadership today*. Bowen Hills, Australia: Australian Academic Press.
- Steyn GM 2002. The changing principalship in South African schools. *Educare*, 31(1&2):251–274. Available at http://uir.unisa.ac.za/bitstream/handle/10500/232/arsteyn_changing_principalship.pdf?sequence=1&isAllowed=y. Accessed 9 October 2016.
- The Wallace Foundation 2013. *The school principal as leader: Guiding schools to better teaching and learning*. New York, NY: The Wallace Foundation. Available at <http://www.wallacefoundation.org/knowledgecenter/Documents/The-School-Principal-as-Leader-Guiding-Schools-to-Better-Teaching-and-Learning-2nd-Ed.pdf> . Accessed 9 August 2016.

- Townsend T & MacBeath J (eds.) 2011. *International handbook of leadership for learning (Part 1)*. New York, NY: Springer.
- Van der Westhuizen P & Van Vuuren H 2007. Professionalising principalship in South Africa. *South African Journal of Education*, 27(3):431–445. Available at http://www.sajournalofeducation.co.za/index.php/s_aje/article/view/118/32. Accessed 9 October 2016.
- Walker A & Qian H 2006. Beginning principals: balancing at the top of the greasy pole. *Journal of Educational Administration*, 44(4):297–309. doi: 10.1108/09578230610674921

THE POWER OF PEER LEARNING: GROUP REFLECTION AS A MODEL FOR UNIVERSAL DESIGN FOR LEARNING (UDL)

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Abstract

The challenges of developing a fully inclusive learning environment were brought to the fore through the shift to emergency remote teaching during the Covid-19 pandemic and served to highlight many of the inequalities and deficiencies of meeting learners' needs in traditional teaching practice. Fortunately, a framework exists to support the enhancement of this teaching space; Universal Design for Learning (UDL). UDL consists of a set of principles for curriculum development that aims to afford diverse learners equal opportunities to learn by providing more flexible and thus inclusive methods of teaching, learning and assessment. The three core principles of UDL include multiple means of engagement in learning, multiple means of representing information, and multiple means of expressing knowledge. This paper is focused on the present authors' collective learnings as a peer learning group of university educators participating in the Digital Badge for Universal Design in Teaching and Learning, accredited by Ireland's National Forum for the Enhancement of Teaching and Learning. We place particular emphasis upon the group's experiences implementing a UDL re-design of their teaching as part of the Digital Badge. Our analysis of this experience explores in detail each lecturer's reflective examination of their own teaching, learning and assessment practices; and the practical approaches taken to embedding UDL within these practices. It also considers the impact on the learners involved based on both quantitative and qualitative feedback from practitioners and student cohorts while highlighting the importance of engaging in peer groups. Finally, it concludes with a consideration on how engagement with UDL will impact future teaching practice.

Keywords: *Universal design for learning (UDL), peer learning, lifelong learning, group reflection, case studies.*

1. Introduction

Providing an inclusive learning environment is complex; and creating a culture of engagement and inclusion that works for all learners without accidentally marginalizing some in the process requires a systematic shift in thinking and a change of behaviour. Universal Design for Learning (UDL) is a learner-centred framework that emphasises accessibility, collaboration, and community. This framework acknowledges diversity of motivations and learning preferences in the learning environment and provides a set of principles for curriculum development and delivery. UDL seeks to reduce learning barriers and seamlessly provide appropriate supports, thus enabling educators to develop courses where all students have an equal opportunity to learn, while maintaining expectations of quality (Rogers-Shaw et al., 2018). The three core principles of UDL include multiple means of engagement in learning, multiple means of representing information, and multiple means of acting upon or expressing knowledge.

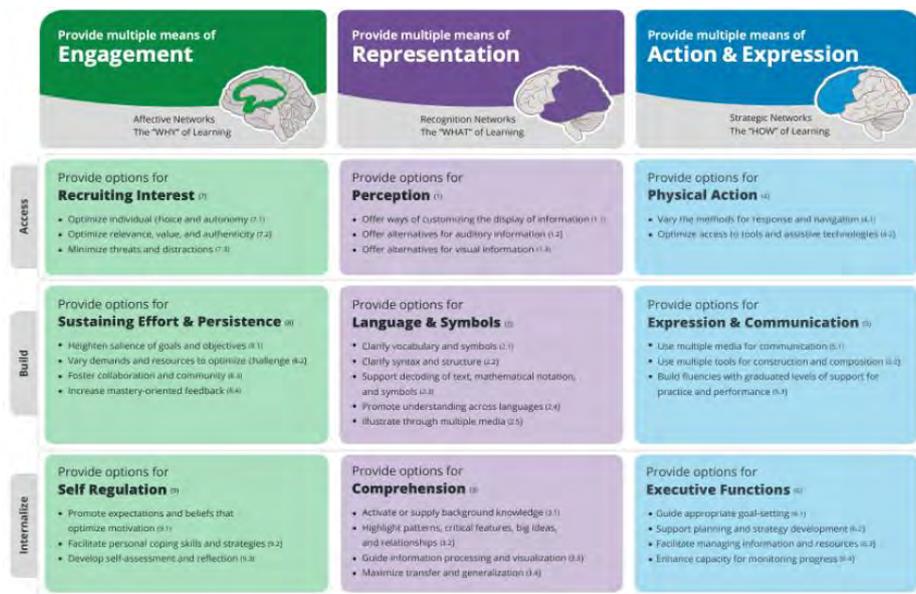
- **multiple means of engagement** in learning concerns the affective domain and suggests that there are a variety of methods to engage and motivate learners.
- **multiple means of representation** in learning concerns with how information is presented to learners, recognising that there is not one optimal means of representation.
- **multiple means of action and expression** in learning concerns how learners can demonstrate that they have learned and recognising that are multiple means to achieve this.

(CAST, 2018)

In the increasingly diverse and evolving Further and Higher Education landscape, UDL provides an effective framework to improve the learning experience of all learners. As an approach to inform Irish educators about UDL, a training programme called the Digital Badge for Universal Design in Teaching and Learning was developed by AHEAD and University College Dublin's department of Access & Lifelong

Learning, with accreditation provided by Ireland’s National Forum for the Enhancement of Teaching and Learning (opencourses.ie, 2021). The stated goal of the Digital Badge is to provide participants with a solid introduction to the Universal Design for Learning Framework and offer an opportunity to implement UDL principles within the participants’ current teaching activities (AHEAD, 2021). The programme requires approximately 25 hours’ work over 10 weeks, primarily structured around educator peer learning groups and the redesign of an activity in line with UDL principles.

Figure 1. The Universal Design for Learning Guidelines (CAST, 2018).



2. Case studies

This paper focuses on the redesign experiences of one such educator peer learning group, who participated in the UDL Digital Badge rollout in Sept-Dec 2021. The group consisted of five teaching practitioners from Technological University Dublin (TU Dublin); four of the cohort are involved in the delivery of a Creative Digital Media programme, while the fifth involved in teaching Psychology on undergraduate degrees in Social Care Work, Community Development and Youth Work, and Early Childhood Education and Care. The five have individually been involved in higher education from between five to twenty years and have experience across a number of disciplines.

If the goal of UDL is to develop an enhanced learner experience it is essential that staff engage with additional CPD in this domain. The present authors are a self-selecting cohort that has consistently taken the opportunity to further develop their teaching practice through regular CPD. Nonetheless, in committing to completing the UDL Digital Badge all shared a similar rationale, each expressed a view that they already incorporated UDL processes in their existing practice, albeit on an unsystematic basis. Solano (2020) has noted that when dealing with transformative change many respondents typically answer with “We do that!” even though in reality that may not entirely be the case.

A key strength of formally engaging with UDL educator peer learning is that it exposes its participants to a complete and systematic understanding of UDL practice by incorporating its members’ complementary perspectives with reflexivity. Brookfield argues for critical reflection of teaching practices as a method for interrogating assumptions held, checking their validity and accuracy, and reframe these where necessary (Brookfield, 2017). Given this, all participants felt that the Digital Badge provided an important opportunity to enhance their practice. The following case studies present the key reflections of peer group members about the processes and outcomes of the learning re-design activity.

2.1. Case study 1: Providing multiple means of engagement

Creating high quality instructional materials and authentic assessments is important for learner success; though it is only meaningful if the learner is engaging with those materials. There are significant differences in how learners can be motivated to learn, and there is not one means of engagement that will be optimal for all learners in all contexts (CAST, 2018). Thus, the first goal of a UDL approach is to design multiple options for learners to engage: for example, with the content, with the mode of access/delivery, with the teacher, and with their peers.

This case study outlines the redesign of an assessment for "Professional Practice", a third-year module in the Creative Digital Media programme. The learning outcomes for this module include requirements to describe and analyse working patterns, career opportunities and trends within the digital media industry, and identify and reflect on their own skills and career aspirations within the sector.

The original assignment brief required students to research and write a report on one of four sectors in the digital media industry. While this brief allowed students a certain limited degree of choice, it was felt that there was considerable potential for improvement regarding scope, personalisation, and metacognitive reflection, with the goal of enhancing students' interest in and personal critical analysis of potential career opportunities. The assignment was therefore reviewed through a UDL lens, with particular attention paid to providing multiple means of engagement (CAST, 2018). As shown in Figure 1, the UDL guidelines for engagement consist of three principles – providing options for recruiting interest, for sustaining effort and persistence, and for self-regulation. Within these guidelines, four checkpoints were identified as being of specific relevance: 7.1, Optimise individual choice and autonomy; 7.2, Optimise relevance and authenticity; 8.1, Heighten salience of goals and objectives; and 9.3, Develop self-assessment and reflection.

To optimise individual choice and autonomy (CP 7.1), the first step was to ask the students what interested them. A class survey revealed a wide diversity of professional interests, with 21 different career preferences represented. The assignment was then redesigned to encourage students to research any sector in the digital media industry that interested them (e.g., animation, sound design, branding, game design, AR/VR, or any other sector of their choice). The redesigned brief also allowed students to submit their report in any appropriate format (e.g., written report, video, website, infographic, podcast, etc.). Offering such multiple means not only provided autonomy, it also enhanced the relevance and authenticity of the task (CP 7.2) as the topic could be aligned to individual interests. Similarly, students could determine their individual goals and objectives (CP 8.1) by researching a sector relevant to their own career potential. Finally, students were required to evaluate and reflect (CP 9.3) on how their own skills, experience and attributes matched the requirements for a career in their selected industry sector.

The outcomes of this UDL initiative were very positive. A post-submission feedback survey indicated that 100% of students welcomed the opportunity to choose their topic and their format. Typical comments included, "This helps me express myself the way I want to, the way that makes it actually fun to do! It's a joy to cover both topics and formats that I enjoy," and "I personally think the freedom to choose the format and topic gives me more of a drive to deliver my best possible work for this assignment." In terms of the options chosen, there was a wide variety of industry sectors represented in the reports. However, one surprising result was that despite welcoming choice in assignment format, a majority of students opted for a written essay. Qualitative responses to the survey indicated that students felt time-poor at the end of the semester, and many opted for a familiar format, even though it was not their first preference. This observation highlights the importance of providing support, guidance, exemplars, and time to practice when offering multiple means of engagement and expression, to allow learners to fully embrace wider opportunities.

2.2. Case study 2: Providing multiple means of representation

Sensory disabilities, cultural differences, and learning differences among learners all contribute to the need to present information in a number of different formats. This second case study details a redesign process aimed at increasing means of representation within a first-year module, particularly in relation to guideline 1 of the UDL guidelines; 'Provide options for perception' (see Figure 1).

Prior to the redesign activity multiple options for perception were already in place. Class notes and materials were available in a customisable written form, audio versions of written notes were made available, and much of the course material was available in multiple formats. For this redesign activity the instructions that were given to students in relation to peer review were considered. This activity provided a good basis for assessing the impact of UDL principles in the short-term as it was an activity that occurred more than once throughout the semester.

Learners participated in a peer feedback activity in week 5 and again in week 8 of the semester. While originally both feedback activities were identical in structure, this redesign reviewed the instructions for the second activity with a view to increasing clarity using structure and formatting. In accordance with UDL Guideline 1 the following were implemented: break-down of instructions into step-by-step guidelines, increased use of headings and sub-headings, and increased use of font size and colour to communicate information and to separate and differentiate advice from instructions. Overall, the aim of this redesign was to provide a clear visual hierarchy of information which would help learners to engage more effectively with this activity.

Following completion, a short survey was issued to learners. Findings included an indication that most learners (73%) perceived the instructions for the second task as clearer. Most respondents (93%) enjoyed giving feedback more the second time, however this finding should be considered in the context

that most respondents (93%) perceived that their comfort with the task increased because it was the second iteration of the activity. Having said that, all respondents indicated that they appreciated the breaking down of instructions into steps, and most (86.7%) indicated that following a prescriptive step-by-step method made the task easier.

In practical terms, a significant improvement was noted in the learner comprehension and completion of the activity on the second occasion. Following the first completion several learners submitted work that had missed one or more steps in the process as laid out in the task instructions. There was a notably higher level of completion in the second feedback activity and there were less queries received relating to the second activity, and the tasks were more likely to have been carried out correctly and completely. While several variables, (stage in the semester, prior experience of the task) influenced the learner experience and feedback, this case study provides encouragement that providing additional options for perception increases activity completion and learner satisfaction.

2.3. Case study 3: Providing multiple means of action and expression

Multiple means of action and expression is considered the “How” of Learning. Invisible disabilities and other learning difficulties can have a significant impact on a student's mode of action and knowledge expression (Ross, 2019). Because learners differ, there is no one-size-fits-all approach to expressing themselves that will work for everyone. It is incumbent therefore on the educator to provide multiple means of expressing how they represent their knowledge and skills.

For this case study the UDL principle “Multiple means of action and expression” was applied in the redesign of a final assessment brief for an undergraduate module in visual design that accounted for 40% of the overall grade of the module. There are three areas where multiple means of action and expression can be provided: physical action, expression and communication, and executive functioning (CAST, 2018). The latter two guidelines were implemented into the redesign of the assessment brief.

The first guideline “Expression and Communication” was incorporated into the assessment brief in two ways. The first was by including activities that fostered the use of imagination in order to solve novel and relevant problems, or to make sense of complex ideas in creative ways that suited their mode of expression. The students presented their own interpretation of the broad problem that required solving. This ensured autonomy and freedom to express how their creativity and problem-solving skills related to their own interpretations of the problem solution; this promoted solving complex problems in a creative way that suited their mode of expression. To promote this autonomy within their own learning, the assessment brief was co-designed with the students.

The second was by providing students with options of presenting their knowledge in different formats; from the perspective of assessing knowledge transfer this was considered crucial for the effective evaluation of students who struggle with certain types of communication. Students could choose to present their assessment in a written report or by presenting their final output addressing the outcome and process via a recorded presentation.

Post assessment, students (n=52) completed a feedback survey on the redesign of the assessment brief. 50% strongly agreed, while 24% somewhat agreed they were more engaged with the assignment as a result of offering flexibility in choosing the scope of their project. 61% strongly agreed that providing a choice of topics for the assignment gave them more scope for creativity, 54% strongly agreed that choice gave them freedom in a more creative way. As a result of co-designing the assessment brief with the students 51% reported that they had more ownership of their own learning. 40% of the students indicated that having implicit milestones in the brief worked for them. 46% of students agreed that feedback at certain milestones engaged them to keep on track with their assignment.

To complement the "Executive Function" guideline of assisting students in becoming expert learners, the assessment brief emphasised planning and building a time management strategy; this was accomplished by offering weekly goals and checklists to keep students on track. To ensure that the students could monitor their progress, feedback milestones were built into the assessment brief, feedback sessions enabled the student to move from various stages of their project. A self-assessment rubric was implemented so that students could grade their own progress giving them a sense of ownership of their own progress. Providing the student with weekly milestones engaged and motivated the student to keep on track with their assignment so that feedback could be given allowing them to move on to the next stage of the assignment.

Reflecting on this redesign process, it was encouraging to see the positive learning experience reported by the students. Providing learners with options and flexibility in their assessment increased engagement and rates of completion and gave the students a sense of autonomy in their own learning. It is evident that implementing even minor changes in line with UDL principles provides a more inclusive experience for the learner.

3. Conclusion

Throughout the digital badge a “plus one” approach was advocated, asking participants to focus on one small area of their course design and delivery and make changes to improve the learner experience. The case studies discussed above indicate that it is possible to implement small, incremental changes over a short period of time, and these can be built on to enable continued improvements. Results, while tentative, are very positive overall, indicating that even small changes that are informed by a UDL perspective can improve learner experience, engagement, and output.

While each group member came to this process with some interest and understanding of UDL, through the digital badge each member has developed a more structured and robust approach to UDL and has identified areas that can be improved by further refinement. Continuous engagement and dialogue with both learners and colleagues throughout the redesign process has proved invaluable. The collegial format has provided a dedicated space and time to explore the UDL principles and consider how these can be best applied to both teaching and learning activities to create a more inclusive learning experience for our diverse cohorts of learners. This process of examining where UDL improvements can continue to be embedded into each member’s teaching practices allows consideration on how to implement elements in small but significant ways. The incremental nature of the UDL plus one approach means that each module design and delivery can continue to be improved on an ongoing basis, where small efforts over time can result in substantial changes for learners.

As a newly established university, TU Dublin is committed to the goal of supporting the learning community through a Universal Design approach to all provision and services and to the physical environment, through a culture of equality, inclusion, and respect for all. The University’s advances in UDL have been officially recognised by the Centre for Excellence in Universal Design (CEUD) and the National Disability Authority (NDA), and the institute continues to demonstrate a commitment to UDL through a variety of initiatives (Centre for Excellence in Universal Design, 2020). It is our intention to build on the insights we have gained in this area to contribute to the further development of a UDL culture within the University. Our own experiences peer learning group have enabled us to appreciate the challenges faced by our learners. By consciously allowing our teaching practice to be informed by UDL principles, we maintain rigor and high expectations, and perhaps more importantly we strive to enable our students to reflect on their own learning experiences and develop lifelong learning skills.

References

- Brookfield, S. (2017). *Becoming a Critically Reflective Teacher* (2nd ed.). Jossey-Bass. (Original work published 1995)
- CAST. (2018). *UDL: The UDL Guidelines*. Cast.org. <http://udlguidelines.cast.org>
- Centre for Excellence in Universal Design. (2021). *Universal Design at TU Dublin Recognised by CEUD | Centre for Excellence in Universal Design*. Universaldesign.ie. <https://universaldesign.ie/news-events/news/universal-design-at-tu-dublin-recognised-by-ceud.html>
- Lepp, G., & Fierke, K. (2017). Expanding student perspectives Expanding student perspectives in an authentic learning environment. *Transformative Dialogues: Teaching & Learning Journal*, 10. https://www.kpu.ca/sites/default/files/Transformative%20Dialogues/TD.10.3.8_Lepp%26Fierke_%20Expanding_Student_Perspectives.pdf
- Rogers-Shaw, C., Carr-Chellman, D. J., & Choi, J. (2017). Universal Design for Learning: Guidelines for Accessible Online Instruction. *Adult Learning*, 29(1), 20–31. <https://doi.org/10.1177/1045159517735530>
- Ross, S. R. (2019). Supporting your neurodiverse student population with the Universal Design for Learning (UDL) framework. *2019 IEEE Frontiers in Education Conference (FIE)*, 1–5. <https://doi.org/10.1109/fie43999.2019.9028693>
- TU Dublin. (2021a). *Principles of an Education Model for TU Dublin*. <https://www.tudublin.ie/media/intranet/education-model/documents/10-Design-Principles-for-a-TU-Dublin-Education-Model.pdf>
- TU Dublin. (2021b). *Strategic Intent | TU Dublin*. Tudublin.ie. <https://www.tudublin.ie/explore/about-the-university/strategicintent/>

SUBJECTIVITY AND SOCIAL RECOGNITION: THEORETICAL AND EMPIRICAL PERSPECTIVES ON THE VALUE OF NON-FORMAL EDUCATION FROM THE PERSPECTIVE OF YOUNG PEOPLE

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Abstract

Due to its principles of voluntariness and openness, and because of its diverse offer of experiential and subject-related educational opportunities, open youth work is increasingly seen as having a special potential in supporting the acquisition of key competences and life skills. But which educational opportunities are meant here and what form of education are we talking about here at all?

These are the questions addressed by the qualitative-reconstructive study "Educational Experiences in Non-formal Settings", which is being conducted at the Centre for Childhood and Youth Research (CCY) at the University of Luxembourg. The study examines the subjective educational experiences of young people in open youth work on the basis of ethnographic observations in youth centers, in problem-centered interviews and group discussions with young people as well as a supplementary quantitative survey.

The study is based on an understanding of education that follows the tradition of subject-scientific theory (v. Humboldt, Koller) as well as the recognition theory (Honneth) and discusses education with concepts of self-determination and maturity in dealing with social norms and routines. The starting point of this consideration is that education can be determined as the transformation of the relationship to the self and the world. It is also linked to the theoretical work of Albert Scherr (1996), who defines the development of self-awareness, self-esteem, self-determination and thus ultimately subjectivity as the central educational goals of youth work. Empirically, it is thus not primarily a matter of investigating processes of knowledge acquisition, but rather of describing "innovative moments in the development of individual ways of thinking and acting (Koller, 2018, p.112).

The results of the data analysis show a differentiated description of youth-related educational occasions and marks small-scale experiences of the appropriation of personal, social and everyday life references. They also highlight moments of expanding young people's ways of thinking, possibilities of action and dispositions in the context of open youth work. The high importance of social recognition as a basic prerequisite for educational processes (among the young people involved) becomes visible.

Keywords: *Non-formal education, youth work, reconstructive social research, youth research, educational theory.*

1. Introduction

This paper presents the design and initial findings of an ethnographic-reconstructive study in the context of empirical educational research in Luxembourg. The study "Educational experiences in non-formal settings" aims to describe what educational experiences young people generate in non-formal educational settings and what value these experiences have for them in their current life contexts and for their future life plans. Open youth work in Luxembourg was chosen as an exemplary field of investigation, which, as a genuine field of social pedagogical action, also has a legally anchored non-formal education mandate.

The study focuses on the question of how "education" in the context of open youth work can be represented empirically within the framework of interpretative research contexts and from the perspective of young people.

2. Research context

By redefining the youth sector as an area of non-formal education, Luxembourg has followed an international trend that has been flanked for years by the reporting of supranational organisations (OECD, UNESCO, EU, etc.). The origin of this development can be traced back to a crisis in the education system discussed throughout Europe and also in Luxembourg, as evidenced by international studies and research such as the Pisa study. One aspect of this debate is the importance of non-formal education approaches. In the sense of holistic, local educational landscapes, the aim is to contribute to promoting the complementarity of educational offers and to achieve a fairer and altogether more successful education in the sense of young people. In this context, youth work was introduced as a non-formal education partner of the formal educational institutions.

In Luxembourg, this redefinition of the youth sector can be seen in two changes in particular:

(1) With the introduction of a national education framework in Luxembourg in 2017, the understanding of youth work as educational work has been consolidated.

(2) With the adoption of the new school law of 29.08.2017, concepts of school social work and cooperation between school and youth work services have been implemented. Youth work is thus assigned the role of "supporting partner" of formal education.

3. State of the art

In recent years, Delmas and Scherr (2005) and Cloos et al. (2009), among others, have dealt with the special educational potential of youth work. Their findings show that young people have reported many different learning and educational moments when taking part in open youth work activities, which they rate as particularly positive. These moments often involve the acquisition of competences, for example in concrete educational projects. In contrast, the professional experts interviewed by the authors hardly describe their work in open youth work as educational work and thus fail to recognise educational potentials which subsequently remain unused. Moreover, in their extensive ethnographic study, Cloos et. al. found numerous examples of the co-construction of educational processes between youth workers and young people. These took place in a wide variety of interaction frameworks and were partly unconscious and unreflected. These empirical results, which can only be briefly reported here, show that educational work does take place in open youth work. However, this is usually not targeted or planned, and often even unconscious. This makes it difficult to adequately use the educational potential of youth work in an educational partnership with formal education.

All in all, the user perspective has not yet received much attention from youth work research (Biewers, 2020). For example, there has hardly been any empirical research on the mode of educational experiences of young people within youth work, i.e. which changing and developing moments they actually experience there and how they evaluate them. The questions as to what extent the socio-pedagogical support function of youth work in the context of personal or social learning processes and/or changed family structures is important for the young people and what contribution youth work makes to coping with the increasingly complex problems of adolescence in connection with digitalisation or the increasing pressure to perform are also largely unanswered.

4. Theoretical framework

The study is grounded on an understanding of education that is in the tradition of subject-scientific theory (v. Humboldt, Koller) as well as recognition theory (Honneth) and discusses education with concepts of self-determination and maturity in dealing with social norms and routines. The starting point of these considerations is that education can be determined as the transformation of the relationship to the self and to the world. It also ties in with the theoretical work of Albert Scherr (1997), who defines the development of self-confidence, self-esteem, self-determination and thus ultimately subjectivity as the central educational goals of youth work. Scherr starts from the idea of a largely "autonomous subject" and at the same time considers this subject and its development embedded in the social and societal environment (p.50). Through these connections with the expectations and rules affecting the subject from the external, its autonomy is limited in parts and the subject is faced with the task of balancing the interplay of internal ideas and dispositions with the external norms and rules. Scherr considers "becoming a subject" to be the fundamental educational goal of every human being, so to speak. According to his theory, the core task of youth work is to enable a responsible subject "who develops a self-confident and self-determined life practice based on the reliance on structures of mutual recognition" (Sturzenhecker & Deinet, 2018; p. 697). Empirically, therefore, the study is not primarily concerned with examining processes of knowledge acquisition, but rather with describing "innovative

moments in the development of individual ways of thinking and acting" (Koller, 2018, p.112). To this end, the study is oriented towards approaches of ethnographic-reconstructive social research in combination with grounded theory.

5. Objectives and research questions

The study presented in this paper addresses these gaps in research. The aim is to highlight, on the basis of empirical data, which concrete educational experiences young people generate in the different settings of open youth work, as well as which significance and which benefits they attribute to these experiences with regard to their own development and life situation. Therefore, the following questions are the focus of the study: What subjective educational and learning experiences do young people generate in open youth work? How can these educational experiences be characterised? And what value do the young people attach to these experiences for their subjective development?

6. Methods

To answer the research questions, the study was grounded on a mixed methods design. It used 1) ethnographic observations in 8 youth centers, 2) problem-centered interviews and group discussions with 35 young people in open youth centers and 3) a quantitative online survey (n = 101 participants). These triangulation of methods and perspectives should lead to a holistic view of the educational experiences of young people in open youth work.

The individual sub-studies pursued different goals: The ethnographic-qualitative methods served to open up a previously poorly researched subject area in depth and to a large extent. For this purpose, the interactions of the young people were first observed ethnographically in selected pedagogical settings within the youth centers and the young people were then questioned about their experiences on the basis of these observations. In addition to predefined guiding questions, open observation protocols were kept. In the quantitative online survey, the study was opened to all young people attending a youth center in Luxembourg. The aim here was to extend and validate the results of the qualitative study. The use of a variety of data and perspectives was also due to the fact that "research practice is considered to be highly dependent on milieu and situation, shaped by the subjects involved, their lifestyles and conditions, and the imponderables of everyday life" (Lüders 2013, p. 393). This research practice in the youth center required a certain flexibility.

7. Findings

The results of the data analysis indicated a) a differentiated description of youth-related educational reasons, which show that the young people's reflexive examination of themselves and/or their environment is often based on certain "subjective occasions", which are addressed by the professionals as well as by the peers. These include, for example, the desire to overcome an existing crisis or a family problem, but also the discovery of the "foreign" and the difference to previous experiences. Such occasions and educational opportunities are often identified as starting points for transformations, and the young people begin to think about new options for action (with the support of the professionals). Social interaction usually provides a supportive and even protective framework. Many of the young people interviewed talk about "feeling supported by the group" or "having found a community in the youth center" in which and with which they have developed further.

The results mark b) a variety of situations and "innovative moments" in which developments occur in which young people acquire new personal, social, societal and everyday references. In retrospect, these were moments that proved to be trend-setting for the young people. Such formative experiences can be seen, for example, in the first overnight stay outdoors, in conversations and contacts that led to a certain career choice or also in the fact that young people did not commit a planned criminal act. This also includes the expansion of the young people's ways of thinking, possibilities of action and dispositions in the context of creative, musical or social offers and projects that are very close to the young people's topics and interests.

The results also show c) a high level of satisfaction among the young people about the community lived in the youth center, which contributes to well-being and an atmosphere of appreciation. A common thread running through the data is the high importance of social recognition as the basis for self-esteem, self-confidence and openness to expand one's own horizons.

8. Conclusions

This study aimed at systematically recording and describing the subjective educational experiences and learning moments that young people generate in their participation in the offers in different settings of Open Youth Work, thus arriving at empirically supported statements about the educational potentials and the value of Open Youth Work from the young people's point of view. The results show that young people find a variety of opportunity structures and possibilities in the settings of youth work, in which they can participate with their individual ideas, needs and interests, and in which these are respected and recognised. It could be shown that education in youth work is much more than the mere transfer of knowledge and competences. Rather, youth work shows itself to be a place of education where, due to its professional setting of openness, voluntariness and low threshold, it comprehensively succeeds in supporting young people to develop themselves with "all their strengths" and in "all directions" (v. Humboldt, cited in Koller, 2018).

References

- Biewes Grimm (2020). *Qualitätskonstruktionen. Zur Verarbeitung divergierender Qualitätsanforderungen in der Jugendarbeit*. 2. Auflage. Weinheim: Beltz Juventa.
- Bock, K. (2008). Einwüfe zum Bildungsbegriff: Fragen für die Kinder- und Jugendhilfeforschung. In H.-U. Otto & T. Rauschenbach (Hg.), *Die andere Seite der Bildung: Zum Verhältnis von formellen und informellen Bildungsprozessen* (2. Aufl., S. 91–105). VS Verlag für Sozialwissenschaften/GWV Fachverlage GmbH Wiesbaden.
- Cloos, P., Köngeter, S., Müller, B. & Thole, W. (2009). *Die Pädagogik der Kinder- und Jugendarbeit* (2., durchgesehene Auflage). VS Verlag für Sozialwissenschaften. <http://www.socialnet.de/rezensionen/isbn.php?isbn=978-3-531-16597-4>
<https://doi.org/10.1007/978-3-531-91557-9>.
- Delmas, N. & Scherr, A. (2005). Bildungspotenziale der Jugendarbeit.: Ergebnisse einer explorativen empirischen Studie. *Deutsche Jugend*, 53(3), 105–109.
- Deinet, U. & Sturzenhecker, B. (2018). Kinder- und Jugendarbeit. In *Kompendium der Kinder- und Jugendhilfe*. Springer Verlag. pp 693–712.
- Koller, H.C (2018). *Bildung anders denken. – Einführung in die Theorie transformatorischer Bildungsprozesse*. 2. aktualisierte Auflage. Stuttgart: Kohlhammer Verlag.
- Lüders, C. (2013). Bildungsbiografien von Kindern, Teenies und Jugendlichen im Kontext ihrer Peers. Discourse. *Journal of Childhood and Adolescence Research*, 8(2), 243-246. <https://nbn-resolving.org/urn:nbn:de:0168-ssoar-392545>.
- Scherr, A. (1997). *Subjektorientierte Jugendarbeit. Eine Einführung in die Grundlagen emanzipatorischer Jugendpädagogik*. Weinheim und München: Beltz Verlag.
- Soeffner, H.-G. (2011). Sozialwissenschaftliche Hermeneutik. In U. Flick, E. von Kardorff & I. Steinke (Hg.), *Qualitative Forschung - Ein Handbuch* (8. Aufl., S. 164–174). Rowohlt.
- Sting, S. (2013). Sozialpädagogische Zugänge zur Bildung in der frühen Kindheit. In Sektion Sozialpädagogik und Pädagogik der frühen Kindheit (Hg.), *Konsens und Kontroversen: Sozialpädagogik und Pädagogik der frühen Kindheit im Dialog* (S. 14–24). Beltz Juventa.
- Sturzenhecker, B. (2008). Zum Bildungsanspruch von Jugendarbeit. In H.-U. Otto & T. Rauschenbach (Hg.), *Die andere Seite der Bildung: Zum Verhältnis von formellen und informellen Bildungsprozessen* (2. Aufl., S. 147–165). VS Verlag für Sozialwissenschaften/GWV Fachverlage GmbH Wiesbaden.
- Thiersch, H. (2006). Leben lernen: Bildungskonzepte und sozialpädagogische Aufgaben. In H.-U. Otto (Hg.), *Zeitgemäße Bildung: Herausforderung für Erziehungswissenschaft und Bildungspolitik* (S. 21–36). E. Reinhardt.

RECONFIGURING TEACHER EDUCATION IN SOUTH AFRICAN UNIVERSITIES TO ADDRESS LEARNER BEHAVIOURAL CONDUCTS IN SCHOOLS: CHANGED REALITY

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Abstract

The purpose of the paper is to argue for the need to reconfigure the training of Bachelor of Education Degree student teachers as a strategy to empower them in dealing with the changed reality in secondary schools. The purpose is achieved by looking at the relevancy of the education or training offered to undergraduate teacher trainee students at universities in Eastern Cape Province of South Africa regarding learner behavioural problems being experienced in secondary schools. The paper was guided by a situated learning theory. The paper adopted a qualitative approach and a case study design. The study purposively selected 3 universities, 9 lecturers and 15 teacher trainees as participants. Data were collected through use of interviews and focus group discussions. Thematic frames were used to analyse data that were discussed concurrently with the findings. The study established a mismatch between how the teachers' training and actual reality in schools as a challenge that needs to be addressed. The implication drawn is that failure to move with speed to reconfigure the training of initial teacher education increases frustration and tension between teachers and learners. The paper concludes that the current way of training of teachers lacks reality of how teacher trainees should deal with learner behavioural problems in schools. Universities should redesign an initial teacher education programme that capacitates teacher trainees to handle and speak to the current generation of secondary school learners.

Keywords: *Initial teacher, teacher education programme, learner behavioural conduct, school-based experience.*

1. Introduction

An analysis or reflection on the state of the training programme offered to Bachelor of Education Degree (B.Ed.) student teachers in South Africa is necessary. Such an analysis should focus on the review of dealing with learners showing symptoms of indiscipline, counselling, infusion of technology into learning and teaching among other things. This would be important to transform the programme and speak to the millennium generation found in present schools and the society that is fast changing. Darling-Hammond, Flook, Cook-Harvey, Barron and Osher (2020) argue that for 21st-century learners to be created, focus must be on teachers' 21st century skills and re-conceptualize how teachers could be evaluated and trained. From the interaction the current researchers of this paper did with some university teacher trainees, we discovered that most teacher trainees were not enthusiastic to go for School Based Experience (also known as Teaching Practice in some corners of the globe) citing their inability and how they struggled to deal with the generation of learners currently found in schools.

Reconfiguring the initial teacher education in universities can be a necessary move to take in response to learner behavioural challenges faced by teachers in secondary schools. Violence is prevalent at some South African schools. Cases such as learners' shootings at school premises, physical violence, beating up of teachers, and in some instances, killings of teachers at schools, drug, and alcohol abuse, (Nhambura, 2020) are common on news headlines in South Africa. In line with the above, Steyn and Mentz (2008) observe that there was a dramatic increase in lack of discipline in schools and classrooms, increase of violence on school grounds, learners and parents with HIV/AIDS, unemployment, poverty and other societal issues that exert pressure on teachers. Based on the above scenario, we argue for the restructuring of the initial university teacher training programme. It is of great importance to ensure that the manner in which teachers are trained suits and meets the demands and the dynamics of the present society. The question to ask is 'are teacher trainees equipped by universities to deal with the social ills that are now common in secondary schools?'

2. Objectives

The study objectives were:

To establish lecturers' and student teachers' perceptions regarding the current B.Ed. programme offered in South African universities to trainee teachers in relation to the actual practice in secondary schools.

To identify measures that can be used to ensure that Bachelor of Education Degree teacher trainees are prepared to deal with the psychological and social disorder conducts of secondary school learners in Eastern Cape Province of South Africa.

3. Theoretical framework

The study was informed by the Situated Learning Theory (SLT). Jean Lave and Etienne Wenger founded the SLT in the 1980s (David, 2007). The Situated Learning Theory's key feature is its belief that learning should take place within authentic context, culture, and activity (David, 2007). SLT argues that learning happens when students work as a team and are given real life activities to work on. Lave and Wenger (1991) argue that SLT students' ideas and actions are shaped by the environment. The theory was suitable for the study since it provides usable knowledge to real world contexts which also the current study is arguing for.

4. Literature review

The researchers of this paper are aware of the debate on the model that universities can adopt to train student teachers in institutions of higher learning. Van der Walt and Fowler (2006) state that there was an ongoing debate amongst educationists, worldwide, regarding a particular model for teacher education within the context of the attainability, sustainability and effectiveness of the particular model. We are of the view that the suitability of a model is determined by its capacity to address the needs and challenges faced by the audience it is going to service. Currently, the South African universities are using the integrated model to train the prospective teachers (Robinson, 2015). It is the responsibility of the South African Qualification Authority (SAQA) to set the requirements or criteria and register them on National Qualification Framework (NQF) that guide universities offering the teacher training programme. According to the Ministry of Education (2001), the custodian for all teacher education programmes are institutions of higher learning under the Department of Higher Education and Training (DHET).

The focus of this paper is on the reconfiguring of the Bachelor of Education Degree's nature, content and expected outcomes for the different qualifications for teacher education. The Department of Education (DoE) (2007) indicates that the nature, content and attributes for the qualifications for teacher education are articulated in the Norms and Standards of the Department of Education (DoE 2000). The SAQA indicates that the B.Ed. programme bears 480 credits. The nature of the programme is that it covers the area of specialisation and the professional component. The Departments of Basic Education and Higher Education and Training (2011) specifies the roles or responsibilities that should form part of the programme in terms of content to be covered. The roles are: (1) a learning mediator (2) an interpreter and designer of learning programmes and materials (3) a leader, administrator and manager (4) a scholar, researcher and lifelong learner (5) responsible for a community, citizenship and pastoral role (6) an assessor and (7) a learning subject specialist (DoHE & DHET, 2011). From the above integrated model mostly followed by South African universities offering teaching degree programmes shows that the emphasis is on subject-content knowledge and pedagogy (Steyn & Mentz, 2008).

The paper is arguing for a change in the approach and nature of the curriculum for Bachelor of Education degree to speak to the changed reality in societies. From literature discussed above, there is little emphasis if any for the curriculum to focus on understanding of the sophisticated changing social character of schools. The student teacher might have the knowledge, yes, but is s/he equipped to manage learners diverse classrooms who are influenced by the societies they are coming from (Mugenyi, 2021). Such learners might have a tendency of displaying behaviours that are difficult (Nhambura, 2020; South African Human Rights Commission, 2008) for teacher trainee or newly qualified teachers. This might result in cultural shock and likely to find the teacher or learners missing in action, hence the need for this current study. It is also crucial to train and equip student teachers with the skills necessary to deal with the current generation of secondary school learners. Darling-Hammond (2006) sums it all up by stating that it required teachers to have a deeper knowledge of how to address a diverse array of learners and more refined diagnostic abilities to inform their decisions. In a similar view, Levy and Murnane (2004) posit that the ability to communicate in complex environment requires constant information flow and adjustment.

5. Methodology

The paper adopted a qualitative approach and a case study design given that the aim of the study was to argue for the need to reconfigure the curriculum of Bachelor of Education Degree offered to student teachers. Three universities, 9 lecturers and 15 teacher trainees were purposively chosen to participate in the study. Purposive sampling technique was used since it allows researchers to select participants deliberately and purposefully with rich information (Creswell & Creswell, 2018) suitable for the study. Data were collected through use of interviews and focus group discussions that permitted room for probing to get clarity (Mncube, 2012). The interviews and focus group discussions were audio-taped and transcribed verbatim. Thematic frames and verbatim quotations were used to analyse data that were discussed concurrently with the findings.

6. Ethical considerations

Permission to conduct research was sought and granted by the three universities that participated in the study. Permission to use names of the universities and participants was not granted hence use of codes. Participants were assured of anonymity, confidentiality, privacy and their rights to be observed. Consent forms to participate in the study and to be audio recorded were signed by the participants. We explained the purpose of the research to the participants and assured them that they could withdraw from participating in the study without being victimised.

7. Findings and discussion

In relation to the B.Ed. programme offered in South African universities, the following challenges were identified from the responses given by both students and lecturers. We noticed that the participants' perceptions of the programme were characterised more with challenges associated with the programme as shall be explained below. All interviews and focus group discussions focused on a question that solicited the participants' views related to the B.Ed. programme: 'What are your perceptions regarding the nature of the B.Ed. programme being offered to undergraduate secondary school teacher trainees?' Follow-up questions included 'What experiences have you had of the programme?' and 'What changes would you like to see in the programme?' We asked empirical questions and probed for clarity.

The common critical issues that emerged from the study and recorded were:

a) Expected outcomes

- *The courses offered by universities do not match the lived reality in secondary schools.*
- *Inadequate teaching practice time for student teachers.*
- *Too much focus on theory and content*
- *Heavy workload for lecturers and has a bearing on supervision of students on SBE TP*
- *Need for more learning time, semester is too short due to late starting of lectures or tutorial*
- *Student teachers not well trained to face the pressures faced in societies that are reflected in secondary schools.*
- *Programme taught by some staff who do not have a teaching or professional qualification*

Both academics and students felt that the B.Ed. offered had some gaps that needed an urgent attention. There was a consensus that the programme was focusing too much on the specialized knowledge at the expense of other factors like preparing and equipping the student teachers with information on how to deal with divergent learners. The participants shared similar sentiments that the programme was divorced or detached from reality of what was happening in schools. Student teachers or newly trained teachers often found themselves struggling to deliver the content they would have learnt at university because of the challenges they encounter in class. Academic A from university B indicates, '*Universities need to rethink about the B.Ed. programme. The way we are teaching and preparing student teachers is not enough. They struggle when they go to schools that are these days marked by violence, theft, abuse, learners with conduct disorders, harsh societies, poverty, diseases and so forth. How will the student teacher deal with such behaviours?*' Academic AA from university C shared a similar view, '*there should be a curriculum change and development that is constructed by university curriculum developers, student teachers and school management for the universities' teaching to mirror reality of what is happening in societies. Our students are not adequately trained to deal with reality hence advocating for a curriculum reform*'. In addition to the above views, Academic AAA from university A expressed concern on the issue of staff who were teaching student teachers without them having a teaching professional qualification. AAA thus said, '*I feel that the whole system needs a revamp and reconsider the criteria that can be used to recruit lecturers in the faculty of education. How is it possible that someone without a teaching qualification trains a teacher?*'

The responses that were collected through students' focus group discussions corroborated the data collected from academics through interviews. What this implies is that the B.Ed. programme being currently offered in these 3 universities is at stuck and an urgent attention to address the issue is needed. A student from university A's focus group voiced the issue of time which they felt was not enough. The student thus said, *'We need more time, the time we spend on school based experience is too short for us to be grounded in the actual practice. Moreso, our lecturers always complain about huge workloads and this result in them not assisting us adequately during our teaching practice. They only visit us once while on teaching practice, so, we lack proper guidance. Sometimes we are even attached to inexperienced mentors in schools after being taught again by some inexperienced lecturers'*. From university B's focus group, students were concerned about the shocks they get when they go to schools for observation and school based experience. The group through one student thus said, *'Our experience at university and experience in schools is like we are in two separate worlds or planets. How we are prepared at university and what is expected of us when we go to schools is totally different. Schools expect us to mark and balance registers but at university we don't do that. Sometimes we feel discouraged and embarrassed to go on teaching practice because you feel that I am not ready to stand and face the pressure in schools. Some learners' conduct behaviours are difficult to handle'*. The other focus group from university C also raised more or less similar views to the ones raised by the other two groups. The general consensus was that the participants were not happy about how the current programme is being offered in terms of its nature, content and timeframes.

b) Actual Experiences

- *Shortage of skilled and experienced lecturers*
- *Struggling to infuse community engagement activities*
- *Lack of proper ICT infrastructure for teaching and learning*
- *Lecturers and students lack basic computer skills for teaching*

Both academics and students who participated in the study expressed concern that the B.Ed. programme had to ensure that student teachers were exposed to use of technologies to keep pace with the wonders of the twenty-first century. Some student teachers expressed that they did not have confidence to use information and communication technologies since they were not prepared for that by their lecturers. Some of the lecturers were also struggling to use those technologies. A student from university C's focus group said, *'How is it possible that in this age of technology, universities are still producing teachers who cannot go into schools and use technologies when the learners they will be teaching are a techno savvy generation?'* The implication for this question is that student teachers are not adequately capacitated to use ICTs and when they go to schools they feel lost. It also shows that their lecturers lack or have limited skills to use ICTs. This finding is in line with the finding that was established by Marongwe, Muniengwe and Chisango (2019) that some university lecturers were not infusing technologies in their teaching and learning. It also emerged from the study that some universities that participated in the study had no adequate ICT infrastructure, hence, lack of enthusiasm to use ICTs. The ICT infrastructure only improved amid the COVID19 pandemic that pushed universities to switch to online. The above issues affect directly how the universities prepare the student teachers. It can be drawn that universities will produce teachers who are not technologically orientated. When such teachers go to schools that use ICTs, they found themselves being incompetent to meaningfully use the ICTs in their teaching. This can cause learners who are being taught to misbehave in class because the teacher will not be using the means that appeal to them as techno-savvy learners

c) Mitigation Strategies

- *Reforming the programme by making it more practical than theoretical (hands-on)*
- *Content structure to be balanced and focus also on techniques and skills to deal with the changing societies*
- *A must teach with technology for all student teachers*

The study participants envisaged a B.Ed. programme that matches and speaks to what is happening in schools. Interesting proposals were submitted by both student teachers and their lecturers. There was a consensus that a curriculum reform in terms of the programme structure, content, approach and use of technology need not to be re-emphasised. The programme should be more practical and authentic to avoid a mismatch between how student teachers are trained and how things are done in schools.

8. Recommendation

The universities under study should relook at the programme they are offering. This will help to produce graduate teachers who are relevant and who can stand the societal pressures.

9. Conclusion

The paper concludes that the B.Ed. programme currently offered at universities that participated in the study has some gaps that impact negatively on the performance of student teachers when they are placed for school based experience. Some classroom realities are not addressed, and students are shocked when in class struggling to deal with reality. Use of ICTs should be infused into the training of student teachers. To sum up it all, the current B.Ed. programme being offered should be reconfigured to match the changed reality in schools and speak to the current societal pressures. The student teachers are not adequately prepared to deal with changed reality in schools.

References

- Creswell, J. W., & Creswell, J. D. (2018). *Research Design Qualitative, Quantitative, and Mixed Methods Approaches (5th, ed.)* SAGE Publications Ltd, United Kingdom.
- Darling-Hammond, L. (2006). Securing the right to learn: Policy and practice for powerful teaching and learning. *Educational researcher*, 35(7), pp 13-24.
- Darling-Hammond, L., Flook, L., Cook-Harvey, C., Barron, B., & David. (2001). Ministry of Education. 2001. National Plan for Higher Education in South Africa. Available at: <http://aafaq.kfipm.edu.sa/features/npafrica.pdf>.
- David, L. (2007). Situated learning theory. Learning Theories. [Web page]. Retrieved from: <https://www.learning-theories.com/situated-learning-theory-lave.html>
- Department of Education. (2007). The National Policy Framework for teacher education and development in South Africa. 'More teachers, better teachers'. Government Gazette No 29832. 26 April. Pretoria.
- Department of Education. (2000). Norms and standards for educators. Government Gazette No 82. Pretoria.
- Lave, J. & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge University Press, London.
- Levy, F., & Murnane, R. J. (2004). Education and the changing job market. *Educational Leadership* 62(2), pp 80.
- Marongwe, N., Munienge, M., & Chisango, G. (2019). *Can a Solution be Found Using Information and Communication Technology Gadgets in Higher Education? A Case of a Rural University*. EDULEARN19 Proceedings- Theme on - 11th International Conference on Education and New Learning Technologies. Spain – Mallorca – 1st -3rd July 2019 – Palma Bay Hotel. ISBN 978-84-09-12031-4 Pages: 1079-1088 ISSN: 2340-1117.
- Mncube, V.S. (2012). Perceptions of parents of their role in the democratic governance of schools in South Africa: are they on board? *South African Journal of Education*, 29 pp: 83–10.
- Mugenyi, E. (2021). *Family Factors, School Environment and Conduct Disorders Among Primary School Pupils in Kampala District*. Masters' Dissertation. Makerere University. Kampala.
- Nhambura, M. (2020). *Handling of violent behaviour of learners in secondary schools: A case study of Vryburg Cluster in North -West province*. North-West University, South Africa.
- Robinson, M. (2015). *Teaching and Learning Together: The Establishment of Professional Practice Schools in South Africa. A Research Report for the Department of Higher Education and Training*. Stellenbosch University and the Cape Peninsula University of Technology, South Africa
- Steyn, H. J., & Mentz, E. (2008) Teacher training in South Africa: The integrated model as viable option. *SAJHE* 22(3), pp 679–691.
- The Departments of Basic Education and Higher Education and Training (2011). *Integrated Strategic Planning Framework for Teacher Education and Development in South Africa*. Departments of Basic Education and Higher Education and Training, Pretoria.
- Van der Walt, J. L., & Fowler, S. (2006). *Constructivist teaching-learning theory: A stewardship approach*. In *The call to know the world: A view on constructivism and education*, eds. B. de Muynck and J. L. van der Walt. Amsterdam: Buijten and Schipperheijn

TEACHING AND LEARNING THE MULTIPLICATION TABLE BY USING MULTIPLICATIVE STRUCTURES: VARIATION AND CRUCIAL PATTERNS

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Abstract

This paper examines and analyzes how students learn multiplication tables, specifically the role of multiplicative structures and how these are used as students learn to master the tables. The analysis is performed in the context of the generalization process related to the teaching activity focusing students' perception of concepts. The theoretical approach applies Davydov's concept of theoretical generalization as perception-conception-elementary concept (PCE model) and Vergnaud's theory of multiplicative structures in three classes: mapping rule (MR), multiplicative comparison (MC), and Cartesian product (CP). For the methodological design, Marton's variation theory has been chosen.

This study includes two teachers and 40 students in two Year 3 classes, followed two years later by one teacher and 25 students in one Year 5 class. The analysis of the outcome is based on documented classroom observations, one-on-one interviews with students and teachers' reflections on students' learning outcomes. The conclusion of the study is that the generalization of multiplication is a difficult process for students, especially in the classes MC and PC, and one that sometimes results in challenges to identifying multiplicative situations and relating these to the multiplication tables. This illustrates that teaching activities and teachers' support are necessary conditions for students' learning. The study also shows that multiplicative structures can help students to find and systematize crucial patterns in the multiplication table, allowing them to learn the multiplication table in a more efficient and structured manner. During the one-on-one interviews, students actively searched for and found structures and solutions that did not come up during lessons. This shows that multiplicative structures are a suitable didactic tool for identifying patterns in multiplication tables, thereby facilitating learning other than by rote.

Keywords: *Multiplicative structures, multiplication table, generalization, student's perception, elementary basic concepts.*

1. Introduction

Multiplicative structures are one basis for understanding the concept of multiplication and for finding interesting patterns in the multiplication tables. Multiplicative thinking is one of the "big ideas" of mathematics that provide students with tools for learning different content during their early school years. According to Hurst & Hurrell (2014), in primary and middle school the nature of students' learning of multiplication is mostly procedural and their multiplicative thinking and understanding of multiplication may differ. The issue of learning multiplication and multiplication tables through empirical learning has also been addressed by researchers such as Gierdien (2009) and Downton (2015). Their empirical studies show that multiplication teaching is culturally based, often with the emphasis on repeated addition (Askew, 2018; Van Dooren et al., 2010). Earlier studies suggest that students in Years 5, 7 and 9 often intuitively use the primitive model of repeated addition (Fischbein et al., 1985). Researchers agree that the structural characteristics of multiplication play an important role in learning to understand the concept of multiplication (Park & Nunes, 2001; Sherin & Fuson, 2005). Multiplicative thinking is a complex process to grasp, not only for students but also for teachers. Heng & Sudarskan (2013) have challenged teachers' pedagogical assumptions about what it means to teach for student understanding, with a focus on multiplicative thinking. This implies that, when it comes to multiplication, the organization of teaching must include elements to activate students' learning and to create the conditions for structured learning. The guiding principle of teaching plays a central role and will help students to generalize

essential-intuitive-primitive models for multiplication into general, more abstract models. The teaching activity guides students through the various steps of transforming the problem situation and identifying crucial relationships within it. This constitutes the concept of multiplication as a basic level for multiplicative thinking (Kaput, 1985). The development of instructions for promoting mathematical strategies, supporting teachers in understanding mathematical concepts, and helping them to understand when and how students are ready to learn, are a necessary condition for teaching (Ball, Thames & Phelps, 2008). This also implies that students need active support to change and develop their perceptions of multiplication (Vergnaud, 1988).

The development of conceptual thinking and its significance for students' multiplicative thinking is described by Wright (2011), who points out that the student's previous experience of applying the concept is crucial to identifying relationships in different contextual situations, thus activating the student's knowledge as a resource for learning multiplication.

One theoretical approach to conceptualization and generalization is described by FeldmanHall (2018), who emphasizes that generalization is a logical device usually connected with the process of learning. As a teaching method, generalization is closely linked to the process of formatting mathematical concepts as a basis for learning as a mental activity in the transition from perception to concept, e.g., "... a generalization is made – that is, similar qualities in all objects of the same type or class are acknowledged to be general" (Danilov & Esipov, 1957 p. 77). Empirical studies about generalization and conceptualization in the teaching and learning process are described by (Kennedy, 1997; Onwuegbuzie & Leech, 2009; Williams & Young, 2021).

The present empirical study is not investigating an epistemological context related to the generalization of multiplication tables by multiplicative structures as different multiplication models. This study examines the role played by the generalization of multiplicative structures in students learning of the multiplication table, within the framework of Davydov's (1990; 1992) and Vergnaud's (1983) theoretical approach.

2. Theoretical approach and design

Davydov's model emphasizes the connection between generalization and conceptualization. According to Davydov, generalization – a phenomenon related to the mental process – is used to describe different aspects of students' learning. The empirical-theoretical approach taken by Davydov (1990; 1992) indicates that generalization and conceptualization are key components of how schools teach mathematics. As a result of generalization, the student's "...ability to abstract himself from certain particular and varying attributes of an object is noted" (p. 5). This implies that the student's understanding of the nature of facts can be expressed in a verbal response and recognized in a familiar situation. A necessary precondition for the development of the student's ability to generalize and conceptualize is mathematical activities in teaching. These activities must be planned with the emphasis on the content of concept and teacher-student discourse, where students analyze, constitute, recognize and produce verbal responses. Davydov interprets the generalization process as consisting of three linked elements: perception, conception, and concept. The student's apprehension of concept is a result of generalized perceptions and conceptions of many similar objects with a focus on the object's crucial properties. The transition from perception to concept is not an easy process for students of primary school age to grasp. For them, generalization is a form of representation and "elementary concepts". For the purposes of this study, the model of generalization used is "perception–conception–elementary concept" (PCE). According to Davydov (1990), the transition to concept requires that "students master the entire aggregate knowledge about the objects to which the given concept pertains" (p. 12). To make a connection to the theoretical framework about concept as multiplicative structure, it is linked to Vergnaud (1983).

Vergnaud (1983) defines the multiplicative structure of multiplication thus: "Multiplicative structures rely partly on additive structures; but they also have their own intrinsic organization which is not reducible to additive aspects". According to Vergnaud (1983), different multiplicative problems can be described by different multiplication models. These models can be divided into three classes as a base for multiplicative structures: the mapping rule (MR), also known as repeated addition; multiplicative comparison (MC), also known as enlargement; and Cartesian product (CP) including properties of commutativity. These models are used as a context for this study.

3. The study

The study is a part of a project focused on how students learn multiplication tables using multiplicative structures (MR, MC and CP), as well as the role of multiplicative structures for Year 3 and 5 students learning the multiplication table using PCE theory.

4. Methods

4.1. Variation theory

Variation theory (Marton, 2015) is a general theory of learning with its roots in phenomenography. For learning to take place, there must be a focus on the crucial aspects of the object of learning. At the same time, there must be some variation in some crucial aspects while others remain constant. From the teachers' point of view, this requires a good overview of and insight into the content, as well as knowledge of the subject in question (Shulman, 1986), otherwise the teacher will be neither able to plan sustainable teaching nor identify the crucial aspects of students' conceptions of the actual phenomenon. In this study, variation theory is used as a methodological design to analyze the variation of teaching activities with the emphasis on multiplicative structures and crucial patterns in the multiplication table related to multiplicative structures.

4.2. Data collection

Participants in the study were two teachers and 40 students in two Year 3 classes, followed two years later by 25 of the same students, now in Year 5. Data were collected by observing the teaching process and conducting one-on-one interviews with students in Year 3 and then later in Year 5. All data were transcribed and systematized for analysis related to the theoretical tools. In Year 5, students were asked the same questions about multiplication and multiplicative problems as in Year 3.

5. Findings from the study

5.1. Finding 1

During one lesson 1 in Year 3, the teaching activity was based on Figure 1. The task was formulated thus: *Describe the picture as addition and multiplication.*

Figure 1. Picture from the textbook *Favorite Mathematics (2013)*.



A sample of the student's answers is:

Student 1 $3 + 3 + 3 + 3 = 12$

Student 2 $4 \times 3 = 12$

Student 3 $3 \times 4 = 12$

Student 4 $3 \times 12 = 12$

Student 5 $2 \times 6 = 12$

The answers demonstrate the students' varying perceptions. While the focus was on different ways of explaining multiplicative situations through the three multiplicative structures, the teacher-student discourse was a communication in triads, question-answer-reaction, and offered limited possibilities for the teacher to ascertain in whether the answers achieved consensus. For example, the answer $2 \times 6 = 12$ was rejected although there are 6 birds on each side of the trunk, and the teacher did not pay attention to the connection between $4 \times 3 = 12$ and $3 \times 4 = 12$, the commutative law for multiplication. It is in fact difficult to find any clear goal for that part of the lesson.

5.2. Finding 2

The results of observations and interviews suggest that most of the students perceived MR as a multiplicative structure. That said, it was difficult for most of them, even in Year 5, to connect this to an MC structure and use it to analyze the structure of the multiplication table, CP. One reason for this is the problem in perceiving the commutative law for multiplication in a repeated addition.

5.3. Finding 3

Few of the students in Year 5 were able to perceive the property of commutativity. During the interviews, one question was: Which sum is larger, $4 + 4 + 4 + 4 + 4 + 4 + 4 + 4$ or $7 + 7 + 7 + 7$? Only four

of the students were able to understand these repeated additions as multiplications and use the commutative law for multiplication. The other students reasoned as follows:

Student 1 *It is $7 + 7 + 7 + 7$*

Teacher *Why, can you explain?*

Student 1 *Because 7 is a bigger number than 4*

Student 2 *I think it is the one with 4's*

Teacher *Can you explain why?*

Student 2 *$4 + 4$ equals 8. And there are just four 7s. So, my feeling is that this one is bigger*

An understanding of commutativity is a crucial aspect of the multiplication table. This shows the importance of developing MR into MC and CP to understand a multiplicative property like commutativity and later associativity and distributivity.

5.4. Finding 4 Multiplicative structures and crucial patterns in the multiplication table

Interviews with Year 5 students demonstrate that most of the students were able to read the multiplication table using MR and MC structures. However, at the beginning of the interviews few students were able to identify CP structures and use them to find crucial patterns in the multiplication table; not even the four students who knew the multiplication table by heart. During the interviews, the students were made aware of one or two CP structures, after which most of them were able to find relationships between even and odd products, commutativity as symmetry in the table, and sometimes even patterns in the five- and nine-times tables. While students clearly had no problem understanding multiplicative structures in the multiplication tables, unless these are highlighted, they will not notice them.

6. Discussion and conclusions

The study shows that the generalization of multiplication, especially from MR to MC and CP, is a difficult process for students to grasp. This illustrates the fact that teaching activities and support from teachers are necessary preconditions for students' learning. The study also shows that multiplicative structures, such as even and odd functions and commutativity, can help students to find and systematize crucial patterns in the multiplication table and thus learn the multiplication table in a more efficient and structured manner. In interviews, students actively searched for and identified structures and solutions to problems that had not come up during lessons. Multiplicative structures are suitable didactical tools to support students in finding patterns in the multiplication table, thereby facilitating their learning of basic facts, not only by rote but also in an algebraic context.

References

- Askew, M. (2018). Multiplicative reasoning: Teaching primary pupils in ways that focus on functional relations. *The Curriculum Journal*, 29(3), 406-423.
- Ball, D. L., Thames, M. H., & Phelps, G. (2008). Content knowledge for teaching: What makes it special? *Journal of Teacher Education*, 59, 389-407.
- FeldmanHall, O., Dunsmoor, J. E., Tompary, A., Hunter, L. E., Todorov, A., & Phelps, E. A. (2018). Stimulus generalization as a mechanism for learning to trust. *Proceedings of the National Academy of Sciences*, 115 (7). E1690-E1697.
- Fischbein, E., Deri, M., Nello, M. S., & Marino, M. S. (1985). The role of implicit models in solving verbal problems in multiplication and division. *Journal for Research in Mathematics Education*, 16 (1), 3 - 17.
- Danilov M. A., & Esipov B. R. (1957). *Didaklika [Didactics]*. Moscow: Publishing House of the RSFSR Academy of Pedagogical Sciences.
- Davydov, V. V. (1990). *Types of generalization in instruction: Logical and psychological problems in psychological problems in the structuring of school curricula*. Reston, VA: National Council of Teachers of Mathematics.
- Davydov, V. V. (1992). The psychological analysis of multiplication procedures. *Focus on Learning Problems in Mathematics*, 14(1), 3-67.

- Downton, A. (2015). Links between multiplicative structures and the development of multiplicative thinking. *Annual Conference of the International Group for the Psychology of Mathematics Education*. Australia: Proceedings of the 39th Conference of the International Group for the Psychology of Mathematics Education, 217–224.
- Heng, M.A. & Sudarshan, A. (2013). “Bigger number means you plus” – Teachers learning to use clinical interviews to understand students’ mathematical thinking. *Educational Studies in Mathematics*, 83(3), 471 - 485.
- Hurst, C. & Hurrell, D. (2014). Developing the big ideas of number. *International Journal of Educational Studies in Mathematics*, 1(2), 1-18.
- Gierdien M. F. (2009). Musings on multiplication tables and associated mathematics and teaching practices. *Pythagoras*, 70 (70), 16-31.
- Kaput, J. J. (1985). *Multiplicative word problems and intensive quantities: An integrated software response* (Technical Report). Cambridge, MA: Harvard Graduate School of Education, Educational Technological Center.
- Kennedy, M. M (1997). The connection between research and practice. *Educational Researcher*, 26(7), 4-12.
- Marton, F. (2015). *Necessary conditions of learning*. London: Routledge.
- Onwuegbuzie, A. J. & Leech, N. L. (2009). Generalization practices in qualitative research: a mixed methods case study. *Quality & Quantity*, 44, 881-892.
- Park, J.-H. & Nunes, T. (2001). The development of the concept of multiplication. *Cognitive Development*, 16(3), 763-773.
- Sherin, B. & Fuson, K. (2005). Multiplication strategies and the appropriative of computational resources. *Journal for Research in Mathematics Education*, 36(4), 347-395.
- Shulman, L. (1986). Those who understand: Knowledge growth in teaching. *Educational Researcher*, 15(2), 4-14.
- Van Dooren, W., De Bock, D., & Verschaffel, L. (2010). From Addition to Multiplication ... and Back: The Development of Students’ Additive and Multiplicative Reasoning Skills. *Cognition and Instruction*, 28(3), 360 – 381.
- Vergnaud, G. (1983). Multiplicative structures. In R. Lesh & M. Landau (Eds.). *Acquisition of math concepts and processes*, 127-174. New York: Academic Press.
- Vergnaud, G. (1988). Multiplicative structures. In J. Hiebert, & M. Behr (Eds.). *Number concepts and operations in the middle grades*, 141–161. Hillsdale, NJ: Erlbaum.
- Williams, A. M. & Young, J. (2021). Reliability generalization meta-analyses in mathematics education research: A research synthesis. *International Journal of Education in Mathematics, Science and Technology (IJEMST)*, 9(4), 741-759. DOI:<https://doi.org/10.46328/ijemst.1434>
- Wright, V. J. (2011). *The development of multiplicative thinking and proportional reasoning: Models of conceptual learning and transfer* (Thesis, Doctor of Philosophy (PhD)). Hamilton, New Zealand: The University of Waikato.

STUDENT TEACHERS' PERCEPTIONS OF THE ASSESSMENT OF VIDEO-RECORDED LESSONS DURING TEACHING PRACTICE

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Abstract

Lecturers have not been able to go to schools where student teachers were placed for teaching practice, to physically sit in classrooms to observe and assess their lessons. This is due to Covid-19 lockdown regulations in South Africa. For this reason, students were instructed to video-record their lessons, and submit them to lecturers for observation and assessment of their teaching competence. As a result of this unprecedented venture, the researchers sought to determine student teachers' perceptions of the video-recorded lessons, and the assessment thereof. A qualitative research approach was employed to carry out this study because the researchers intended to understand in-depth, the student teachers' views and perceptions regarding their video-assessed lessons. Individual interviews were conducted among a sample of 40 third-year students, which were purposefully selected. Collected data were analyzed by means of identification of patterns and themes. Findings revealed that most student teachers preferred video-recording their lessons and sending them to lecturers for assessment. They felt less nervous and anxious, and thus made fewer mistakes when it was just them and the learners in the classroom, as opposed to when the lecturer or mentor teacher sits in and observes them as they conduct lessons. However, they preferred mentor teacher/lecturer feedback over feedback from their peers. The study highlighted the need for a shift, from lecturers being physically present in the classroom to observe and assess student teachers' teaching competence, to assessing video-recorded lessons and providing students with feedback.

Keywords: *Assessment, teaching practice, video-recorded lesson.*

1. Introduction

The COVID-19 pandemic caused disruptions in many sectors including education. Several systems were affected at schools and universities alike. Prior to this pandemic student teachers, we placed in schools to undergo teaching practice as part of their Work-integrated learning (WIL). The teaching practice is in most cases over a period of two to four weeks depending on the year level of the student-teacher.

At the Central University of Technology (CUT), first and second-year Bachelor of Education (B.Ed.) student teachers predominantly do school and classroom observations for a period of between two and three weeks. While third and fourth-year students do their teaching practice in the form of co-teaching together with their respective mentor teachers, allocated to them by their school management where they have been placed. The co-teaching process involves the capacitation of student teachers with skills in lesson preparation, lesson presentation, planning and execution of assessment of classroom tasks, classroom management, and other critical skills in the practice of teaching. During this period, university lecturers are dispatched to different schools to evaluate these third and fourth-year student teachers on the practice of teaching.

As a result of the COVID-19 pandemic, this teaching practice system was disrupted as lecturers were unable to conduct these student-teacher evaluations. This prompted the CUT to come up with an alternative strategy for these school visit evaluations. The lecturers proposed the implementation of remote evaluation of student teachers during teaching practice. With this system student teachers were expected to video record themselves presenting lessons and these video-recorded lessons are sent to lecturers for assessment of their teaching competencies.

1.1. Video-recorded lessons

Apart from it being a forced strategy to implement during the COVID-19 pandemic video-recorded lessons have many advantages. First, video-recorded lessons have the potential to encourage collaborative teaching among student teachers and their mentor teachers (Vedder-Weiss, Segal & Lefstein, 2016). This is because opportunities to learn are constructed through actions and interactions interpreted by peers within a learning environment and in this case among student teachers (Chizhik & Chizhik, 2018, Coddington, 2017).

Second, with its ability to make classroom practices public video-recorded lessons enable interaction and free feedback among student teachers, their mentor teachers, and their lecturers. This is because it prompts discussions of pedagogy and practice examines student thinking and fosters reflection on the practice of teaching (Chizhik & Chizhik, 2018). Third, it enables student teachers to explore the theory of teaching as presented in practice and therefore sharpen their understanding of the teaching environment (Vedder-Weiss, Segal & Lefstein, 2016).

Fourth, through its ability to encourage rehearsals student teachers are at liberty to fine-tune different skills like the skill of set establishment, the skill of probing questions, the skill of stimulus variation, the skill of explanation, etc. Viewing one's own video is more motivating and stimulating for learning (Coddington, 2017). The video recordings were regarded as more appropriate in line with the disruptions brought about by the Covid-19 pandemic to the teaching practice period.

2. Methodology

This study sought to determine the perceptions of a university of technology's student teachers on the assessment of their video-recorded lessons presented during teaching practice. For this reason, a qualitative research approach was used to collect data from the research participants. Qualitative research, according to Denzin and Lincoln (2003:5-13), is concerned with the studied use and collection of empirical materials, for example, a case study, personal experience, introspection, interview, artifacts, cultural texts and productions, observational, historical, interactional, and visual texts that describe routine and problematic moments and meanings in individuals' lives. The word qualitative implies an emphasis on the qualities of entities and on processes and meanings that are not experimentally examined or measured. The qualitative approach was best suited for this study because there was no interest in carrying out any experiments or measuring any quantities. This study was rather focused on understanding student teachers' feelings and perceptions of the assessment of their video assessed lessons that they presented during teaching practice.

Hammarberg, et.al (2016:499) assert that qualitative research methods are suitable and fitting when truthful and authentic information is required to answer the research question. These methods are also used to answer questions about perspective, meaning, and encounter, from the participant's point of view. In this study, the researchers relied heavily on factual data collected from the views, experiences, and opinions of all the research participants. The researchers also sought truthful and authentic information directly from the student teachers regarding how they perceived the assessment of their video-recorded lessons.

Devetak, et al (2010:77) further reports that the aim of a qualitative study is to collect data in the form of rich content-based descriptions of people, events, programs, processes, and situations. Qualitative research was chosen for this study by virtue of its nature of engaging in an in-depth study rather than focusing on numbers, measurements, and statistics.

3. Data collection

Open-ended interview questions were used to determine the student teachers' perceptions of the assessment of their video-recorded lessons during teaching practice. According to Weller et al. (2018: 2), open-ended questions are used for the in-depth exploration of a particular phenomenon. A sample of 40 third-year students was purposefully selected to participate in this study due to their position as senior students who had to video-record the lessons they presented during teaching practice. These lessons were submitted to lecturers electronically for assessment. Because of the regulations of the covid-19 lockdown in South Africa at the time, these interviews were sent to students and administered in WhatsApp groups that were created for this purpose.

4. Results

While student teachers were doing their teaching practice amid lockdown due to the covid-19 pandemic, the lessons they presented to learners were assessed in two ways. Firstly, their school mentor teachers attended their classes to observe them as they conducted the lessons. These mentor teachers used an assessment rubric to award marks according to their performance and competence.

Secondly, students video-recorded their lessons and shared these videos amongst themselves according to their groupings and gave each other feedback on their performance. Students in a particular group had to choose one video and submit it to their lecturer for evaluation. This they do after consultations and peer reviews within their respective groups. The results of the open-ended interview questions are presented in two parts as detailed below.

4.1. Results when assessed by the mentor teacher

All 40 students were asked if their mentor teachers assessed any of their lessons besides the video-recorded lessons, and they all were assessed by their mentor teachers for some lessons.

28 students reported that they were anxious and extremely nervous having to present lessons in the presence of the mentor teacher, and thus fumbled through the lesson, resulting in low marks awarded.

Here are some of their responses when asked how the presence of the mentor teacher affected their performance:

- *“I felt very intimidated by the presence of the mentor teacher, and I could not be myself”*
- *“I was always worried that I was making mistakes, and I actually ended up forgetting simple things such as outlining lesson outcomes”*
- *“He was looking right at me, and I could not even speak loud and clear. My voice was literally trembling”*

12 students reported that they were reasonably calm and at ease when presenting the lesson, and thus did not fumble.

4.2. Results when the video-recorded lesson was assessed by peers and sent to the lecturer for assessment

All 40 students reported that they were neither anxious nor nervous about having to present video-recorded lessons in the absence of the mentor teacher.

Here are some of their direct responses when asked how their performance was affected while recording their lessons in the absence of the mentor teacher, and sharing them amongst each other as peers:

- *“I was quite comfortable when he was not there, and I was feeling myself”*
- *“I felt very relaxed and as a result I executed my lesson according to plan”*
- *“The lesson was smooth-flowing because I could be myself all alone with the learners”*
- *“I was not worried about making mistakes and this put me at ease”*
- *“I was so relaxed I could even crack some jokes related to the lesson, which made the lesson more interesting and interactive”*

4.3. Results regarding feedback by mentor teacher vs peers

Asked if they preferred to get feedback on their lessons from their peers or mentor teachers, 33 students mentioned various reasons why they prefer feedback from the mentor teacher. 7 students reported that they preferred feedback from their fellow students. Here are some of their direct responses:

- *“I prefer that the mentor provides feedback on my lesson because she has much more experience than my peers”*
- *“I trust the mentor’s feedback more because she observed me teaching live and was able to correct my mistakes immediately”*
- *“I trust my mentor’s feedback because he is such an expert in Mathematics”*
- *“My fellow students and I are at the same level. I do not fully trust their feedback”*
- *“As students, we relate more to each other than we do with teachers or lecturers. I can definitely rely on feedback from my peers”*

5. Discussion of results

This study found that student teachers' performance as they present lessons in the presence of either a mentor teacher or lecturer, may take a decline. This is due to anxiety or nervousness about having to teach learners in the presence of a more knowledgeable figure, and the fear of making mistakes resulting in the loss of marks.

Students tend to perform much better when the environment in which they operate is neither tense nor intimidating.

Even though they prefer video-recording their lessons in the absence of the teacher or lecturer, they still trust and prefer teacher/lecturer feedback on their lesson over feedback from their peers!

The study highlighted the need for a shift from lecturers being physically present in the classroom to observe and assess student teachers' teaching competence, to assessing video-recorded lessons and still providing students with swift feedback on their performance.

References

- Chizhik, E & Chizhik A. 2018. Value of Annotated video-recorded lessons as feedback to teacher-candidates. *Journal of Technology and Teacher Education*. 26(4), 527-552
- Codding L. 2017. Teachers' Perspectives on using video-recorded lessons during professional development. Annual Meeting of the American Education Research Association. April 1- 27
- Denzin, K.N. & Lincoln, S.Y. 2003. *Collecting and interpreting qualitative materials*. London: Sage.
- Devetak, I. Saša, A. Glazar, G & Vogrinc, J. 2010. The role of qualitative research in science education. *Eurasia journal of mathematics, science & technology education* 6(1): 77-84. (http://www.ejmste.com/v6n1/EURASIA_v6n1_Devetak.pdf) Retrieved on 16 February 2022.
- Hammarberg, K., Kirkman, M. & de Lacey, S. 2016. Qualitative methods: when to use them and how to judge them. <https://academic.oup.com/humrep/article/31/3/498/2384737>. Retrieved 14 May 2020
- Vedder-Weiss, D, Segal, A & Lefstein, A. 2016. Managing threats to teacher face discussions of video-recorded lessons. *International Conference of the Learning Sciences (ICLS) proceedings*. 783-786
- Weller, S.C. Vickers, B. Bernard, H. R. Blackburn, A. M. Borgatti, M. Gravlee, C.C. and Johnson, J. C. 2018. Open-ended interview questions and saturation. *PLOS ONE*.

A HUMAN RIGHTS CENTRED HISTORICAL APPROACH TO TEACHING SCIENCE FOR SOCIAL CHANGE

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Abstract

The COVID-19 pandemic brought to light uncomfortable realizations for science educators; it has become patently obvious how much confusion and misunderstanding there exist about basic scientific facts that could help one make informed decisions, from individual choices to policy making at all levels of government. The extreme polarity in public and private discourses related to COVID-19 might be augmented by political views, economic interests and social media algorithms, but at the bottom of it all there is a lack of understanding of scientific concepts and of the nature of science, as well as its sociocultural and historical contexts. There is also a lot of skepticism about science and scientists. This skepticism is not completely out of place; historically, there are embarrassing large numbers of cases in which human rights were infringed in the name of advancements of scientific knowledge. There are also incredible contributions of science to upholding and improving human rights. Whereas scientific discoveries are presented by the media as noteworthy and celebrated, there is a lack of intentional exploration and meaningful discussion of the “ups and downs” of science throughout its history and across cultures in the context of its relationship with human rights. To address this issue, I developed and implemented two courses designed for pre-service and in-service teachers, exploring the rather turbulent history of science and human rights from ancient times to the present day, from a perspective that considers both science and human rights within social, cultural and historical contexts, and highlights the contributions of science to human rights causes, from both negative and positive cases. Rather than promoting a naïve view of science as an a-cultural practice, detached from its sociocultural and historical context, and uncritical of the hegemonic Western, Judeo-Christian, White, male, heteronormative and colonial grounds on which rests the mainstream science presented in grade school textbooks, the courses pushed the boundaries of the very definition of science and its role in human rights causes, challenging students to consider the many implications of how we define, present and study science in schools, as well as how we promote and use scientific knowledge in our lives. Students in the courses were challenged to (re)envision science and human rights as they critically analyzed predominant Discourses from an eco-pedagogical social-cultural and historical perspective. A description of the courses and results evidencing the impact of the courses on students’ conceptualizations of science education for social change are reported in this conference presentation.

Keywords: *Science education, human rights, teacher education, sociocultural and historical context, equity.*

1. Introduction

The Faculty of Education at the University of Manitoba offers four programs: a Bachelor of Education (BEd); a Post-Baccalaureate Degree in Education (PBDE); a Master of Education (MEd); and a Doctor of Philosophy in Education (PhD). The BEd program is a post-degree, two-year teacher preparation program, catering primarily to provincial students. Students apply for one of three possible streams: Senior Years (focused on curriculum, teaching and learning in high school, that is, from grades 9 to 12 in the province of Manitoba); Middle Years (focused on grades 5 to 8); and Early Years (focused on Kindergarten to grade 4). Students admitted into the Senior Years Stream must hold minimum course credit hours on two specific teachable areas, which become their major and minor teachable disciplines in the BEd program. The BEd program encompasses 60 credit hours, distributed among 20 courses (5 per term, including a practicum in K-12 schools). Senior Years Stream students have the option to choose one out of three *Themes* courses during their last term in the program, which fulfils one of the five electives in their program. One of the courses I describe and discuss in this conference presentation is a *Themes* course for Senior Years Stream students in the BEd program.

The second course I describe and discuss in this presentation was offered at the PBDE level, also open for registration to graduate students. The PBDE program is a post-undergraduate program

encompassing 30 credit hours of coursework. Unless students are seeking specific certification, there are no required courses in this program. The vast majority of PBDE students are in-service teachers taking the program as professional development and/or for upward salary scale placement. The MEd program requires 18 credit hours of coursework and a thesis, or 30 credit hours of coursework and a comprehensive paper. MEd students must take a combination of core courses (mandatory courses), concentration courses (focusing on a specific educational field of their choice), and research methods courses (at least one for the comprehensive route and two for the thesis route). The comprehensive route also allows students to take elective courses to complete the required 30 credit hours of their MEd program. The course I report on in this presentation is commonly referred to as a *Topics* course, which are newly developed courses offered no more than three times in any one of the post-undergraduate level programs at the Faculty of Education, and which typically encompass recent developments, current perspectives, or innovations in curriculum, teaching and learning, reflecting the expertise of faculty members and student demands, and responding to the need for new courses to be developed and offered from time to time, without becoming permanent offers in the course calendar for each program¹. Thus, the *Topics* courses are excellent opportunity to pilot new courses and to respond to time sensitive issues (for example, the many implications of the COVID-19 pandemic restrictions on teaching and learning). The course I developed and taught as a *Topics* course worked as a pilot for a new MEd specialization currently being planned for our MEd program, which is being proposed on the basis of a strong sociocultural and critical stance for Mathematics Education and Science Education, and also as an opportunity to better align the courses offered in our PBDE and graduate programs in science education to the strategic plan and vision of the Faculty of Education and of the university, particularly regarding equity and inclusion initiatives. My desire to design and implement such a course also stemmed from my teaching philosophy for science education and my perception of the immediate need for change in how we conceive of science and the purpose of science education in K-12 schools, as well as our role as science educators in society given the many challenges we face in the Anthropocene. The public debates raging on social and traditional media outlets during the COVID-19 pandemic fueled the urgency for a provocation that could and hopefully would stir pre-service and in-service teachers towards critically appraising their roles and responsibilities as science educators and re-imagining possibilities for action and social change through science education.

In the next sections, I describe the two courses and, subsequently, I discuss the impact of the courses on students, inferred from students' course work, discussions, and final assignment submissions. Finally, I propose next steps for us, science educators and teachers of a new generation of citizens who are tasked with furthering the pro-equity, pro-inclusion and pro-sustainable future agendas to overcome the challenges of our times.

2. Course descriptions

Both courses were offered during the Winter 2022 term (January–April). The BEd Themes course was titled *Teaching Science as Cultural Activity: A Human-Centered Approach*. There were 29 students enrolled, all of them in their last term of the program. Students' major teachable areas included Biology (10), Chemistry (1), English (2), General Science Education (1), Geography (1), Heritage/Aboriginal/World Languages (2), History (1), Music (1), Mathematics (1), Physical Education (7), and Physics (2). I have previously taught most of these students (22) during their BEd program. The PBDE Topics course was titled *Teaching Science for Social Change: The People and the Stories that Changed the World*. It had 18 students enrolled, 10 of which were MEd students at various stages in their programs. Previously, I have taught four of the students in this course and I had professional interactions with several others. Knowing many of the students facilitated rapport and the establishment of a safe space where sensitive and, at times, uncomfortable topics were discussed as part of these courses. We met twice a week for 9 weeks for the BEd course (total of 32 contact hours), and once a week for 12 weeks for the PBDE course (total of 34 contact hours). Both courses were delivered remotely and synchronously, via Zoom©, due to the university COVID-19 pandemic restrictions to in-person meetings.

The stated purpose of the BEd course was to explore “historical and contemporary stories of scientists to illustrate an approach to school science that moves away from a focus on the body of scientific knowledge or preparation for employment in the high-tech, knowledge-based global economy and illuminates the interdependence of science and society and science and the humanities” (McMillan, Pozzer, & Hechter, 2017) by “follow[ing] the trajectory of science as a discipline through sociocultural lens,” making explicit “the connections of science and society, the cultural and normative grounds of scientific thought, Discourses and practices, as well as the multicultural and interdisciplinary nature of early scientific endeavors” (Pozzer, 2022a). Hence, a major focus of the course content was on

¹Such courses can become permanent, but only after submission of a proposal justifying the demand for and benefits of the course for the program, which involves approval at various levels within the university.

non-Western history of science and the inclusion of scientists' profiles and contributions from diverse ethnicities, nationalities, cultures and genders. The *Encyclopaedia of the History of Science, Technology and Medicine in Non-Western Cultures* (Selin, 2020) became a foundational reference source for course development, given that many of the sources consulted focused exclusively or primarily on Western history of science and scientists (e.g., Bauer, 2015; Fara, 2009; Gribbin, 2004; Wooton, 2015). In addition to personal and contextualized stories of scientists, which humanized them and demystified the “hero” and “genius” character commonly associated with famous scientists, the content in the course was presented following a chronological trajectory that emphasized the intimate connections of scientific pursuits and advancements to the social and cultural values and norms of the times (Bauer, 2015; Dewitt, 2018; Ede & Cormack, 2017; Wooton, 2015). Teaching and learning strategies included multimodal lectures, whole-class discussions, small group discussions (through Zoom© breakrooms), key readings that students collaboratively summarized and presented in class as multimodal posters (using Mural©), student-led multimodal presentations on specific topics, and guest speakers presenting on the intersections of Western mainstream science and Indigenous Science in Canada.

The PBDE course stated purpose was to explore “the sociocultural and historical context of scientific breakthroughs that changed the world and contributed to human rights causes,” familiarizing students with “sociocultural and eco-pedagogical perspectives on history of science and scientific literacy” (Poizzer, 2022b). From the very first day, students were introduced to the works of Freire (2005), Misiaszek (2018), and Martusewics, Edmundson and Lupinacci (2011) on ecopedagogy. Selected concepts from the works of Chomsky (1999), Gee (2007), and Bourdieu (1991) were used as framework for analysing hegemonic Discourses in mainstream Western Modern Science (WMS, an acronym also sarcastically referred to as White Male Science). The course included an extensive bibliography on science education for equity and social justice, ecojustice education, ecopedagogy, science and human rights, and decolonization of science, curriculum, teaching and learning. Every class, students were introduced to a short story of the trajectory of human scientific knowledge on a specific topic, including contributions from non-Western cultures and the social and cultural contexts of the times of major contributions and advancements in that field. Then, a discussion ensued regarding the uses and misuses of scientific knowledge and its products, which was based on the materials students were required to read/watch/listen to in preparation for class. The themes of these classes were: The universe; The invisible world; Physics & Medicine; Evolutionary Theory; Transportation; Genetic Engineering; Communication; and Eco-centric ecological perspectives & Indigenous Science. The materials students accessed in preparation for class included academic writings (articles and book chapters), movies and documentaries, podcasts, fictional short stories, webpages and songs. During class, students were also shown artwork and listened to songs, which they were then invited to analyze or otherwise respond to during class discussions.

In both courses, one of the major assignments required students to research the story of a scientist of their choice, including the sociocultural historical context and emphasizing particular issues identifiable in this story, such as, for example, gender or sexual bias, cultural or ethnic bias, nature of science, normative nature of scientific Discourses, ethical issues, or societal in/equity issues. Students should also situate the major contributions of this scientist into our current understanding of the physical world, within a narrative of our trajectory as humans to develop scientific knowledge of this concept, i.e., how this scientist's contribution gave continuation or challenged/changed our understanding of a particular aspect of the physical world and the social consequences of this. In the BEd course, students completed five profiles, and they were asked to showcase diversity in the scientists they have chosen to profile. In the PBDE course, students completed 3 profiles, and these should be connected to human rights causes. In both courses students were encouraged to vary the format in which they submitted the stories, ensuring their presentations were informative, engaging and multimodal.

The final assignment for the PBDE students was a short story, fictional or historical fiction, in which they elaborated on how science has contributed to the advancement of human rights and eco-social justice causes. Students were encouraged to write in any format they prefer (e.g., essay, comic strip, photo-novella, fable, fairy tale, poetry, etc.). During the last two meetings in the course, students read their stories aloud to the class. Allowing students to share their stories orally was intentionally designed to resonate with the many cultures around the world where the telling of stories is a quintessential aspect of their cultural traditions.

Through sharing all their assignments with the class, a repository was created of a very diverse group of scientists, from ancient to current times and from all fields of science, whose contributions have or are changing the world. During classes, students were exposed to examples of different ways of delivering content, different presentation formats, as well as critical sociocultural analysis of curriculum content and historical narratives in science. In the PBDE course, students read *Octavia's Brood* (Imarisha, Brown, & Thomas, 2015), a collection of short science fiction stories, and they completed two exercises designed to help them develop a plot for the short stories they were required to write as a final course assignment.

3. Students' work and responses to the courses

Overall, student reception of course content was positive, albeit students recognized the many challenges some of the course content posed to them, both personally and as educators. Among these challenges, students recognized the need for changing practices in their lifestyles and in their pedagogy. They also came to the realization that science is not neutral and therefore their science teaching is not and cannot be politically and culturally neutral either. In the BEd course, the first few weeks of class were spent on helping students understand the meaning of sociocultural context and how to recognize Discourses in the provincial science curriculum and in the history of science materials we explored in the course. Student achievement varied greatly in these two items, but significant progress was evident among the work of most students, from the first to the fifth submission of their course assignments. Two common issues students focused on in their assignments were racial discrimination against Black people and gender bias against women. The scientists students selected to profile were very diverse in ethnicity, nationality, and cultural backgrounds. Chinese and Islamic scientists from ancient times predominated, while immigrants, Blacks and Indigenous peoples were well represented among more modern (1960's onwards) contributions to science. Women scientists were selected in $\frac{3}{4}$ of the assignments submitted. Whereas most of the scientists profiled contributed to the fields of medicine, epidemiology, or genetics, a great many other fields of science were also represented in students' work, including astronomy and space exploration, geology, computer science, mathematics, engineering, physics, chemistry, paleontology, environmental sciences, botany and agriculture, kinesiology and sports science, psychology, animal behavior, and nutritional studies, among others.

Both BEd and PBDE/MEd students fully embraced the call for presenting content in different formats, producing podcasts, narrated posters, interactive presentations, animations, short movies, blog posts, and fictional news articles to tell the stories of the scientists they have chosen to profile. In their assignments, they suggested ways in which the stories of these scientists could be embedded into the science curriculum for different grade levels and provided many resources to deepen our knowledge of these people and/or their fields of studies. BEd students whose teachable major was not science performed equally well in the course, although some of them referred to the need to learn the "science" while learning about the story of the scientists. This issue was not raised among students in the PBDE course, possibly because they were given the choice to select social scientists for their profile presentations. Indeed, in the PBDE course, students included an educator, a sociologist, a philosopher, two political scientists and a historian; all other scientists represented field within the natural sciences, mathematics and computer sciences, with 30% of these representing health sciences. In this course, students' choice of scientists was not as culturally and ethnically diverse, with only one fifth of the scientists profiled representing non-Western cultures. Only two of the scientists profiled lived and worked before the 19th century, and close to 41% were females. Not only students in the PBDE course chose more "traditional" scientists (that is, males, Westerners, and famous), but also their discussion of how the work of these scientists connected to human rights issues and social change was always portrayed as positive. Some students commented on discrimination and other challenges the scientists faced, but the overall message in their presentations was that of how science contributed to positive social change and advancements in human rights.

In the PBDE course, students' reactions to some of the materials shared in class or assigned for them as homework were very emotional, including feelings of powerlessness, impotence, rage, and anxiety. Many students referred to the course materials as depressing. Students found particularly challenging to understand how our ancestors accepted and reproduced dehumanizing practices targeted at Blacks and Indigenous populations, as well as discriminatory and inhumane treatment of special needs people and women. However, when asked to consider some of the contemporary issues of exploitation of humans and non-human animals, such as, for example, the cruel treatment of animals for research and in animal industrial farms, the corporate exploitation of cheap labour in poor countries, the devastating environmental impacts of unsustainable lifestyles in Canada and other developed countries, or the systemic racism against Indigenous populations in Canada and against Blacks and Latinxs in the US, students struggled to perceive the similarities in the sociocultural contexts that created the possibilities for practices to be produced and sustained.

Despite or because of the discomfort students felt with some of the PBDE course materials and discussions, students reported that the course definitely promoted changes in the way they think about science and their role and responsibilities as science educators. One student mentioned that it is not possible to unsee what one has seen and that they can no longer ignore the knowledge they now possess about social and ecological injustices and inequities in society. Several students also admitted they have never heard of some of the events related in the course and the various cases of human rights infringements performed in the name of scientific advancement. Some students mentioned they felt overwhelmed with the magnitude of the task they envision for themselves as educators, now that they are in possession of such knowledge. Many students admitted being daunted by the prospect of writing a

short story and reading it aloud to the class, but, afterwards, they reported on the feeling of community the sharing of the stories created, and the powerful reflection this exercise entailed, especially when writing their stories. Only two of the fictional short stories were targeted at children. Many of the stories described dystopian futures where current practices and societal structures were extrapolated to create fictional scenarios that are possible and even probable. Listening to these stories provoked strong emotional reactions and deep introspective reflection.

On the flip side of feelings of powerlessness and impotence, several students in the PBDE course reported being inspired to make changes, in their private life and as educators, and many plan to share their short stories in their own classrooms. Likewise, many BEd students vowed to include the stories of the scientists they researched in their teaching in schools, as a way of promoting students' identification with science by sharing stories of scientists that "look like them" and represent cultural, gender and ethnical diverse groups.

Undoubtedly, it takes more than one course to create the conditions necessary for meaningful change to occur, especially when these are deeply ingrained ways of knowing, thinking and doing that are produced and reproduced as intrinsic to science. However, the original aim of stirring teachers into action that propelled the development of these courses was achieved. As one PDBE student mentioned during our last class, she finally understood what I meant when I told them all possible futures are fictional – when we create and share stories we are imagining possibilities, we are creating possible futures; which stories we choose to tell and how we tell them makes all the difference when it comes to transforming the fiction into reality.

References

- Bauer, S. W. (2015). *The story of science: From the writings of Aristotle to the big bang theory*. New York: W. W. Norton & Company.
- Bourdieu, P., & Thompson, J. B. (1991). *Language and symbolic power*. Cambridge: Harvard University Press.
- Chomsky, N. (1999). *Profit over people: Neoliberalism and global order*. New York: Seven Stories Press.
- DeWitt, R. (2018). *Worldviews: An introduction to the history and philosophy of science* (3rd ed.). Oxford, UK: Wiley Blackwell.
- Ede, A., & Cormack, L. B. (2017). *A history of science in society: From philosophy to utility* (3rd ed.). North York, ON: University of Toronto Press.
- Fara, P. (2009). *Science: A four thousand year history*. Oxford, UK: Oxford University Press.
- Freire, P. (2005). *Pedagogia do Oprimido* (Pedagogy of the Oppressed, 47th ed.). (Original work published 1970). São Paulo: Paz e Terra.
- Gee, J. P. (2007). *Social linguistics and literacies: Ideologies in discourses* (3rd ed.). New York: Routledge.
- Gribbin, J. (2004). *The scientists: A history of science told through the lives of its greatest inventors*. New York: Random House.
- Imarisha, W., Brown, A. M., & Thomas, S. R. (Eds.). (2015). *Octavia's brood: Science fiction stories from social justice movements*. AK Press.
- Martusewics, R., Edmundson, J., & Lipinacci, J. (2011). *EcoJustice Education: Toward diverse, democratic, and sustainable communities*. New York: Routledge.
- McMillan, B., Pozzer, L., & Hechter, R. (2017). *EDUB 4102 T27 course syllabus*. Non-published material created for course instruction. Winnipeg, Canada: University of Manitoba.
- Misiaszek, G. W. (2018). *Educating the global environmental citizen: Understanding edopedgogy in local and global contexts*. New York: Routledge.
- Pozzer, L. (2022a). *EDUB 4102 T27 course syllabus*. Non-published material created for course instruction. Winnipeg, Canada: University of Manitoba.
- Pozzer, L. (2022b). *EDUB 5220 T07 course syllabus*. Non-published material created for course instruction. Winnipeg, Canada: University of Manitoba.
- Selin, H. (2020). *Encyclopaedia of the history of science, technology, and medicine in non-Western cultures* (2nd ed.). The Netherlands: Springer Dordrecht. <https://doi-org.uml.idm.oclc.org/10.1007/978-94-007-3934-5>
- Wooton, D. (2015). *The invention of science: A new history of the scientific revolution*. New York: Harper Collins.

REFLECTION ON THE USE OF E-PORTFOLIOS DURING TEACHING PRACTICUM AT A UNIVERSITY OF TECHNOLOGY IN SOUTH AFRICA

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Abstract

During teaching practicum student teachers are expected to acquire major pedagogical skills that have to do with classroom management; organisation; self-criticism; leadership; teaching; testing and assessing between themselves. Evidence of all activities of a student-teacher during teaching practicum is usually contained in a portfolio of evidence which is submitted to the faculty at the end of the program. At the Central University of Technology, this portfolio has always been paper-based. The aim of this project is to reflect on the use of e-portfolios during teaching practicum as a replacement for paper-based portfolios. The project used Participatory Action Research (PAR) as a research methodology. Workshops, interviews, and observations were used as data-gathering instruments. Internal stakeholders took part in the project and included student teachers and lecturers, and the e-learning center at the Central University of Technology. This report provided an overview of the entire project, including the planning phase results. Thematic analysis arrived at teacher training institutions must adopt e-portfolios as a reflective tool to enhance students learning.

Keywords: *Teaching practicum, e-portfolio, pedagogical skills, self-criticism, reflection.*

1. Introduction

To comply with the prescripts of the Policy on the Minimum Requirements for Teacher Education Qualifications (MRTEQ), teacher education institutions in South Africa must send student teachers for work-integrated learning (WIL) as part of practical learning. Practical learning comprises learning from practice and learning in practice. In education, WIL is referred to as teaching practicum or teaching practice (TP). Teaching Practice forms part of learning in practice. It involves teaching in an authentic and simulated classroom environment (Department of Higher Education and Training, 2015). First, TP includes aspects of learning from the practice of teaching in the form of observations and reflecting on lessons taught by others, as well as learning in the practice of teaching which involves preparing lessons, teaching, and reflecting on lessons presented by oneself (Van Wyk, 2017). During this period student teachers who are registered full-time for a Bachelor of Education (B.Ed.), according to MRTEQ, are to spend a minimum of 20 weeks and a maximum of 32 weeks in a formally supervised and assessed school-based practices over the four-year duration of their degree (DHET,2015). Student teachers at the Central University of Technology normally go on teaching practice, at schools, for a period of two or three weeks depending on their year of study. For the 1st year of study, it is two weeks of observations. In the 2nd year of study, student-teachers go for six weeks of co-teaching and the six weeks are divided into three weeks in the first semester and three weeks in the second semester. The 3rd year follows the same arrangement as the 2nd year. In their 4th year of study, student-teachers go for six weeks of the actual teaching and lecturers visit their respective schools to evaluate them. Evidence of all activities of a student-teacher during teaching practicum is usually contained in a portfolio of evidence which is submitted to the faculty after each TP period. Portfolios have been broadly recognized and applied to develop prospective teachers' reflection competencies in the last two decades (Carl & Strydom, 2017). It is a media that facilitate student-teacher's reflections on their knowledge building and complex realities in their teaching practices (Van Wyk, 2017). They are given guidelines within which reflections about their knowledge and teaching practices are scaffolded. It is also a means to measure student teachers' readiness to teach (Wray, 2007). Shulman (1998, 37), an early proponent of educational portfolios, defines the teacher's working portfolio as a " structured documentary history of a set of coached or mentored acts of teaching, substantiated by a sample of student

portfolios, and fully realized only through reflective writing, deliberation, and conversation” Traditional portfolios have been in a paper-based format but recently because of the increased integration of technology into teacher preparation curriculum, the rise of electronic portfolios format has been observed (Wray, 2007).

The purpose of this paper is to outline the planning phase of the introduction of e-portfolios as a reflection tool for CUT student teachers during teaching practicum. The e-portfolio project is proposed by lecturers in the Department of Educational and Professional Studies (DEPS) because, at the Central University of Technology, the teaching practicum portfolio has always been paper-based.

The aim of this project is reflected in the use of e-portfolios during teaching practicum. The purpose of this e-portfolio is for the student teacher to know and record the pedagogical reality of the school, integrate critical and reflective thinking about their vocation as educators, and analyse and reflect on the observations at the school such as enrolments, responsibilities, and their relationships in the educative institution (Carl & Strydom, 2017). The teaching practicum e-portfolio is specifically aimed at enhancing the teaching practicum as a source of reflection and learning. It is further aimed at assisting student teachers to reflect on their own performance and their future as educators and finally to assist them to observe diverse aspects of the school reality.

The need to introduce the e-portfolio at this institution was a result of the following. First, the university was faced with the challenge of storage. The university did not have enough storage facilities to store paper-based portfolios in line with the requirements of DHET, one of which is that the institution must keep the students’ portfolios for a period of three years after completion of their study. Second, submission of paper-based portfolios during the Covid-19 period was practically impossible because during this period there was minimum physical contact between the institution and students. Third, recording the reflections on the student’s experiences during the Covid-19 was a challenge. Some of the processes could not be fully implemented and this frustrated both students and lecturers. Last, evaluating paper-based portfolios and evaluating student-teachers teaching in front of a class during the Covid-19 period presented a challenge. As a result, lecturers had to come up with a way to overcome these challenges, and the use of e-portfolios was found to be a feasible option. The e-portfolio was preferred because it can be easily shared, stored, and updated (Pallitt, Strydom & Ivala, 2015). This kind of portfolio includes arranged multimedia embedded in the text or hyperlinked. It can provide opportunities for reflective practices and provide a potential for collaborative learning (Pallitt, Strydom & Ivala, 2015). E-portfolios can promote immediate feedback from both peers and lecturers (Van Wyk, 2017, Pallitt, Strydom & Ivala, 2015).

2. What is an e-portfolio?

Like a normal paper-based portfolio, there are many definitions of an e-portfolio, and it can be used for different purposes. Some researchers refer to an e-portfolio concept, pedagogy, and/or practice, rather than a particular online system (Pallitt, Strydom & Ivala, 2015). An electronic portfolio uses digital technologies, allowing the portfolio developer to collect and organize portfolio artifacts in various media types like audio, video, graphics, text, and multimedia. A good e-portfolio is both about being a product (a digital collection of artifacts) and a process (of reflecting on those artifacts and what they represent (Centre for Teaching Excellence, University of Waterloo, 2013). Literature refers to the concept as electronic portfolio (e-portfolio/EP) or digital teaching portfolio (DTP) or online teaching portfolio (OTP) but for this project, the term “e-portfolio” is used throughout (Van Wyk, 2017). For the purpose of this paper, an e-portfolio is a digital collection of essays, photographs, videos, and processes, created by student teachers, during their teaching practice-related experiences at schools.

e-Portfolios are a way to generate learning as well as document learning (Basken, 2008). An e-Portfolio is both a product, that is, a digital collection of artifacts, and a process. As a process, e-Portfolios generate learning because they provide an opportunity and virtual space for students to critically assess their academic work, reflect on their work, and make connections among different courses, assignments, and other activities, such as work experiences, extracurricular pursuits, volunteering opportunities and more (Carl & Strydom, 2017, Pallitt, Strydom & Ivala, 2015). They also support students’ own knowledge construction and make invisible aspects of the learning process visible. E-portfolios are key to curriculum integration and implementation that takes both technology and pedagogy into account (Pallitt, Strydom & Ivala, 2015).

3. e-Portfolio project outline

The aim of this project is to reflect on the use of e-portfolios during teaching practicum. The project will take a maximum period of three academic years. Each academic year will have its own outcomes, and these will progressively build on the deliverable of the previous academic year. In the first year of the project, the researchers concentrated on planning. This includes, among others, meetings with the CUT

e-Learning section to design a strategy for the migration of paper-based portfolios to e-portfolios. The designing of all e-tools/ documents that will be used on the university learner management system (e-Thuto). Soliciting Lecturers' and students' views about the envisaged use of e-portfolios for teaching practicum was also undertaken. In the second year, the electronic system will be tested. This will include, among others, the training of lecturers to use the system. A pilot study using first-year student teachers during their observation period will be conducted. This will be the process of checking the functional capacity of this electronic system and the perceptions of student teachers and schools towards the use of e-portfolios. The third year of this project will include the full-scale implementation of the project for the first year (observations) and second-year second students (co-teaching). Feedback will be sought from the students and mentor teachers at schools to prepare for the teaching practicum for the third and fourth-year students.

The initial plan was executed as follows. First, a blueprint e-portfolio was developed on the university learner management system (e-Thuto) by colleagues from the e-learning section. Second, a video of instructions on how to create an individual e-portfolio was developed and distributed to all student-teachers. Third, a platform was created for students to generate their individual files using MS One Drive (Cloud) and this gave students 1 Terabyte of storage space. Forth, when students are ready to submit their e-portfolios they just have to create a link to their files and submit their links on e-Thuto, for it to be evaluated. Last, a video of the instruction on how to evaluate the e-portfolios is developed and distributed to the affected lecturers.

4. Methodology & research design

This project employed Participatory Action Research (PAR) to fulfil its aim of reflecting on the use of e-portfolios during teaching practicum. PAR is adopted because the co-researchers will actively participate in dealing with problems that affect them in their practices (Kemmis, McTaggart & Nixon, 2014). Additionally, it will give participants an opportunity to engage in identification or acknowledging the existence of the problem; studying the problem; analysing it, and designing ways of addressing the problem (Kemmis, et al. 2014). The paper involved collective, community-based research since all participants will benefit on the ground of shared responsibility (Kemmis, et al. 2014). Internal stakeholders included the three lectures, students, and the e-learning centre from the DEPS as co-researchers in keeping with PAR principles of empowerment and equality. Other internal stakeholders will be e-learning specialists, lecturers from other four departments in teacher education at CUT, and student teachers. The four Departments from which the participants will be drawn are Languages, Natural Sciences, Mathematics, Computer Science & Technology, and Economic & Management Sciences. External stakeholders will comprise mentor teachers from the Foundation Phase (FP), senior phase (SP), and Further Education and Training Phase (FET) schools in and around Bloemfontein, Botshabelo and Thaba-Nchu.

The project followed the cyclical stages in a participatory research process. The first stage of PAR relates to problem identification and acknowledgment of the problem. The second stage is about the planning of the actual processes to be followed. The third stage involves action or the activities to be carried out. The fourth stage involves the implementation of the outcomes of the activities and involves what the participants learned collectively as a team. The cycle will start again to reflect and identify the limitations and embark on continual improvement and corrective measures, with the objective of tackling the challenges (Cohen, Manion & Morrison, 2018).

5. Findings

Integration of ICT into curriculum practices is an important component of education in the twenty-first century that should be protected for educational purposes. Institutions were also pushed to alter their teaching and assessment practices as a result of the Covid 19. Workshops, interviews, and observations were used to gather data. The paper's claim is that knowledge-producing procedures are increasingly becoming prioritized in a variety of educational settings.

5.1. Implications for students

The project covered assessment, data storage, documentation, and the integration of e-portfolios into teaching and learning for students and lecturers. Traditionally, first-year to fourth-year teacher candidates created and presented paper-based portfolios that proved their understanding of teaching and pedagogy. e-Portfolios covered documents that students can use to reflect on their teaching. Students' responses back up this assertion:

“e-Portfolios aided me in expanding my knowledge and abilities while also allowing me to thoughtfully record what I learned and did at school”.

"Using technology, I was able to reflect on my learning path."

"The lecturer's documentation assisted me in organizing the e-portfolio and I was aware of the expectations."

"The professors were helpful and guided the project."

During the teaching practicum, the majority of the students felt at ease with e-portfolios. The most difficult part was uploading the e-portfolio onto the system for evaluation. In order to build their e-portfolios, students needed information help, and motivation from their lecturers.

5.2. Implications for the lecturers

The lecturing staff needed to be taught about e-portfolios and have access to technological support. The instructors were a little nervous about introducing e-portfolios and the process during the initial workshop and face-to-face meetings.

"I don't think e-portfolios will work, so I propose we put them off until next year."

"It will be impossible to introduce e-portfolios to all teacher education groups."

More e-learning centre workshops and face-to-face meetings and interactions resulted in increased motivation, learning, co-teaching, and community of practice. The positive result was that e-portfolios for teaching practicum could be implemented at all levels.

6. Conclusion

The aim of the paper is to reflect on the use of e-portfolios during teaching practicum as a replacement for paper-based portfolios. The institutions' expectations will play a significant role in the success of the use of e-portfolios as a reflective tool for teaching practicum. This will put researchers on their toes to ensure that all the loopholes are attended to. Stakeholders need to be regularly monitored to ensure that this project succeeds. It is the intention of the researchers to ensure that this project realizes its outcomes and that all the stakeholders learn as much as possible for the benefit of student-teachers. As a result, teacher education institutes must adopt e-portfolios as a reflective tool and use them to enhance students learning.

References

- Basken, P., 2008. Electronic portfolios may answer calls for more accountability. *Chronicle of Higher Education*, 54(32), pp. A30-A31.
- Carl, A. & Strydom, S. 2017. e-Portfolio as reflection tool during teaching practice: The interplay between contextual and dispositional variables. *South African Journal of Education*. 37(1), 1-10.
- Cohen, L., Manion, L., & Morrison, K. 2018. *Research methods in education*. Los Angeles: SAGE Publications.
- Department of Higher Education and Training. 2015. *National Qualifications Framework Act (67/2008): Revised policy on the Minimum Requirements for Teacher Education Qualifications*. Government Gazette, 596(38487). Pretoria: Government Printer.
- Kemmis, S., McTaggart, R. and Nixon, R., 2014. *The action research planner: Doing critical participatory action research*.
- Pallitt, N; Strydom, S & Ivala, E. 2015. *CILT Position Paper: ePortfolio*. CILT, University of Cape Town.
- Shulman, L. 1987. *Knowledge and teaching: Foundations of the new reform*. Harvard Educational Review, 57(1), 1-23.
- Van Wyk, M. 2017. An e-portfolio as an empowering tool to enhance students' self-directed learning in a teacher education course: A case of a South African University. *South African Journal of Higher Education*. 31(3), 274 – 291.
- Wray, S. 2007. Electronic Portfolios in a teacher education program. *E-Learning*. 4(1), 40-51.

DEALING WITH MULTICULTURALISM AND SOCIAL JUSTICE IN DIVERS SOCIAL SCIENCE CLASSROOMS: PERCEPTIONS AND EXPERIENCES OF INTERMEDIATE PHASE STUDENT TEACHERS

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Abstract

This qualitative study reflects the perceptions and experiences of intermediate phase student teachers in dealing with multiculturalism and social justice in diverse classrooms. The content of Social Science as a subject in the intermediate phase, respond to many societal challenges currently associated with issues such as urban and rural settlement, pandemics, climate change, poverty, racism, etc. -these contents as portrayed in some subject themes, fulfils a role in enhancing social cohesion and tolerance for one another. In an age in which diversity, multiculturalism and social justice are increasingly prominent features of higher education and society, researchers are tirelessly exploring numerous ways to meet the educational needs of diverse populations. Social Science as a subject in the intermediate schooling phase of South Africa deals with the interrelationship of humans and their environment and can thus play an integral role to meet the needs of diverse populations. Through a qualitative research methodology, data was gathered from Focus Group Discussion (FGD) sessions with three groups of five teacher education students from the same race, in their final year, specializing in Social Science teaching. The results of the study indicate that student teachers find the teaching of Social Science in a multicultural classroom very challenging, irrespective of their race, culture, or socio-background. The study therefore recommends regular exposure to diverse learners through mandatory teaching practice at multicultural schools, appropriate training and development throughout the students' teacher training with supported policies and integration of social justice into the curriculum content.

Keywords: *Classrooms, diversity, experiences, intermediate phase, multiculturalism, perceptions, social science, social justice, student teachers.*

1. Introduction

Social justice generally embraces values, such as the equal worth of all citizens and their equal right to meet their basic needs. Kea, Campbell-Whatley and Richards, (2006) aver that in the context of democratic education, teacher competencies such as sociocultural consciousness, adopting responsible teaching strategies, and having an affirming attitude towards learning from culturally diverse backgrounds, should form part of teacher education students' professional development. Most advocates of social justice education note that preparing teachers to teach in such learning environments and challenging oppression is difficult work, facing a multitude of barriers (Pace, 2014). As such, democratic education requires teacher education students to lead and teach for social justice and combat oppressive practices, while creating an equal and dignified classroom environment. This study investigates how student teachers deal with multiculturalism and social justice in divers Social Science classrooms and discusses their view and experiences with the aim to provide possible recommendations on how to deal with multiculturalism and social justice in the modern South African Social Science classroom.

2. Literature review

2.1. Social Science as a subject in the intermediate phase

In attempting to define Social Science, it would be incorrect for us to omit one of the earliest definitions of the Social Sciences that has paved the way for numerous definitions that were to follow in subsequent years. This definition is credited to Edgar Wesley, a renowned scholar and advocate for the Social Sciences, sometimes referred to as "the father of social studies" who developed what some scholars have called the most enduring definition of all time (Evans, 2004). Social Science is defined as a

science simplified for pedagogical purposes. It is this definition that has led to Social Science being defined in terms of content, as shown in the National Council for Social Studies (NCSS) in the USA charter, that social studies are used to include history, economics, sociology, civics, geography, and all modifications of the subjects whose content, as well as aim is social (Mhlaili, 2010).

The intermediate phase of the South Africa Social Science curriculum as covered in the National Curriculum Statement, illustrates different themes that can, in some instances, provide elements of controversy, depending on the perspective from which it is facilitated. The study of Social Science can be emotive and controversial where there is actual or perceived unfairness to people by another individual or group in the past (The History Association, 2015). Invariably such issues are underpinned in these Social Science topics, because these themes deal with factors such as race, gender, class, politics, ethics, culture, language and economics in other words, issues of moral complexity. Polarisation will, therefore, in light of the above, come about when historical events and the related evidence elicit disagreement, arouse anger, raise emotions and cause bias to arise.

2.2. Social science and multiculturalism

The Curriculum Assessment Policy Statement (CAPS) in South Africa is built on the principles of providing all learners with knowledge, skills and values. Similar to teaching for multiculturalism, teaching Social Science involves teaching about and for multicultural perspectives and viewpoints; establishing respect for cultural diversity; and working towards identifying and transforming areas of injustice that inhibit the goals of democracy (Castro, 2013).

2.3. Social science and social justice

Some people see social justice as an outgrowth of multicultural education which gives respect to the way multicultural education has embraced a theoretical power analysis. But social justice can also be defined in ways that are distinct from multicultural education, as various writers address the idea of social justice as it relates to teaching and learning (Gray, 2017; North, 2006; Russo, 2004). Some of these works attempt to marginalise or reject social justice concerns, either because of a sceptical postmodernist denial of the tenability and desirability of universal principles or because of an uncritical approach to conceptualising answers to difficult problems (Cochran-Smith, 2010). However, there are those scholars who are committed to shining a light on the darkness of inequalities that manifest in education.

3. Conceptual framework

The conceptual, theoretical and philosophical foundation of university transformation discourse is often led by the Social Sciences and presented as a template for other fields, such as pure science and engineering, as well as other professional fields which include accounting, health, economics and management sciences. This has caused tension and the perception of imposition, instead of co-creation and co-determination of the terms of transformation. Social Science is more advanced in critical theory and has dedicated more time and effort to developing tools for analysing the weaknesses of our education systems. There is an urgent need to affirm the principle of co-creation and a reciprocal dialogue among these disciplines to advance the transformation of content and pedagogy (Midford, James & Hutchinson, 2018).

4. Methodology

As a fragment of a broader part of research, this qualitative study reflects on the perceptions and experiences of student teachers on how they deal with multiculturalism and social justice in diverse Social Science intermediate phase classrooms. Student teachers to think more deeply about the learners' beliefs, values, and identities in relation to what is being learned and how these influences teaching and learning.

The study was conducted at a university in the central region of South Africa, where the subject Social Science as a specialization in the intermediate phase is offered for teacher training. The University has a diverse student population that caters for students from different cultures and socio-backgrounds. The diversity of the students was of interest to me and since it assisted me. For the purpose of this study, the sampling method that I used was a mixture of purpose and stratified sampling. In stratified sampling, all the people in the sampling frame are divided into 'strata' (groups or categories). With each stratum, a simple random sample or systematic sample was selected. We decided on the purposive sampling, 20 participants were selected, and further sampled using stratified sampling, to divide the group into race groups.

5. Data analysis

The conceptual framework shaped my data analysis. It assisted me to develop concepts and themes and test them with participants through analysing and interacting with the collected data, while also transcribing and coding the texts. The conceptual framework assisted me in understanding and explaining how the different practices of Social Science teachers have played significant roles in perceptions of South African learners in Social Science. It assisted me to interpret how racial, ethnic, socio-economic and cultural identities of South African learners have intertwined and interacted with their perspectives on Social Science.

6. Findings

In this study, the student teachers interpreted their Social Science teaching and learning experiences in various ways. Several major themes emerged from my data analysis.

Theme 1: Multicultural school teaching experience and taking up a multicultural teaching post

A description of what the participants identified as their experience of teaching in a multicultural classroom and if they would take up a multicultural teaching post.

• Relate well to learners because I grew up amongst diverse groups

Participant FGDC1 C2 indicated that it was easy to adapt to a multicultural classroom because he related to all learners as he grew up amongst diverse groups. FGDC2 C9 also found it similarly not so challenging to relate to learners in a multicultural classroom, and this will make it easier to accept a post at a multicultural school. Trust is a major issue in most intercultural classrooms. A study by the South African Council for Educators (2017), found that an emotional relationship, especially confidence between educators and their learners in the intercultural classroom, is important in establishing trust between learners and their educators (SACE, 2017). Participant FGDC2 C8 expressed similar sentiments and articulated the following: *“Yes. It was a good experience because I learnt a lot about other cultures, beliefs and customs during teaching practice. I will for sure take a post at a multicultural school.”*

• Comfortable amongst your own

Participant FGDC2 C10 and FGDA A1 expressed their desire to rather teach in surroundings that they are more familiar with, meaning to teach learners from their own race, culture and socio-background. Similar sentiments were echoed by FGDC2 C7 in the verbatim response below: *“No, I did my teaching practice in the township because I had a choice of school to go to. I felt more comfortable among people I can relate to and understand. I will not take a post at a multicultural school if I have a choice, because I feel comfortable amongst a more familiar space and among more familiar people.”*

The responses from the teacher education participants are similar to the opinion of Housee (2008) who states that a teacher’s racial identity is an important factor in emotional exchanges. Black teachers are sometimes judged for their ‘loyalties and sensibilities’ with the black community, while white teachers are questioned for their understanding and sympathy with race/racism issues.

Theme 2: Understanding different cultures and how to deal with them

Participant FGDA A1 indicated that a lack of understanding of other cultures and customs could be a challenge for pre-service teachers in multicultural school settings. FGDA A2 and A3 agreed and indicated that a better understanding of the learners could contribute to successful teaching and learning in a multicultural classroom. In relation to challenges faced in multicultural schools FGDC1 C3 made the following comment: *“I think we might have a challenge understanding all our learners, because we are not really exposed to multicultural schools during teaching practice.”*

The literature in chapter three emphasised the importance of a good understanding of different cultures in multicultural school settings. The findings of this study provide clear evidence that most of the teacher education participants lacked knowledge about other cultures and consequently, made them susceptible to attack by people from those cultures.

• Lack of training to deal with diverse groups

FGDB B1 emphasised that a lack of training to deal with diverse groups could be a challenge for pre-service teachers. The sentiments were also shared by FGDC1 C4, who in turn, indicated that because of the reality of facing multicultural schools, pre-service teachers should deal with this during training. Teaching is a profession that revolves continuously as knowledge and technology changes and require that teachers upskill themselves frequently, thus the opportunity for professional development is critical (Landsman & Lewis, 2011). In relation to the latter statement, teacher education participant FGDA A3 agreed by asserting the following: *“I think it is not easy to manage diverse groups, because we are not trained to deal with diversity, or the training is not adequate.”*

I share the above-mentioned sentiment, that teachers in the multicultural classroom should be provided with knowledge about several cultures of their learners, their experiences, communication styles, and learning approaches that are harmonious for all learners in the multicultural classroom (Multicultural education & curriculum, 2012).

- **Code-changing not possible in multicultural schools**

FGDC2 C9 made a very interesting observation that a challenge some teachers will encounter will be not to be able to code-change during a lesson, to try to explain certain areas of content that learners find difficult to grasp. The participant indicated that some teachers use code-change to try to explain things in class and because the class has learners who do not understand a particular language, this will not be possible. Teacher education participants FGDC1 C4, FGDC2 C6 and FGDC2 C7 agreed with the sentiment and added that in many instances a teacher prefers to explain some issues in a different language but are unable to do so, due to the diversity in the classroom. If teachers and learners in the multicultural classroom have different verbal styles of communication, then they cannot understand and express themselves directly and clearly to one another; thus, the result is that students have low academic accomplishment (Multicultural education & curriculum, 2012). Learners' achievements and progression in multicultural schools may also be negatively affected if they are taught in their second or third language and they lack proficiency in that particular language (Alsubaie, 2015).

Theme 3: Social Science and the teacher's beliefs and socio-background

A description of what the participants views on the teaching topics or issues that go against their beliefs, and customs of what they have been taught during their upbringing.

- **Healthy debate in Social Science classroom**

The teacher education participants FGDA A1, FGDB B1, FGDB B4, FGDC1 C1, FGDC1 C3 and FGDC1 C4 indicated that to teach content that you not comfortable to teach would develop the teacher further and facilitate healthy debates that such topics generate; this could be valuable in the nation-building process of our country. Barton and Levstick, (2011) advise that teachers should empower their learners by providing them with skills to debate issues, providing discussion techniques and teach learners to respect and accept disagreement. With reference to the above-mentioned matter, teacher education participant FGDC2 C7 articulated the following in support of debate in the Social Science classroom: *"Yes, I will teach any topic; I must just do proper research and try to give as many perspectives as possible, thus allowing discussion in the classroom without creating animosity among the different learners in my classroom."*

Comparable to the arguments of the teacher education participants, I am in support of healthy debate in the Social Science classroom. The literature mentioned in chapter 2 and 3 supports the notion and belief that the character of both the learners and the teachers is built in such an environment.

7. Discussion

This study explores the perceptions and experiences of student teachers in dealing with multiculturalism and social justice in divers Social Science intermediate phase classrooms. The findings indicate that Social Science is difficult to teach in a school with learners from different cultures, races and social backgrounds. Makoelle (2014) explains why participants would find it difficult, by indicating that despite all the significant policy pronouncements by the South African Department of Education, there has been silence on the inherent racial and ethnic divide which perpetuates exclusive stereotypes and conceptions about those viewed as racially and ethnically different.

In general, student teachers find it uncomfortable teaching Social Science; most of them feel that more exposure and advanced further training would benefit and equip them with the required skills, knowledge and values, to teach without fear or prejudice. Participants were also of the opinion that exposure to the teaching and learning of different societies, cultures and communities, would benefit student teachers in developing their skills on how to interact with learners different from them. Kallaway (2009) expresses concerns by indicating that part of the problem is that nobody has trained the trainer; it is simply expected that if someone who has been a good student teacher, will become a good teacher and will therefore be aware of the skills needed to in a multicultural school.

Fair treatment of all learners, irrespective of their race, culture, ethnicity, socio-economic background and physical appearance. The findings revealed that most participants from the black and coloured races felt very strongly about this and viewed the current state of affairs as shockingly neglected by Higher Education institutions, particularly in South Africa. The findings further indicated that white participants felt that efforts were being made to address these matters. It can thus be argued that participants would welcome a stronger emphasis on social impartiality, as part of their preparation to become teachers.

8. Recommendations

This study made several recommendations to South African Social Science student on how to deal with multiculturalism and social justice in the modern Social Science intermediate phase classroom.

Inclusion of social justice and multiculturalism in the curriculum of intermediate phase Social Science

Institutions of higher learning are frequently revising their programmes ensure that the curriculum is relevant to a changing world; therefore, a curriculum that addresses the challenges of society would be beneficial to all stakeholders. The establishment of partnerships between stakeholders who have an interest in education, i.e., the state, parents, learners, teachers and other members of the community, in the vicinity of a school is critical. The recommendation to include social justice and multiculturalism in the training programme of Social Science should be regarded as relevant and is therefore suggested. If it has been done already, the recommendation would be to advocate that it be listed as priority.

Interaction with societies of different socio-economic groups.

The inhabitants of many South African public-school classrooms are from different spheres of life and learners are also from different socio-economic groups. A considerate approach to the learners is critical for the success of teaching and learning; therefore, teachers should have a broad knowledge, understanding and empathy towards all learners, irrespective of their situations. Based on this assertion, this study recommends that regular engagement with communities of different socio-economic groups in both official and on social levels, would be prudent.

9. Conclusion

This study enriches the current literature on student teachers' perceptions of Social Science teaching and learning in South African Multicultural classrooms, adding to the limited research in this area. My study therefore strongly suggests regular acquaintance to diverse learners through obligatory teaching practice at multicultural schools, appropriate training and development throughout the students' teacher training with supported policies and integration of social justice into the curriculum content.

References

- Alsubaie, M.A. 2015. Examples of Current Issues in the Multicultural Classroom. *Journal of education and Practice*, 6(10): 86-89.
- Barton, K., & McCully, A. 2007. Teaching controversial issues, where controversial issues really matter. *Teaching History*. 127.
- Cochran-Smith, M. 2010. Towards a theory of teacher education for social justice. In M. Fullan, A. Hargreaves, D. Hopkins, & A. Lieberman (Eds.), *The International Handbook of Education Change*. New York: Springer. 445-467.
- Evans, R.W. 2004. *The Social studies, wars: What should we teach the children?* New York: Teachers College Press.
- Gray, R.A. 2017. Social justice educators' road through transformational educational pedagogy: What are the lessons learned? University of Pittsburg. 205.
- Housee, S. 2008. Should ethnicity matter when teaching about 'race' and racism in the classroom? *Race Ethnicity and Education*, 11(4): 415-428.
- Kallaway, P. 2009. Reconstruction, reconciliation and rationalization in South African politics of education. In P. Kallaway, G. Kruss, A. Fataar, & G. Donne (Eds.), *Education after apartheid: South African education in transition*. Cape Town: UCT Press, 34-49.
- Kea, C, Campbell-Whatley, G & Richards, H. 2006. *Becoming culturally responsive educators: Rethinking Teacher Education Pedagogy*. Retrieved from <http://www.niusileaderscape.org/docs/> Accessed 24 July 2017.
- Makoelle, T.M. 2014. *Race and Inclusion in South African Education: Analysis of Black-African Learners' Perceptions in Previously Advantaged White Schools*. *Mediterranean Journal of Social Sciences*, 5(14): 283-289.
- Mhlauli, M.B. 2010. *Social studies teachers' perceptions and practices of educating citizens in a democracy in upper classes in primary schools in Botswana*. Unpublished PhD dissertation. Columbus: The Ohio State University.
- Midford, S., James, S. & Hutchinson, G. 2018. *Key concepts in humanities and social sciences*. La Trobe University Melbourne Australia. 90.
- SACE (South African Council of Educators). 2009. *The Code of Professional Ethics (As Amended)*. Pretoria: SACE.

UNDERSTANDING THE TRANSITION TO KNOWLEDGE GENERATION ENVIRONMENTS: EXAMINING THE ROLE OF EPISTEMIC ORIENTATION AND TOOL USE

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Abstract

Current reforms in education have emphasized shifting learning environments from a traditional replicative framework to be much more aligned to knowledge generation environments. These environments are focused on promoting student engagement with the epistemic practices of the discipline, which are the argumentative practices used to generate disciplinary knowledge. Helping teachers to shift from their more traditional pedagogical approaches requires professional development programs that enable them to not only experience learning within a generative environment but to also engage with the theoretical underpinning of such environments. To better understand the complexity involved in helping promote teacher change, the researchers implemented a professional development program that focused on asking teachers to examine their orientation to learning and how this influenced their pedagogical approaches. The knowledge generation approach, Science Writing Heuristic (SWH) approach, was the focus of the professional development as the work was centered on improving science teaching and learning.

The professional development program focused on examining cognitive learning theory, the use of epistemic tools of argument, language and dialogue, the development of pedagogical approaches and development of teaching units that aligned with school curricula. The K-5 teachers were drawn from two states and were involved in 10 days of professional development – 6 during the summer and 4 during the academic year. To study teacher transition to these environments the researchers developed three new survey instruments focus on epistemic tools that are utilized in these environments: argument, dialogue and language. The teachers also completed an epistemic orientation for generative environments survey. Teachers completed these survey instruments every six months across the three years of the project.

This presentation focuses on the first year of participation in the project as this represents the critical transition time for teachers in moving to implement the SWH approach within their classrooms. Using Latent Transition Analysis the 95 participating teachers were classified into three initial profiles. During the first six months there were transitions from both low to medium, and medium to high implementation. However, the reasons for the transitions were different. Low to medium transition was around improvements in orientation and dialogue, while for medium to high the transition was around understanding argument. The transitions during the second six months shifted to be centered much more on orientation, than epistemic tools. Once teachers transition to a new profile, they remain at that level or potentially move to the highest profile.

Keywords: *Epistemic orientation, epistemic tools, transitions.*

1. Introduction

Current reforms in education have emphasized shifting learning environments from a traditional replicative framework to be much more aligned to knowledge generation environments. These environments are focused on promoting student engagement with the epistemic practices of the discipline, which are the argumentative practices used to generate disciplinary knowledge. These environments reflect the current emphasis place on promoting epistemic practices that underpin much of the new curricula being implemented in the western world. Particular emphasis is being placed on ensure that students can experience the epistemic practices of the discipline as they generate conceptual understandings of the topics being studied. This shift to focus more on the engagement of epistemic practices, is not about replication of practices.

Epistemic practices by their nature are how a discipline advances the field of study. These are not procedures that need to be replicated by students. Simply getting students to follow the step-by-step application of the epistemic practices is not how arguments are built. Epistemic practices are practices which focus on the processes by which knowledge is generated – it is how we come to know new knowledge, how we embed knowledge into our conceptual understandings. That is, how we generate new understandings.

A critical question that arises from such a position is what are the essential tools that will help students generate rich understandings. We argue that there are three critical areas that important for learning: Argument, Language and Dialogue

Argument from a disciplinary perspective is how a discipline moves forward. In science education the concept of argument has emerged as an emphasis area since the late 1990s. The emphasis has been centered on replication of the particular practices related to argument – these are represented in the Next Generation Science Standards in the US as eight practices (Cavagnetto, 2010). From posing questions, gathering data, generating claims and communicating to audiences. The major approach to utilizing these practices has centered on the replication of these – students are generally provided questions to explore, and are expected to complete procedures that will enable them to arrive at the scientific outcome. The approach to argument that is much more focused on immersing students in science argument is the Science Writing Heuristic (SWH) approach – this approach places importance on students posing questions, participating in generating designs, and gathering data from which they can use reasoning to generate evidence for a claim. Such an approach places much more emphasis on students generating understanding through utilizing argument as an epistemic tool.

Language is critically important because as Norris and Phillips (2003) have emphasized, there is no science without language. Science cannot happen without knowledge - this is language in all its forms of text, graphs, equations (chemical and mathematical), diagrams etc. To be able to both understand and to communicate science ideas students have to engage with the appropriate language that will best represent the idea. Importantly, students need to be able to move between these modal forms, be able to link these modal forms, and to ensure the resultant output is able to fully represent the idea being explored. Understanding that being able to connecting between modal forms is a critical element of building understanding. This shifts the emphasis from using language as a means to complete the work, language becomes an epistemic tool (Prain & Hand, 2016).

Dialogue is critical in implementing environments where students have to socially interact as an element of learning. Recent research into dialogical education has begun to highlight the benefits of engaging students in opportunities to dialogue with each. These opportunities are for both small group and whole class forms of negotiation. Importantly these dialogical opportunities are seen as forms of negotiations – they are not monological exchanges where speakers talk past each other. Dialogues are generative, they build as participants exchange ideas with each other. It is an epistemic tool - through these social interactions, students negotiate and generative new understanding.

What becomes important is how teachers approach the use of these tools. The orientation that they have to learning will dictate how effective these tools will be. We believe students utilize these tools as they need to in every situation. However, the question that is important is how to maximize the use of these tools? We believe that the orientation to learning is critical for maximizing the opportunities for students to use these tools. The difference between the derived and fundamental sense of literacy is the shift away from viewing learning environments as being about completing a product (replication) to focusing much more on the processing (generation) of knowledge. This is critical for how a teacher sets up his/her classroom environment. As highlight in the study by Cikmaz et al (2020), the students' utilization of their epistemic tools of argument, language and reasoning was impacted by the learning environment. In the chemistry lab classroom, which was framed on the SWH approach, students developed and utilized these tools as elements of the classroom engagement. When the same students went to the physics lab class, the focus was much heavily focused on completion of traditional formats with a limited amount of interactive classroom dialogue. As a result, student utilization of their epistemic tools was greatly reduced.

Encouraging students to engage in understanding the processes of knowledge generation is critical in helping them develop and utilize the epistemic tools that underpin a discipline. Understanding how we can help teachers move to adopt these types of approaches is critical in helping students learn science better. This study was focused on examining how teachers' shift in their understanding as they move towards becoming more generative in their teaching. Helping teachers to shift from their more traditional pedagogical approaches requires professional development programs that enable them to not only experience learning within a generative environment but to also engage with the theoretical underpinning of such environments. To better understand the complexity involved in helping promote teacher change, the researchers implemented a professional development program that focused on asking

teachers to examine their orientation to learning and how this influenced their pedagogical approaches. The knowledge generation approach, Science Writing Heuristic (SWH) approach, was the focus of the professional development as the work was centered on improving science teaching and learning.

2. Method

The research reported here is based on a 3-year National Science Foundation grant focused on grade K-5 teachers in two states within the US. The grant was focused on a professional development program that was focused on examining cognitive learning theory, the use of epistemic tools of argument, language and dialogue, the development of pedagogical approaches and development of teaching units that aligned with school curricula. Teachers were asked to shift their science teaching to adopting the SWH approach. This approach has been shown to improve science knowledge, critical thinking skills and help reduce the disadvantage gap for IEP and low SES students (Hand, Chin & Suh, 2021). The K-5 teachers were drawn from two states and were involved in 10 days of professional development – 6 during the summer and 4 during the academic year. The teachers shifted each teaching unit in science to be based on the SWH approach.

Data Collection: To track the shift in teachers shift to generative learning environments and their abilities to develop adaptive expertise, the researcher developed three instruments related to the three epistemic tools that underpin science learning: Argument, Language and Dialogue. The teachers also completed an epistemic orientation for generative environments survey. The intent of these surveys was to provide information related to teachers' perceptions on these particular critical elements of any learning environment. Teachers completed these survey instruments every six months across the three years of the project. Information related to teacher implementation of the approach was also collected.

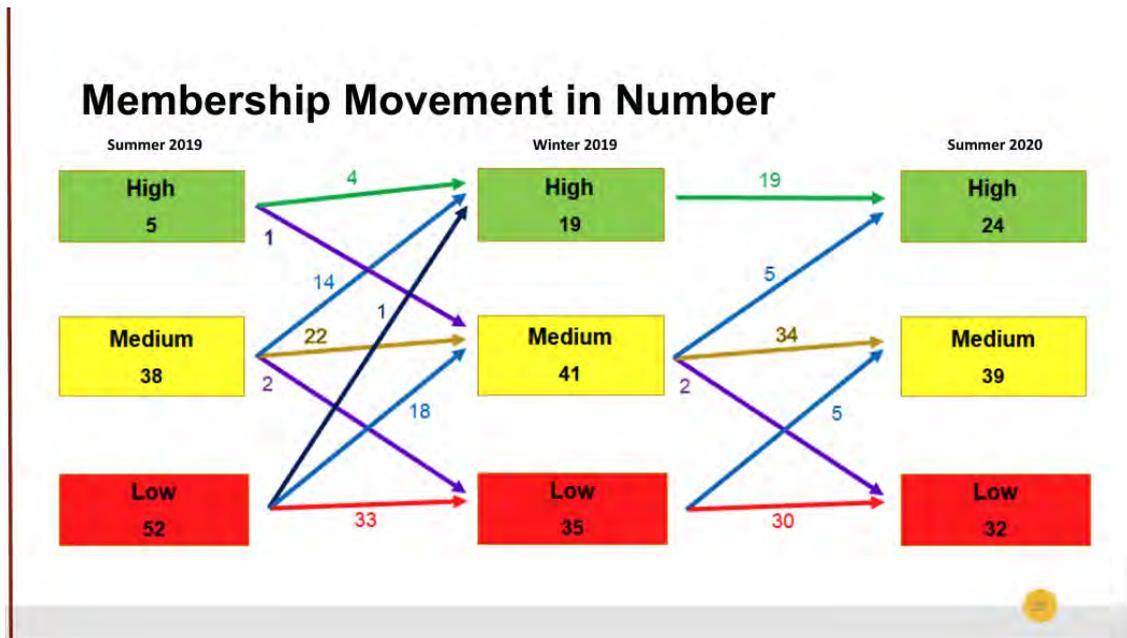
Data Analysis: Latent Transition Analysis (LTA) was used to examine the degree to which the 95 participating teachers shifted in terms of their shifting perceptions related to epistemic orientation, language, argument and dialogue. The LTA generates profiles of teachers at each time point – in this presentation these time points represent at the start of the professional development, six months later, and just prior to the second summer professional development workshop (12 months after the first).

3. Results

The teachers were classified into three initial profiles. The profiles were generated based on the interplay between orientation, argument, dialogue and language. As can be seen from the figure below, at time point one the majority of the teachers were in profile 1 – classified as the lowest profile. The teachers generally had the lowest scores for EOS and tended to be centered around a more replicative perspective, that is, these teachers appeared to be focused on ensuring students received the correct science information. The distribution of teachers in the other two profiles was lower, with only 3 teachers being in the highest profile – that is, the profile representing the highest scores in all four survey instruments. During the first six months there were transitions from both low to medium, and medium to high implementation. However, the reasons for the transitions were different. Low to medium transition was around improvements in orientation and dialogue, while for medium to high the transition was around understanding argument. Interestingly, there was one person who transitioned from profile one to profile three. Importantly for the researchers there were only 3 researchers who move down from their previous profiles – one from profile 3 to 2, and 2 from profile 2 to 1.

There was a second round of transitions during the next six-month period. However, the emphasis on what promoted the teacher shift was based on appeared to be centered much more on orientation, rather than epistemic tools. Again, there were only two teachers who moved down from their previous profiles - in this case from profile 2 to profile 1. An interesting outcome was that once teachers transitioned to a new profile, they appeared to remain at that level or potentially move to the highest profile. This is important because it would appear that the professional development program is successful in helping teachers develop and maintain an orientation towards adaptiveness.

Figure 1.



4. Discussion

The success of implementation of new curricula is dependent upon the ability of teachers to develop an adaptive expertise that will promote generative learning environments. Such environments enable students to be active participants in their own learning as they generate understanding of the science concepts being studied. Such environments require the utilization of epistemic tools that underpin learning – argument, dialogue and language. Through a professional development program based on modeling these generative environments, the researchers interested in building understanding of the transition teachers make in developing an epistemic orientation centered on generative learning.

There are a number of interesting outcomes arising from this study. The first is that teacher learning is not a linear process – it is complex and should be treated as a complex. Rather than treating each of the particular elements in a decontextualized manner, the researchers were interested in treating the four elements of orientation, language, argument and dialogue as intersecting with each other. That is, the researchers believe that there is a complex interaction between these elements and that the nature of the different types of interaction promote different transitions.

Second, the transitions between levels or profiles were different – different in terms of combination of elements and different in terms of timing. During the first six months the transitions were around orientation and dialogue (profile 1-2) and orientation and argument (profile 2-3). During the second period the transitions were more centered on orientation. These differences highlight the concept of complexity – there are different pathways for teachers to become adaptive.

Third, a critical question which has not been addressed in the literature is what percentage of teachers will make the transitions when involved in professional development. Promoting a generative professional development model and encouraging teachers to generate their own understandings of generative learning environments and the pedagogy required, requires paradigm shifts in teacher understanding. In looking at the number of people who shifted profiles, nearly 50% of the teachers shifted. We believe that this is significant but underexplored.

Fourth, an important outcome for the researchers was that there was very little transition occurring from profile 3 to 2, or 2 to 1. That is, once teachers make the transition they remain in the higher profile. Teachers can continue to move to a higher profile or they remain within the profile. We believe this is important and needs further exploration – the stability of profiles.

References

- Cavagnetto, A. R. (2010). Argument to foster scientific literacy: A review of argument interventions in K–12 science contexts. *Review of Educational Research*, 80(3), 336-371.
- Cikmaz, A., Fulmer, G., Yaman, F. & Hand, B. (2021). Examining the interdependence in the growth of students' language and argument competencies in replicative and generative learning environments. *Journal of Research in Science Teaching*, 58, 1427-1488.
- Hand, B., Chen, Y. & Suh, J. (2021). Does a knowledge generation approach to learning benefit students? A systemic review of research on the Science Writing Heuristic approach. *Educational Psychology Review*, 33, 535-577. <https://doi.org/10.1007/s10648-020-09550-0>
- Norris, S. P. & Phillips, L.M (2003). How literacy in its fundamental sense is central to science literacy. *Science Education*, 87, 224-240.
- Prian, V. & Hand, B. (2016). Coming to know more through and from writing. *Educational Research*, 45, 430-434.

CAREER INDECISION AMONG HIGH SCHOOL STUDENTS IN CASABLANCA: LEVEL AND FORM OF INDECISION

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Abstract

Students are urged to make decisions regarding their future course of study and career after completing mandatory education. Making decisions is a challenge for many students. Therefore, we conducted a study by a questionnaire (CDS) and semi-directive interviews in order to assess the level and forms of indecision among the students of the high school. 67 students answered our questionnaire (26 male and 41 female). The results show the presence of indecision among the students by its different forms: anxiety about the career, lack of information about the careers, lack of self-confidence.

Keywords: *Career indecisiveness, career indecisiveness scale, high school, students.*

1. Introduction

The choice of a major is one of the most important and decisive decisions that students face in their secondary education. The importance of this decision is revealed in its repercussions on the student's future professional and personal life.

During high school, students are confronted with pivotal decisions in the formulation of their future career. In the absence of guidance, students may face states of indecision that can lead to wrong choices or anxiety situations. Thus, we conducted this study in the aim to investigate the forms of indecision as well as the level of indecision among high school students. The investigations undertaken with the goal of explaining indecision can be used to create career interventions tailored to the types of challenges that students encounter.

2. Methods

2.1. Participants

The sample consisted of 67 students following their study at high school (26 of male and 41 of female), the age of the participants ranged from 16 to 21 years with a mean age of 17,37 ($\pm 0,929$).

2.2. Instrument

The tool used to investigate career decision making among students is the Career Decision Scale (CDS) (Osipow, Carney, Yanico, & Koschier, 1976; 1987) which is empirically based and unrelated to any theory. The career decision scale is the result of a series of brainstorming sessions. As a result of this work, the authors identify a set of factors that may underlie the state of career indecision. The CDS is presented in the form of 18 items presented on a 4-point Likert. The first two items express a general career indecision (item 1) and educational indecision (item 2), item 3 and 9 describes a general indecision, 4 items and 15 reflect a general indecision due to a lack of information about the different careers available or the interests of the students. The 5, 8 and 11 indicate the anxiety over career choice. Item 6 is about obstacles and 7 general lack of confidence. The items 10, 12, 16, 17 are about indecisiveness due to career information. 13 and 14 reflect the indecisiveness related to self-knowledge. A qualitative investigation using a semi-structured interview was conducted in addition to the questionnaire. The goal of the qualitative research was to explore at the many stages of indecision and to find out how students react in the event of educational or career indecision.

2.3. Data collection analysis

The data analysis was carried out by SPSS version 26 software.

3. Results and discussion

The purpose of this survey is to assess various aspects of the career indecisiveness and to investigate different forms of the career indecision.

Table 1. descriptive analysis of the career decision scale.

<i>Item</i>	<i>Mean</i>	<i>Std. Deviation</i>	<i>Variance</i>
1	2,13	,929	,864
2	2,40	1,015	1,030
3	2,13	1,085	1,178
4	2,52	1,196	1,431
5	2,08	1,082	1,170
6	1,62	,953	,908
7	2,48	1,057	1,117
8	2,33	1,115	1,244
9	1,79	1,016	1,033
10	2,77	1,022	1,044
11	2,81	1,155	1,335
12	2,00	,950	,902
13	2,02	1,000	1,000
14	2,44	,978	,957
15	2,56	1,110	1,232
16	2,15	1,092	1,192
17	3,17	,944	,891
18	2,69	1,130	1,276

Table 1 presents the results of a descriptive analysis of the career decision scale. The table shows an overall choice of 2,13; SD= 0,929 (item1) and an overall study choice of (2,4; SD= 1,015) (item2). Item 3 present an average general indecision (2,13; SD=1,085) and less than the average in item 9(1,79; SD=1,016). The average for item 4 is around (2,52; SD=1,196), item 15 with a value of (2,56; SD=1,110). Item 5 is at the average (2,08; SD=1,082), item 8 with a value of (2,33; SD=1,110), item 11 is much higher than average (2,81; SD=1,155). Item 6 is less than average (1,62; SD=0,953), item 7 is around (2,48; SD=1,057). item 10 is much higher than average (2,77; SD=1,022), Item 12 is at the average (2,0; SD=0,95), item 16 with a value of (2,15; SD=1,092), item 17 is in (3,17; SD=0,944) and item 13 is around the average (2,02; SD=1), item 14 with a value of (2,44; SD=0,978).

According to the results shown in the table, career indecision is present in its different forms among the students, however, career indecision due to lack of information and anxiety is more present among high school students.

4. Conclusion

The preliminary results of this investigation reveal the undecided state of the students. On the basis of this study we can design career interventions to help the students in their choice. The guidance assistance should be varied and appropriate to the individual need.

References

- Guerra, A. L., & Braungart-Rieker, J. M. (1999). Predicting Career Indecision in College Students: The Roles of Identity Formation and Parental Relationship Factors. *Career Development Quarterly*, 47(3), 255–266. <https://doi.org/10.1002/j.2161-0045.1999.tb00735.x>
- Osipow, S. H. (1999). Assessing Career Indecision. In *Journal of Vocational Behavior* (Vol. 55). <http://www.idealibrary.comon>
- Osipow, S. H., & Winer, J. L. (n.d.). The Use of the Career Decision Scale in Career Assessment.
- Xu, H., & Bhang, C. H. (2019). The Structure and Measurement of Career Indecision: A Critical Review. In *Career Development Quarterly* (Vol. 67, Issue 1, pp. 2–20). Wiley Blackwell. <https://doi.org/10.1002/cdq>.

COMMUNITY BUILDING ACTIVITIES IN HIGHER EDUCATION DURING EARLY TIMES OF COVID-19 – A CASE STUDY FROM HUNGARY

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Abstract

After the challenges and experiences of the first semester of home education during Covid-19 pandemic, the Szombathely Institute of Eötvös Loránd University Faculty of Education and Psychology has developed a new initiative, which serves both to prepare BA students of community coordination for their professional career as well as the joint operation and strengthening of the student-teacher community in digital education via extra-curricular activities.

This is how the *Community Assembly Workshop* programme series has been created at the Institute of Pedagogy and Psychology including eight-eight programmes in the 2020/21 and 2021/22 academic years with the involvement of students on the basis of learning by doing principle. All phases of the work were carried out by the students, with background information, professional support and guidance provided by the instructor.

The paper is based on the results of a survey and SPSS analysis conducted in May 2021. All students of the two grades participating in the project implementation answered the questions. The aim of the research was to assess the development of students' professional competence, motivation, and ideas about professional perspectives in the future. The results are relevant for the year 2020/2021 academic year which can be described as early times of Covid-19 with restrictions in all segments of life.

The results show that, in addition to the predominance of individual work as a starting point, students lack significant trust in both themselves and their peers, commitment to the profession is also weak. The organizational and implementation tasks of the *Community Assembly Workshop* programmes have developed students' competencies in several areas. According to the results, the work carried out during the project is suitable for increasing skills in terms of teamwork, trust in peers, commitment to peers, responsibility, stress tolerance and creativity as well as precision. Critical thinking is reinforced by the review of university rules and the role of moderators taken in conversations. Creativity can be strengthened along with logically expected graphic and playful tasks with process design as well as writing articles. All the subtasks done individually (moderator) or where the feedback from peers brought the result of satisfaction: e.g. writing articles, taking and publishing photos and videos can be considered as a self-confidence booster. The change in the commitment to the profession cannot be tied to a subtask significantly, as it is visibly strengthened by planning the processes and the work carried out during the whole semester. In terms of the development of the BA programme of community coordination, the result of the initiative is that after only half a year of work, the students' commitment to the profession has increased by 70%.

The work continues in 2021/2022 academic year.

Keywords: *Digital community coordination, learning by doing, extra-curricular activities, Covid-19.*

1. Introduction

'Közművelődés' [cultural education of the public] as a profession is a *Hungarikum*,¹ and the content of the basic course in community organisation differs from area of community development in the Anglo-Saxon world. Community coordination concerns the cultural education of the public, dealing with cultural and youth groups in local communities (Velics, 2021), encouraging volunteering (Velics, 2008), preserving tradition, as well as economic community development. It aims to strengthen local communities.

¹Hungarikum is a collective term indicating a value worthy of distinction and highlighting within a unified system of qualification, classification, and registry and which represents the high performance of Hungarian people thanks to its typically Hungarian attributes, uniqueness, specialty and quality. <http://www.hungarikum.hu/en/content/what-hungarikum>

After the challenges and experiences of the first semester of home education during Covid-19 pandemic, the Szombathely Institute of Eötvös Loránd University Faculty of Education and Psychology has developed a new initiative, which serves both to prepare BA students of community coordination for their professional career as well as the joint operation and strengthening of the student-teacher community in digital education via extra-curricular activities.

The Institute of Pedagogy and Psychology at the Faculty of Education and Psychology at Eötvös Loránd University (ELTE PPK) has been teaching community organisation to BA students since 2017. While the small classes do create a “cosy” atmosphere for participants, the experience of being a community has not yet become a reality. The lecture series “*Közösségszerelő Műhely*” (Community Assembly Workshop) started in the autumn semester of 2020 and is currently in its fourth semester. The initiative serves both preparation for careers, as well as creating cohesion and strength in the student-teacher community in the era of digital education, the Covid-19 pandemic and beyond.

This paper provides a case study-like analytical account of the experience gained through implementing this innovative idea. The lessons learned and the conclusions drawn from the process can be used to design activities beyond the higher education curriculum and provide inspiration for the renewal of the professional digital toolkit for cultural education of the public in the 21st century. Similar initiatives were described only in few cases (Ardeni et al. 2021) (Hast, 2021).

2. Overview of project

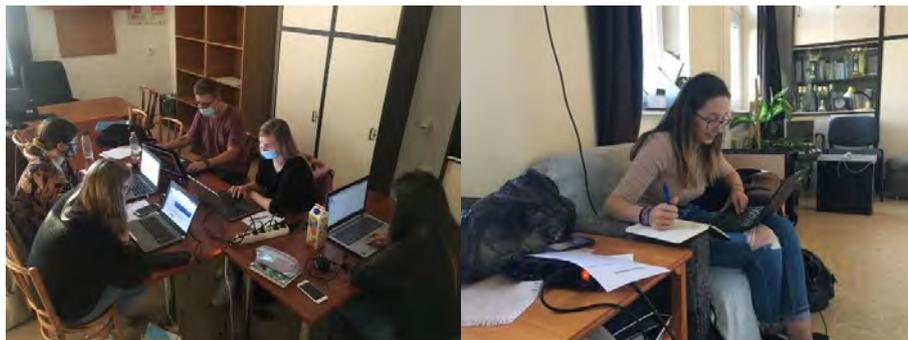
This is how the *Community Assembly Workshop* programme series has been created at the Institute of Pedagogy and Psychology including eight-eight programmes in the 2020/21 and 2021/22 academic years with the involvement of students.

Each semester, the series of programmes is linked to a course (*Mechanisms of Communities and Theory and Practice of Communication I-II*), partly completing its practical tasks, for which students receive a partial credit (25%). All phases of the work were carried out by the students on the basis of learning by doing principle (Bradshaw, 2017) (Samy – Savic, 2019); with background information, professional support and guidance provided by the instructor.

At the beginning of the semester, the students fix the dates and content of the programme and divide the typical tasks among themselves: writing and sending invitations, making posters, preparing General Data Protection Regulation (GDPR) declarations, working out the details of the programme elements, inviting contributors, running the programme, moderation or game master tasks, writing articles, taking photos, etc. The teacher facilitates the process, but the aim is to reinforce shared decision-making and commitment, and to provide experience of workflow in a real-life situation. The programmes were implemented using MS Teams and other digital platforms and tools. In the first and second semesters, programmes were organised for students and teachers, providing a means to connect during periods of online education (See Figure 1.). In the third semester, education was onsite; the programmes were relocated from the digital space, and also from Szombathely, we joined university events such as the Researchers’ Night, and we held a joint evening with the University of Sopron, the student groups from the two universities cooperated to bring the event into being. In the spring semester of 2022, the Community Assembly Workshop will enter the cultural space in Szombathely with the implementation of programmes in cooperation with the Agora-Savaria - Szombathely Cultural Centre.

This series of programmes is still experimental in its content and design. During the early days of the Covid-19 pandemic, part of its novelty was that it served curricular purposes as an extra-curricular activity.

Figure 1. Game masters at work: they sat together for only photo shooting, while the typical working condition can be seen at the right. Social distancing rules and other safety instructions were carried out strictly.
(Photo: Velics, G. 2020.)



3. Methods and results

The general impression became quickly apparent that the students enjoyed the Community Assembly Workshop programmes, but it was also worth exploring what precisely had engendered that satisfaction, as well as what group and personal changes had taken place during the process. Knowledge of what is going on in the minds of the organising students and what the activity means in terms of the digital renewal of the profession of community organisation, is valuable, partly as feedback for the course teachers, partly for pedagogical reasons and also with regard to the planning of future semesters (Fleener – Barcinas, 2019) (Johnson, 2013).

To record the experience gained in the first semester, I collected feedback by email in January 2021 with eleven open-ended questions that provided an opportunity for a longer reflection in writing. Subsequently, a questionnaire survey authorised under no. ELTE PPK KEB 2021/216, and SPSS data processing was carried out in May 2021. The two classes that organised and delivered the programmes for the two semesters were fully represented in the survey: 16 Year II students and 10 Year I students completed the online questionnaire.

In a broader context, the survey focused on the use value, applicability and potential for improvement of the digital solutions for community organisation used during the Covid-19 pandemic. From the results of the research, this paper presents the section on the impact on professional and personal competence development.

The research hypotheses for this area are:

The biggest positive change in students' professional competences is in their perception of teamwork and commitment to the profession.

Main research questions in this section are:

What characteristics did the student self-report before and after the programme?

In which direction have these characteristics changed?

What sub-tasks did each student volunteer to do?

Which feature did these tasks change?

In order to assess the developmental impact of participation in the organisation and implementation of the Community Assembly Workshop, it was necessary to assess the characteristics of the students before they commenced the tasks. I made an assessment of 18 attributes on an ordinal scale, based on the respondents' answers to the following question: "Please, think about how true the following characteristics were of you prior to the Community Assembly Workshop? (1 - least, 5 - most)". The response rate was 100% and painted a picture of students having a significant deficit of trust in themselves and their peers. Commitment to the profession is also weak, with a majority showing at most average scores. Positive attributes include good work ethic, independent work and creativity. The predominance of independent work is a feature brought from secondary school. Students prefer to rely on their own strengths and creativity to solve problems, with less than half of students having had prior experience of teamwork. Perhaps contrary to the general experience of teachers, respondents consider themselves to be good at spelling and meeting deadlines, and see themselves as responsible and precise.

To assess progress, I used the same 18 characteristics and measured the direction of change on a three-point scale: "For each of the following factors, please rate how they have changed as a result of your involvement in the organisation and work of the Community Assembly Workshop (weakened, remained the same, strengthened)". Weakening changes were only found for a few traits and in a few sporadic cases: the ability to tolerate stress, patience and commitment to or trust in peers. The weakening of these shows that the organisational work of the Community Assembly Workshop series, which involved considerable stress in many areas (meeting deadlines, accuracy and precision), was a challenge beyond the comfort level of some students. In the future, it will also be worth bearing in mind that in teamwork, not everyone takes an equal share of the tasks or fails to perform them properly, and this can also be a burden for the others. Spelling, independent work, creativity and precision were the most stable qualities, with three quarters of students indicating these. Commitment to peers, teamwork, trust in peers and commitment to the profession were reported to have strengthened in most instances.

Figure 2. Competences: direction of change. N=26 (100%).

Competences	weakened (%)	N	remained the same (%)	N	strengthened (%)	N
good work ethic	3.85	1	57.69	15	38.46	10
precision			73.08	19	26.92	7
time management			53.85	14	46.15	12
efficiency			46.15	12	53.85	14
responsibility			46.15	12	53.85	14
critical thinking	3.85	1	61.54	16	34.62	9
commitment to the profession			30.77	8	69.23	18
commitment to peers	3.85	1	3.85	1	92.31	24
creativity			73.08	19	26.92	7
use of IT			50.00	13	50.00	13
meeting deadlines			69.23	18	30.77	8
spelling			88.46	23	11.54	3
patience	3.85	1	65.38	17	30.77	8
trust in peers	7.69	2	19.23	5	73.08	19
team work			23.08	6	76.92	20
independent work			76.92	20	23.08	6
self-confidence	3.85	1	61.54	16	34.62	9
ability to tolerate stress	7.69	2	53.85	14	38.46	10

Finally, the students had to choose which task(s) they had carried out and indicate in which area it developed or strengthened them only in terms of the selected task(s): “Please, indicate in the codes the areas the work developed and strengthened you only for the Community Assembly Workshop sub-task in which you participated.” The questionnaire allowed respondents to skip this task if they felt that providing an answer would reveal their identity, thus data from 19 respondents was assessed. In reporting the results, I focus on the weakest initial properties. In terms of confidence building, time management and meeting deadlines, tasks related to the moderation of discussions and those of the game master for quizzes proved to be particularly useful. Both required preparation, there was something at stake, and students were required to deal with sudden and unexpected, technical or human situations alone online, and were provided with immediate feedback. The playful exercises tested at the department’s digital events will also strengthen teamwork, use of IT and creativity.

As qualities worthy of special attention and further development, the strengthening of trust in and commitment to peers, as well as commitment to the profession resulted from the work carried out throughout the semester. There are some areas in which the sub-task in itself determines the competences in which strengthening can be anticipated. Critical thinking is reinforced by reviewing university rules and moderating discussions. Creativity is enhanced by tasks involving graphics and playfulness, process design and article writing. Self-confidence was boosted by any sub-task that demanded independent work or where peer feedback demonstrated satisfaction: e.g., writing articles, taking and publishing photos and videos.

4. Conclusions

In conclusion, the organisation and implementation of the Community Assembly Workshop have improved the students’ competences in several areas. Results reflecting commitment to peers and trust in peers are qualities that show a picture of a community in the making. Progress in teamwork is encouraging as it is an essential attribute for 21st-century workers. The increase in commitment to the profession experienced by 70% of the students is promising in terms of reinforcing the value of the BA in community organisation. The first hypothesis of the research was partially confirmed: a shift towards

professional commitment and teamwork was observed; while the preliminary expectation was complemented by the fact that almost all students reported an increase in the categories of commitment to and trust in peers. This unexpected but positive result can be the basis for social capital that can be used as a resource in later work.

The aim of the study, which was linked to the Community Assembly Workshop set up within the framework of the ELTE PPK Institute of Education and Psychology, was to assess changes in the professional competences of students. As a starting condition, besides the predominance of individual work, the first and second year students on the BA programme in community organisation in Szombathely exhibit a significant deficit of trust in themselves and their peers. Their commitment to the profession is weak at entry, and students are confronted with career elements during their training. The tasks related to the organisation and implementation of the Community Assembly Workshop programme developed the competences of students in several areas. The results show that the work done on the project seems to increase teamwork, trust in peers, commitment to peers, responsibility, the ability to tolerate stress, creativity and precision.

Extra-curricular community activities in higher education provide students not only with a useful way of spending their free time that serve recreational purposes, but also with the opportunity to experience professional collaboration, to strengthen their skills and employability through the experience of teamwork while laying the foundations of their future professional resources by increasing their commitment to each other as a network. Investing energy into these and thus giving back to the community is an activity that does not have an immediate impact, but which will build and develop future generations, as it would in any field.

References

- Ardeni, V.–Dallavalle, S.–Serafin, K. (2021). Building Student Communities in Spite of the COVID-19 Pandemic. *Journal of Teaching and Learning with Technology*, 10(1. Special Issue): 88-102. doi:10.14434/jotlt.v9i2.31410
- Bradshaw, K.–Harvey, R. (2017). Accounting for Taste: Learning by Doing in the College Classroom. *College Quarterly*, 20(2), 1-20. Retrieved 05.12.2021. from: <https://files.eric.ed.gov/fulltext/EJ1142555.pdf>
- Fleener, J.–Barcinas, S. J. (2021). *Futures Learning Strategies for Social Transformation and Lifelong Learning*. American Association for Adult and Continuing Education. Retrieved 05.12.2021. from: https://eric.ed.gov/?q=learning+by+doing&pr=on&ft=on&ff1=dtyIn_2021&id=ED611608
- Hast, M. (2021). Higher Education in Times of COVID-19: Giving Online Feedback Implementation Another Look. *Higher Education Studies*, 11(1): 1-7. Retrieved 05.12.2021. from: https://eric.ed.gov/?q=learning+by+doing&pr=on&ft=on&ff1=dtyIn_2021&id=EJ1288555
- Johnson, K. (2013). Creating Experiential Learning in the Graduate Classroom through Community Engagement. *American Journal of Business Education*, 6(1): 149-154. Retrieved 05.12.2021. from: <https://eric.ed.gov/?q=Katryna+johnson&pr=on&ft=on&id=EJ1054280>
- Samy, A.–Savic, M. (2019). The Hybrid Education Model: Evolution of the Higher Colleges of Technology, UAE. *Work Based Learning e-Journal International*, 8(1): 41-52. Retrieved 05.12.2021. from: <https://eric.ed.gov/?q=learning+by+doing&pr=on&ft=on&id=EJ1269710>
- Velics, G. (2008). Vasi civilek az éterben - két modellértékű kísérlet a közösségi rádiózás tapasztalatairól. (Volunteers of community radio stations in county Vas.) In: S. Nagy, K.–Orbán, A. (eds.) *Értékek és normák interdiszciplináris megközelítésben*. (Interdisciplinary approach of values and norms.) pp. 460-485. Budapest: Gondolat Kiadó.
- Velics, G. (2021). *A közösségi rádiózásról. (1993-2008)*. (Community radio. 1993-2008.) Budapest: Fakultás Kiadó.

THE TEACHING IDENTITY OF UNIVERSITY PROFESSORS: ITS IMPORTANCE IN PEDAGOGICAL PRACTICE

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Abstract

The importance of studying the identity of university teachers lies in their role as mediators of learning and as key players in the professional training of new generations. In this sense, we report the advances of a research whose purpose is to investigate how the teaching identity of university professors is constructed and the way they perceive and mean their pedagogical practice. In the investigation of the construction of the identity of university professors, their school and professional trajectories, as well as their teaching experiences and practices, become important. On this occasion, only the findings related to the teaching trajectory and pedagogical practice of the professors are reported. The qualitative biographical-narrative approach was used to obtain six life stories of teachers from different disciplines working in public and private universities. The narratives on the adequacy of the curriculum and the pedagogical practices of the teachers, as axes of the teaching trajectory, made it possible to investigate how the teachers perceive and mean their pedagogical practice, and an approach to the understanding of the current teaching practice and their identity formation. Among the most important results in these areas are planning and academic freedom in the curriculum; implicit theories of teaching and learning; transmission of values; and the challenges of teaching: the transformation of practices and the relationship with students.

Keywords: *Teaching identity, curriculum, pedagogical practice, university professors, life stories.*

1. Introduction

The identity of teachers has been transformed by the structural, political and social changes that have had an impact on education, and as a result of these changes, teachers have lost autonomy in practice. Our attention will be focused on university teaching identity, since the university is a unique space for the construction of knowledge, it presents singular characteristics that allow a particular identity configuration of university teachers (Contreras, 1997).

Currently, university professors are exposed to an apparent lack of professionalization in their work, partly due to the neoliberal and managerialist dynamics in which higher education finds itself. Public and private universities have gone from being spaces for the training of professionals, cultural promotion and the generation of knowledge and arts; to being organizations whose main objectives will be competition at national and international level, obtaining more and better funding and the exposure of the university to the global market (Jiménez, 2015; Valle, 2015).

The current condition of university teaching exalts the professor as the executor of the neoliberal and modernizing proposal. The teacher must make use of the new educational technology, teach, learn and train continuously, participate in the respective training and evaluation programs generated from outside by policies and organizational systems often alien to the teaching life, which positions him/her as an executor instrument of policies and strategies designed from outside (Aguirre, 1989).

In view of this scenario, the identity of university teachers requires new research that will allow them to continue developing and strengthening their skills as teachers and professionals in their particular area of knowledge. In addition, teaching identity requires a specific field of research that differentiates it from the work on professional identity, since we consider that teaching has its own characteristics that should be recognized as distinctive of teachers and their identity.

These characteristics of the teacher and his or her identity become relevant not only because they have to do with his or her role as a mediator of learning, his or her responsibility in the curriculum and as a key actor in the educational process, but also because of the role played by his or her emotions in his or her daily work. Therefore, the personal, work, cultural and institutional conditions immersed in the continuous development of the teacher not only have a direct impact on the construction of his or her

identity as a teacher, but are also reflected in his or her educational action, therefore, the particularities of this construction go beyond the professional identity alone.

From various theoretical perspectives we retake the concept of identity as a subjective and self-reflective process by which subjects define their differences with respect to others, in this process the individual recognizes and reaffirms himself through others (Mead, 2009; Berger and Luckmann; 1968; Giménez, 2005; Goffman, 1997), in addition, we prioritize the conception of reality proposed by socioconstructivism, as the understanding of reality as a social construction (Ibáñez, 1979).

We consider that identity is a complex construct, which with difficulty we can disarticulate in everyday reflection, since the social actor brings together the various levels of identity in such a way as to produce a subjectively unified image of himself (Dubet, 1989:536), but for the purposes of educational research it is worthwhile to differentiate in which category of identity we position our research.

Our research is focused on teacher identity, which we understand as a set of meanings that the teacher constructs regarding who he/she is and what social task he/she has; these meanings are assumed personally and as a group, on the basis of socially assigned cultural attributes. The teaching identity will be the result of the interaction between the personal experiences of teachers in the social, cultural and institutional environment in which they function on a daily basis (Avalos, 2013).

The construction of the identity of university teachers is a complex process in which a number of important elements are involved. To address this complexity, we opted for a qualitative biographical-narrative approach, whose unit of analysis is the teachers' narratives. These narratives focus on the teachers' profession of origin, the teaching practice, the institutions and the disciplines to which they belong. Based on their discourses, we rescued their school and professional trajectories, as well as their experiences and teaching practices in order to approach their identity construction.

On this occasion, we report the findings found so far related to the construction of the teaching identity from its expression in the pedagogical practice. An important part of the teacher's pedagogical practice is related to the curriculum (Gimeno, 1995); this practice is developed through multiple processes in which different subsystems and functions are intertwined.

The teacher is an active subject of the curriculum who has the right and obligation to contribute his or her own meanings, and also has particular responsibilities as mediator, reproducer of culture, transmitter of values, norms and modeler of socialization. Therefore, knowing and understanding the way in which teachers re-signify the curriculum through their practice allowed us to understand how teachers construct a way of being and feeling themselves as teachers.

2. Development

In order to approach the understanding of the construction of the teaching identity of higher education teachers, we opted for the biographical-narrative qualitative approach.

Although qualitative methodology does not seek the generalization of data, it does allow an in-depth understanding of educational and social phenomena, it is inductive, naturalistic, with a holistic perspective of people and scenarios, and seeks to understand the individual from his or her own social, cultural and contextual frame of reference (Taylor and Bogdan, 1987). In its multiple traditions and methods, it allows understanding educational phenomena as a first step to transform educational reality (Sandín, 2003).

Of these traditions, the biographical-narrative approach is the most appropriate for our object of study, since narrative is an innate form of organization of reality through which subjects incorporate our culture; it is the way in which we construct reality through the organization of memory and human experience; we construct ourselves through life and life is constructed through narrative (Bruner, 1990). The narrative account is constitutive of identity since it emphasizes professional development, is in turn personal and gives entry to disciplinary transversality in the objects of educational study, so that the narrative can be both the phenomenon to be studied and the method to be used.

Therefore, from the set of methods of the narrative biographical approach we chose life stories, and as a tool for obtaining data the biographical interview (in some cases called narrative or in-depth interview), which were the ideal ones to understand the teaching identity as a set of subjectivized experiences and intertwined with the elements that make up the life of the teacher as an integral subject.

The life story is the story told by the subject literally, the subject uses the story to express the contents of a part of his lived experience and constructs his biographical ideology, which refers to the construction after a fact or event made by the subject (Bertaux, 1997, 1999).

We obtained six life narratives of professors from different disciplines working in public and private universities in Mexico. The professors who participated were chosen because they had been working for at least 10 years in one of the two institutions chosen -the National Autonomous University of Mexico (UNAM) and the Ibero-American University (IBERO)-, institutions chosen because they are recognized

for their quality, which implies the presence of consolidated professors who have remained in the universities for a long time.

In addition, the professors chosen represent three of the knowledge segments of Blecher's (1992) disciplinary grouping classification: from the pure sciences (physics and mathematics), from technologies (mechanical engineering and biomedical engineering), and from the humanities and applied social sciences (pedagogy and philosophy).

The disciplines from which teachers come from define to a large extent the way in which they construct their identity and relate to institutions, peers and students, which is why having a varied group of participants allowed us to approach different ways of being a teacher.

3. Findings: Teaching career and pedagogical practice

The following analysis is part of the domain corresponding to the professional trajectory of teachers, which addresses the results obtained regarding the pedagogical practice of the teacher and its relationship with the processes of teacher identity construction, from axes such as the curriculum, implicit theories and the relationship with students.

Among the most relevant findings, we find those related to the curriculum and lesson planning. In this regard, the participants emphasize the importance of academic freedom in their practice, in which the meanings acquired by teachers explicitly or during their training and others resulting from their experiences (Marrero, 1993), which allow them to make decisions on how and what to teach, become relevant.

Within this hierarchy of priorities and skills for teaching, the design of teaching situations that promote management and entrepreneurial skills in students is noteworthy. The development of competencies allows positioning graduates in labor markets in which technical skills allow them to develop with high efficiency, generating new projects with autonomy (Aldana, Tafur, Gil, and Mejía, 2019).

In the specific case of engineers, professors highlight the importance of the development of written and oral communication skills. For engineering students, the most worrying aspects in the development of reading and writing skills are those related to the general structuring of texts and the ability to express themselves in front of an audience, as a result of study habits that prioritize memoristic processes that limit the student to express his ideas fluently (Carreño, 2012), so the teachers' strategies respond to the need of students to develop in different work areas that require the management of various communication skills.

Another relevant axis in our analysis is related to the implicit theories of teaching and learning. Regarding the epistemological conceptions that teachers bring into play in the teaching process, these are integrated by a set of implicit theories that help teachers to make decisions about planning and evaluation (Coll and Miras, 1993).

These conceptions are fundamental for teachers because they define their classroom performance and how it relates to curricular content. In this regard, teachers articulate diverse knowledge from their disciplinary, curricular, experiential or practical training, built throughout their teaching career (Barrón, 2015). This knowledge is constructed and reconstructed by continuing or moving away from different theoretical perspectives, among the notions most present in our participants are those related to constructivist, cognitive and sociocultural approaches to learning.

It is important to clarify that, teachers' implicit theories are not pure and are intertwined with different notions about learning and teaching that the teacher has recovered and put into practice throughout his or her trajectory, in addition, these conceptions or epistemologies are very diverse, are mixed and sometimes are not clear or explicit for them.

On the other hand, there are different elements in our results that show the subjective experience of teachers, related to experiences, situations, relationships and practices that allow us to affirm that the identity of the teacher together with their pedagogical practice, are constantly changing and evolving, it is through experience and reflection that teachers modify or adapt different strategies and manage to incorporate diverse epistemological conceptions in order to build a way of being and feeling like teachers.

Among the challenges that teachers identify are those related to the diversity of students each semester, and how the incorporation of technology and the immediacy that this means, confronts them with different challenges in the classroom, specifically the attention to the so-called millennial generation, which represents the young population of the present, it is the generation born in the transition of the millennium change and the digital revolution (Area, Borrás, and Nicolás, 2015), so the strategies to capture their attention and achieve learning have posed a challenge to the participants within their teaching practice.

Part of the challenges expressed by the participants have to do with the closeness with the students, let us remember that for university students the characteristics of a good teacher-student relationship are mainly related to social elements, personalized, kind, trusting and communicative treatment, the

development of friendly and respectful environments, in addition, the treatment outside the classroom is important to promote better results in students.

The influence of teachers is decisive for students, since the construction of meanings by students about the reality that surrounds them and about themselves is related to the social and relational context in which they develop (Covarrubias and Piña, 2004). In this sense, students perceive the incomprehension, inflexibility and rigidity of the teacher as characteristics that disrupt the educational relationship; for some participants, the approach to students is complex, which they recognize as a challenge to achieve greater empathy and involvement of the student with the content and classes.

4. Conclusions

The construction of identity is a multiple interweaving of elements and experiences, the findings of the research represent a window for the understanding of this construction that in the long term will allow us to know the relevant elements involved in this complex process, which enables the approach to the current situation of university classrooms narrated by one of its main actors.

The curriculum, as a category that crosses the identity construction of teachers, allows us to account for substantial elements of the pedagogical practice that professors develop through years of experience and that is transformed throughout their career, according to the new educational demands.

The importance of intertwining identity processes with the adaptation and translation of curricular content lies in the framework that the curriculum provides to the teacher's practice and the way in which this framework gives guidelines to the construction of different elements of identity, such as the relationship that teachers maintain with their students or the implicit theories on learning that teachers appropriate throughout their teaching career.

Giving voice to university teachers is necessary to achieve significant transformations thought and structured from the needs of the different university spaces and their actors, so narrative methodologies are a relevant alternative to achieve this purpose, because it allows teachers to relate and reconstruct their trajectory from the recognition of the importance of their work, generating a climate of trust and openness between teacher and researcher.

References

- Aguirre, G. (1989). A crisis within the crisis: the professional identity of university teachers. *Revista de la Educación Superior*, 66, 1-9.
- Aldana, E., Tafur, J., Gil, I. y Mejía, C. (2019). Pedagogical practice of entrepreneurship in higher education teachers in Institución Educativa Universitaria de Barranquilla. *Journal Archivos Venezolanos de Farmacología y Terapéutica*, 38 (2), 9-18.
- Area, M., Borrás, J. and Nicolás, B. (2015). Educating the Millennials generation as educated citizens of cyberspace. Notes for digital literacy. *Journal of youth studies*, 109, 13-32.
- Avalos, B. (2013). *¿Héroes o villanos? La profesión docente en Chile*. Chile: Editorial Universitaria.
- Barrón, C. (2015). Epistemological conceptions and teaching practice. A review. *Revista de docencia universitaria*, 13 (1), 35-56.
- Berger, P. y Luckman, T. (1968). *La construcción social de la realidad*. Argentina: Cultura libre.
- Bertaux, D. (1997). *Metodología de la investigación II: Los relatos de vida*. Paris: University of Salta.
- Bertaux, D. (1999). The biographical approach: its methodological validity, its potentialities. *Propositions*, 29, 1-23.
- Blecher, T. (1992). Disciplines and the identity of academics. *University Future*, 4 (10), 56-72.
- Bourdieu, P. (1998). *La distinción: criterios y bases sociales del buen gusto*. Mexico: Taurus.
- Bruner, J. (1990). The entry into meaning. En *Acts of meaning: beyond the cognitive revolution* (pp. 75-99). Madrid: Alianza Editorial.
- Carreño, P. (2012). Oral and written communication in engineering education. *Revista de la Facultad de Ingeniería*, 13 (25), 146-152.
- Coll, C. and Miras, M. (1993). La representación mutua profesor/alumno y sus repercusiones sobre la enseñanza y el aprendizaje. En C. Coll, J. Palacios y A. Marchesi. *Desarrollo Psicológico y educación II. Psychology of Education* (297-313). Madrid: Alianza.
- Contreras, J. (1997). The professionalism of teaching. En *La Autonomía del profesorado* (pp. 15-48). Madrid: Ediciones Morata.
- Covarrubias-Papahiu, P. (2010). Origen y enfoques contemporáneos de la psicología educativa. En F. Tirado, M. A. Martínez, P. Covarrubias, M. López, R. Quezada, A. Olmos y F. Díaz-Barriga. *Psicología Educativa para afrontar los desafíos del siglo XXI* (pp. 14-40). Mexico: McGraw Hill

- Covarrubias-Papahiu, P. y Piña M. (2004). La relación maestro-alumno y su relación con el aprendizaje. *Revista Latinoamericana de Estudios Educativos*, 34 (1), 47-84.
- Dubet, F. y Zapata, F. (1989). De la sociología de la identidad a la sociología del sujeto. *Estudios Sociológicos*, 7(21), 519-543.
- Fierro, C. y Carbajal, P. (2003). Los profesores y los valores de su práctica. *Sinéctica*, 22, 3-11.
- Giménez, G. (2005). *La cultura como identidad y la identidad como cultura*. México: Instituto de Investigaciones Sociales-UNAM.
- Gimeno, S. (1995). *El currículum: una reflexión sobre la práctica*. Madrid: Morata.
- Goffman, E. (1997). La actuación. En *La presentación de la persona en la vida cotidiana* (pp. 29-81). Buenos Aires: Amorrortu Editores.
- Hodelín, R. y Fuentes, D. (2014). El profesor universitario en la formación de valores. *Educación Médica Superior*, 28 (1), 115-126.
- Ibáñez, T. (1979). Factores sociales de la percepción. Hacia una Psicología del significado. *Quaderns de psicologia. International Journal of Psychology*, 1(7), 71-81.
- Jiménez, M. (2015). Ciencias y humanidades en la cultura. El destino de la universidad. En M. Jiménez, y A. Valle (Eds.). *Sociología y cultura: transformar la universidad* (39-61). México: UNAM-Juan Pablos.
- Marrero, J. (1993). Las teorías implícitas del profesorado: vínculo entre la cultura y la práctica de la enseñanza. En J. Rodrigo, A. Rodríguez y J. Marrero (Eds.). *Teorías implícitas: una aproximación al conocimiento cotidiano* (243-273). Madrid: Aprendizaje Visor.
- Mead, G. (2009). The person. *Spirit, person and society. From the point of view of social behaviorism* (pp. 167-248). Mexico: PAIDOS.
- Rodríguez, X. y Andrade, J. (2016). *Identidad profesional docente y su influencia en la práctica pedagógica* (Tesis Licenciatura). UNAM, Mexico.
- Rojas, Y. (2011). Habilidades sociales en los futuros ingenieros. *XI Congreso Nacional de Investigación Educativa de COMIE*. UNAM, Ciudad Universitaria. México.
- Sandín, M. (2003). *Investigación cualitativa en educación: Fundamentos y tradiciones*. Mexico: McGraw-Hill.
- Segovia, M. (2010). *Construcción de la identidad del docente de la Licenciatura en Ciencias de la Educación de la Universidad Autónoma del Estado de Hidalgo* (Tesis de Maestría). UNAM: Mexico.
- Taylor, S. y Bogdan, R. (1987). *Introducción a los métodos de investigación cualitativa. La búsqueda del sentido*. Madrid: Morata.
- Valle, A. (2015). Universidad y cultura, en los límites de la indiferencia. En M. Jiménez y A. Valle (Eds.) *Sociología y cultura: transformar la universidad* (39-61). Mexico: UNAM-Juan Pablos.

DIGITAL MEDIA AND INCLUSIVE EDUCATION IN HOME-SCHOOLING

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Abstract

The paper focuses on one of the aspects most investigated and monitored in recent years by the Desi index (Digital Economy and Society Index) on the digitization process in Europe, human capital, with an in-depth focus on primary school teachers.

The emergent state of Covid 19 has had a strong impact in the field of education, so much so that the uses of digital technology and its applications are now an essential topic in public and political debate. The implementation of digital devices for education, during the lockdown, has necessarily led to a reflection on the methodological paths that can be applied and tested in the educational context. There are many uncertainties linked to the validity of new digital didactic approaches and to the communicative and transmissive effectiveness of the contents where the digital skills of teachers and families and the lack of adequate equipment risk compromising the objective of effective and inclusive education.

How can educational quality and inclusion be guaranteed through digital communication, beyond socio-cultural inequalities? How can school digital capital guarantee new educational planning in the classroom?

These are the main questions of the paper, which will focus on illustrating the communicative strategies of visual storytelling and graphicacy as tools for democratising digital communication, for sociocultural inclusion and for reducing sociocultural inequalities, by illustrating the structural framework and the main actions/strategy of the European Erasmus Plus project CAVE (Communication and Visual Education in homeschooling).

Keywords: *Digital competences, teaching, digital education, inclusion, digitalization.*

1. Introduction

Within the field of education, already in 2018, the Teaching and Learning International Survey (TALIS) promoted by Organization for Economic Co-operation and Development (OECD), highlighted how the percentage of primary school teachers for whom "the use of ICT for teaching" was included in their formal education and training internationally is equal to 56% (in particular Italy, 52%; Spain, 38%; Lithuania, 45%; Romania, 70%; Poland, not available) (OECD, 2019a). If we refer, instead, to the number of teachers who claim to be "well prepared" or "very well prepared" for the use of ICT in teaching, the percentage drops to 43% (Italy and Spain, 36%; Lithuania, 57%; Romania, 70%). The very results of the 2018 TALIS show that only 18% of the teachers surveyed use ICT skills for teaching, about 60% include the use of technologies for activities related to their professional development and only 53% of them let students use devices for projects or project work.

These data reflect the framework set by the DESI INDEX¹ in 2021 with respect to human capital on the basic and advanced skills of citizens in the field of ICT, which requires implementations in at least 12 European countries (European Commission, 2021).

The report "Digital Economy Outlook 2020" (OECD, 2020) analyses how the COVID-19 pandemic has amplified both the opportunities and challenges of the digital transformation. It confirms, therefore, how technologies have proved essential in the management of the epidemic and how this has further accelerated the already rapid pace of implementation of digitalisation, while significantly hitting also the public sector, which proves to be generally slower in times of technological transition because of its large size and bureaucratic management.

¹Since 2015, the Digital Economy and Society Index (DESI) has been monitoring the process of digitalization of EU countries using 4 main indicators: connectivity, human capital, integration of digital technologies in organizational contexts and implementation of digital public services.

However, the surveys have also highlighted significant issues of digital divide, resulting both from structural deficiencies and delays in terms of technological-infrastructure adaptation of organizations and local authorities, as well as situations of digital illiteracy that are still extremely high among citizens. In particular, with respect to schools, the 2022 S.U.P.I. (Social Uncertainty, Precarity, Insecurity) report by Eurispes presents a comparison of the policies and strategies activated by the educational systems of several European countries during the lockdown period, highlighting four main transversal factors of inadequacy within the education sector: 1. time to effectively manage the school organisational system in an emergency situation; 2. adequate training of school staff to cope with the emergency and acquire sufficient skills to design digital educational pathways while safeguarding the quality of education; 3. the absence of official guidelines by government bodies that provide unambiguous guidance on the tools, strategies and teaching methods; 4. infrastructural and technological – but also human and cultural – resources to manage the new digital education system in the medium term (Fluxa, 2022).

In line with the objectives set by Europe 2030 and the *European Green Deal* strategy, the education system is also involved in the process of transition to digitalisation, with regard to sustainability issues, in a long-term perspective ranging from 2030 to 2050, oriented towards initiating structural and methodological transformations, with regard to the models of delivery and transmission of knowledge, to the skills of its actors, and to the organizational and managerial structures of schools.

2. Designing the didactic inclusion in the primary schools

The European Commission's Communication of 30 September 2020 on achieving the European Education Area by 2025 (5) defines inclusion as one of its key objectives.

In the Eurydice report 2022, *Towards equity and inclusion in Higher Education in Europe*, "Inclusion is an objective that has both an individual and a societal basis. Education is a human right, enshrined in both article 26 of the Universal Declaration of Human Rights (18) and article 2, protocol 1 of the European Convention of Human Rights (19). Furthermore, investment in education is an investment in personal and societal development. In this sense, inclusion is at the heart of our understanding of democratic culture. We cannot accept limitations on citizens' rights to education as this would be counterproductive for both citizens and society" (Eurydice, 2022, p.37).

The complex framework of sociocultural and digital inequalities, which the period of health emergency from COVID-19 has revealed and amplified, is the subject of public and scientific debate, in order to identify pathways that meet the training needs of teachers on the digital issue.

CAVE (Communication and Visual Education) is a European project started in 2020 under Erasmus+ that aims to lead primarily teachers, but also students, towards knowledge and wisdom; inspired by the myth of Plato's cave, the project uses visual representation (visual storytelling) and especially pictograms (which recall the rock marks), thus stimulating all participants to overcome physical, cultural and social barriers that have always conditioned traditional learning and teaching, especially during the pandemic period.

The project, while taking its cue from the condition of global health crisis generated by COVID-19, widens its gaze by framing other types of precariousness already manifest before the pandemic and equally critical in compromising the path of school socialization among children; among these we can include: 1. individual health precariousness, determined by physical fragility or degenerative diseases that may affect educational continuity; 2. geographical precariousness, determined by conditions of forced isolation due to natural disasters; 3. all situations of precariousness which may compromise the regular flow of school education for social, cultural, political or economic reasons that do not necessarily depend on the individual's will.

In this sense, CAVE wishes to offer food for thought and opportunities for experimentation for primary schools, in order to identify innovative strategies and alternative educational paths, in which digital technology can be a useful support for the reduction of the various forms of socio-cultural disparity, thanks to its ability to combine the potential of different languages and its multidisciplinary nature conducive to the reduction of linguistic inequalities or generated by cognitive, psychological and physical deficits.

The main priorities of the proposal are two:

1. Reinforcing the development of key competences, through the enhancement of digital competences, of teachers.

In this sense, the project intends to link to the two additional priorities identified by the European Commission under the Digital Education Action Plan, related to digital education: 1) improve the quality of the pedagogical use of technologies in teaching and learning processes; 2) foster the development of digital skills of teachers and students to cope with contemporary sociocultural changes (European

commission, 2018) through adequate digital training (Bulger & Davison, 2018; Hartai, 2014; Hobbs & Tuzel, 2015).

In this regard, the theoretical reference frameworks regarding the digital competence taken into account by the project are: DIGCOMP (2013) and subsequent updates, with particular reference to critical analysis, creative production, communication and collaboration and problem solving. (Ferrari, 2013; Carretero et alii, 2017) and the DIGCOMPEDU (Punie, Redeker, 2017) with particular reference to the following areas: a) "Teaching and learning" which calls for the use of technologies for innovation especially in terms of improving communication and the transferability of educational content to students through an integrated digital teaching. b) "Digital resources" inviting teachers to use new media languages, with particular reference to visual and multimedia languages to prepare teaching material, c) "Learner's empowering" on the implementation of students' soft skills also through the use of digital tools and an engaging teaching methodology and d) "Assessing", relating to the design and application of evaluation methods and tools adaptable to the pathways of Digital Education.

2. Social inclusion of children, through a proposal of didactic experimentation close to the languages and environments of mediated socialization of the new generations. The aim of this priority is to work in several directions:

- the reduction of school drop-out of students resulting from demotivation and deresponsibilisation;
- the weakening of different types of barriers: from the language barriers of immigrant children to the cognitive barriers of children with SLDs², from the geographical barriers, induced by the health emergency condition, to the socio-cultural family; often determined by the different availability of the technological endowment, the economic capital and the cultural and digital background, and finally those barriers linked to the digital capital of the same schools in proposing activities through distance teaching³.

3. Communication and Visual Education in home-schooling: Analysis of intellectual outputs

Through this project, the discipline of Communication Design comes into play to stimulate reflection on the strategies and methods of planning of integrated digital education courses, in a context of Digital Education. The work of critical reflection focuses mainly on at least two aspects underlying the principles of digital educational quality: 1. inclusive communicative languages at the basis of perceptive and cognitive processes, and information storage and 2. the design of the architecture underlying the environment of delivery of teaching in compliance with both the requirements of accessibility and usability for a very young target, such as that of children under 10 and their teachers, both of the relational and communicative dimension, weakened by social distance and digital mediation at school during the pandemic, and of the dimension relating to the safeguarding and protection of data shared and shareable online during the use of the same educational platform.

The main key intervention strategies of CAVE focus on 3 aspects, with respect to which innovative project proposals have been put forward; these are functional to the implementation of social inclusion and quality in the perspective of an integrated digital education:

1. the language;
2. the method;
3. the communication channel.

In the first case, during the didactic experimentation phase of the project, the aim was to adopt visual communicative codes based on better communication and transferability of teaching content both to teachers (during the training phase) and students. To this end, *Information Design* comes into play as a two-stage process: 1. the organization of data (or content) from multiple sources in information; 2. their creation in graphic or representative form (*design*) (Tufte, 1997, IIID, 2007; Manchia, 2020). The final visual communicative artifact, therefore, is not simply reduced to a graphic transposition of a set of notions, but to a codified text, mainly syncretic (Polidoro, 2008)⁴, in which it is possible to recognize a point of view, a communicative style, and a theoretical stance just like in a literary text (Manchia, 2020).

²From the 2018 TALIS surveys, it emerges that about 18% of teachers now teach in classes with more than 10% of students whose first language is different from that of education, both with respect to inequalities generated by learning disorders (SLD) and cognitive and physical deficits knowing that, according to the results of the TALIS 2018 surveys, about 27% of teachers teach in classes with more than 10% of students with SLD and SEND.

³A study carried out on Spain's 2013 TALIS dataset showed that the use of ICT by teachers in the classroom depends not only on teacher training in ICT, but also on cooperation between teachers themselves, the perception of self-efficacy and beliefs in teaching, as well as (albeit to a lesser extent) availability of educational softwares or educational infrastructures (Gil-Flores, Rodríguez-Santero and Torres-Gordillo, 2017). (OECD (2019a), p. 29)

⁴We are talking about syncretic texts (Polidoro, 2008) that are texts capable of connecting multiple languages, from the verbal to the visual one in its different expressions (videos, photos, icons, drawings, etc.).

In this sense, not only the result (the communicative artifact) but also the process of representation (Tufte, 1983) acquire relevance in the process of infographization of the informative and didactic content which recalls cognitive operations related to the reading of raw material, the selection of information, the reorganization of concepts, the synthesis of data and their visual representation on the basis of communication objectives.

In the wake of *Isotype* by Neurath (1945)⁵, the adoption of a visual language, with the aim of "explaining by images", recalls the democratic power of visual design or the possibility of transferring one or more information and knowledge in a clear way to masses of subjects not necessarily prepared on the proposed themes and with heterogeneous skills. In fact, the iconic language (mainly infographic) is easily recognizable and interpretable even by those who do not have adequate linguistic codes (for example, immigrant students), by those who may have learning disabilities (dyslexia, dyscalculia, etc.), as well as students with different learning and expression times, starting from the different cultural stimuli of the sociocultural context.

In the second case, in order to stimulate active participation of students and their cooperation, including between peers (Taddeo and Tirocchi, 2019), the project focus was on two methodological proposals: visual storytelling (Lankow, Ritchie, Crooks, 2012), also understood as the link between storytelling and Information Design (Cortoni, Pandolfini, 2019) and the Munari method.

Visual storytelling is a cognitive method, aimed at understanding the surrounding reality and attributing meaning to the complexity of the surrounding events; it is a cognitive means to stimulate people's interpretive processes and to direct perceptions of reality, ideologies that can lead to social positions or actions. It is also an instrument of socialization through which people can become aware of their identity, their emotions, their social role, and is a specific resource, in an educational context, to stimulate learning processes through laboratory experience (Cortoni, Faloni, 2019).

Bruno Munari's design method is mainly based on the stimulation of visual creativity through play, focusing not so much on the outcome of the workshop (the visual product) but on the process put in place to achieve it. The peculiarity of Munari's approach lies in frequently stimulating the recipients to search for alternative ways of representation of the same object, identifying and discovering "other possibilities" to explore the infinite aspects of the phenomena, without stopping at the already known, stereotypes and representative uniqueness (Munari, 1981)⁶.

The basic principles of communicative design, visual storytelling and Munari's design method have represented some of the main and innovative educational inputs proposed in the first intellectual output of the European project for educators, in order to implement specific skills related to effective communication through the appropriate use of visual languages, as well as developing skills for the design of online classes using the rules of animation and visual storytelling, being able to coordinate moments of knowledge sharing with moments of experimentation and implementation.

Finally, the communication channel that was chosen to experiment the communicative relationship between teacher and student is a social media platform for educational purposes accessible through different devices, from smartphones to PCs, which mainly conveys visual content, with similar settings to those of Instagram, the most popular social medium amongst preteens. For this reason the second intellectual output of CAVE has focused on the design and testing of a visual social educational network, addressed exclusively to students and primary school teachers and functional to support and ensure continuity to the activities proposed in the classroom not only in times and situations of social insecurity, but also throughout the regular teaching routine, thus inaugurating new communicative, linguistic and relational modes that make school socialization keep up with the transformations of digital culture ensuring heterogeneity in educational relations between the different school actors.

The choice of the social visual environment as a communication and educational channel, in fact, meets two specific needs: 1. the stimulation of a relationship with the teacher, as well as peer to peer, and the use of visual language for communication easily accessible beyond disparities; 2. the choice of mobile devices as the main means of enjoyment of educational content by responding to the prerequisite of inclusiveness, insofar as this medium is generally owned and used by more than 90% of young people in Italy regardless of social, cultural, economic and technological disadvantages. The only precondition required is an active Internet connection. The use of this platform can certainly contribute to the medium and long term implementation of some transversal and digital skills such as:

- the ability for students to use online sources and re-process them appropriately;
- the ability to visually represent thoughts and content by learning to synthesize information and organize it by key concepts;

⁵*Isotype* is considered the first example of contemporary infographics

⁶The Munari method goes from the identification of the problem, to its detailed definition, to proceed with the research and analysis of the information related to the problem and then propose a solution with respect to the problem investigated, to be tested, verified and validated.

- stimulate online collaboration between peers and with teachers, who acquire more authority;
- increase interest and curiosity about school topics, often labelled as boring or distant from the interests of learners, especially children.

References

- Bulger, M., & Davison, P. (2018). The Promises, Challenges, and Futures of Media Literacy. *Journal of Media Literacy Education*, 10(1), 1-21. <https://doi.org/10.23860/JMLE-2018-10-1-1>
- Carretero, S., Vuorikari, R., & Yves Punie Y. (2017). *DigComp 2.1: The Digital Competence Framework for Citizens with eight proficiency levels and examples of use*. Luxembourg: Publications Office of the European Union.
- Cortoni, I., Pandolfini, V. (2018). Ricerca valutativa e Information Design. Riflessioni sui metodi e i linguaggi comunicativi. *Rassegna Italiana di Valutazione (RIV)*, 71/72, 2/3, 191-212. DOI: 10.3280/RIV2018-071010
- Cortoni I., Faloni V. (2019). Comunicare l'emergenza: infografica e storytelling del COVID Ricerca e valutazione della comunicazione visuale, *Rassegna italiana di valutazione (RIV)*, a. XXIII, n. 75, 23-41 DOI: 10.3280/RIV2019-075003
- European Commission. (2018). *Digital Education Action Plan*. Brussels: Publications Office of the European Union.
- European Commission. (2019). *Digital Education at school in Europe*. Eurydice report, Brussels: Publications Office of the European Union.
- European Commission. (2019). *Directorate-General of Communications Networks, 2nd survey of schools: ICT in education*. Luxembourg: Publications Office of the European Union.
- European Commission (2021). *Indice di digitalizzazione dell'economia e della società (DESI) 2021. Italia*. Brussels: Publications Office of the European Union.
- European Commission (2022). *Towards Equity and Inclusion in Higher Education*. Eurydice report. Brussels: Publications Office of the European Union.
- Ferrari, A. (2013). *DIGCOMP: A Framework for Developing and Understanding Digital Competence in Europe*. Luxembourg: European Commission Report, Publications Office of the European Union.
- Fluxa, F. M. (2022). *Sistemi di istruzione, lockdown e restrizioni: l'istruzione da ripensare*, SUPI report on Social Precariousness
- Gil Flores, J., Rodríguez Santero, J. y Torres Gordillo, J.J. (2017). Factors that explain the use of ICT in secondary-education classrooms: the role of teacher characteristics and school infrastructure. *Computers in Human Behavior*, 68, 441-449.
- Hartai, L. (2014). *Report on Formal Media Education in Europe*. OFI (Hungarian Institute for Education Research and Development, Hungary). Emedus: European Media Literacy Education Study. Available at: <https://eavi.eu/wp-content/uploads/2017/02/Media-Education-in-European-Schools-2.pdf>
- Hobbs, R. & Tuzel, S. (2017). Teacher motivations for digital and media literacy: An examination of Turkish educators. *British Journal of Educational Technology* 48(1), 7 – 22. DOI: 10.1111/bjet.12326
- IIID (2007). *Information design: core competencies. What information designers know and can do*, available in <https://www.iiid.net/PublicLibrary/idX-Core-Competencies-What-information-designers-know-and-can-do.pdf>
- Lankow, J., Ritchie, J., Crooks, R. (2012). *Infographics: The power of visual storytelling*. Hoboken, New Jersey: John Wiley & Son
- Manchia, V. (2020). *Il discorso dei dati. Note semiotiche sulla visualizzazione delle informazioni*, Milano: FrancoAngeli
- Munari, B. (1981). *Da cosa nasce cosa. Appunti per una metodologia progettuale*, Roma: Laterza
- Neurath, O. (1973). Visual education: Humanisation versus popularization (1945). In Neurath M. e Cohen R.S. (1973). *Empiricism and sociology* (224-248). Dordrecht-Boston: Reidel.
- OECD (2019a). *TALIS 2018 Results (Volume I): Teachers and School Leaders as Lifelong Learners*, TALIS. Paris: OECD Publishing <https://doi.org/10.1787/1d0bc92a-en>
- OECD (2020). *OECD Digital Economy Outlook 2020*. Paris: OECD Publishing <https://doi.org/10.1787/bb167041-en>
- Polidoro, P. (2008). *Che cos'è la semiotica visiva*. Roma: Carocci
- Punie, Y., Redecker, C. (2017). *European Framework for the Digital Competence of Educators: DigCompEdu*. Luxembourg: Publications Office of the European Union:
- Taddeo, G., Tirocchi, S. (2019). *Transmedia Teens: The Creative Transmedia Skills of Italian Students*. *Information, Communication and Society*. NY: Routledge.
- Tufte, E. R. (1997). *Visual Explanations. Images and Quantities, Evidence and Narrative*. Cheshire: Graphics Press Conn.

THE RELEVANCE OF FEEDBACK MESSAGES IN COMMUNICATING QUALITY IN EDUCATIONAL CLASSROOM SETTINGS

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Abstract

This paper put forward an in-depth reflection grounded on two studies. The first regards to doctoral research designed to investigate teachers' interpretations of feedback in terms of theory and practice and it explores how this might be informed by their conceptions of how students learn. The inquiry involves three Year 5 and one Year 4 teachers from three different primary schools in London. The main sources of data comprise classroom observation and teachers' interviews focusing on teachers' feedback practices and the underlying principles that guide them in the actual conducting of classroom interaction and through pupils written assignments. Analysis suggested that feedback focused on correcting basics errors, seeking further actions on the task at hand and contrasting the work with learning objective and success criteria. The main lessons learnt from the practices and views held by teachers in England were distilled into little stories and made them accessible to other teachers to help them to reflect on their own positions on the feedback issues. This was endeavoured in the context of the work in Chile within a teacher professional development programme with 60 enrolled primary school teachers. They were asked to select written assignments stemming from their pupils work to design written feedback for these tasks. This is followed by an iterative process of reflection about the messages conveyed through their comments. Data show that the teachers faced difficulties at the initial stages of development as their comments were evaluative, that is, centred on what was missing, with little room for students' self-assessment. The participants greatly improved their elaborated comments as being more descriptive, and with a focal point on the task features. Both studies provide insightful data in terms of the problematic nature of teachers' comments as pupils cannot achieve a broader understanding of quality within their pieces of work. It seems that teachers still hold a remedial approach to feedback. (Black & Wiliam, 2012, Swaffield, S. 2011; Sadler, 2007,2010).

Keywords: *Quality, feedback, criteria communication, self-assessment.*

1. Introduction

Extant literature highlights the foremost role of feedback in supporting students' learning. Notwithstanding, a notion that pervades across a range of those studies is that the nature and purpose of feedback becomes crucial for students to actually use that information to broaden their understanding (Black & Wiliam, 1998,2009,2012; Black et. al., 2003; Kluger & Denisi,1996; Hattie & Timperley, 2007; Brookhart, 2008, 2009). This main assumption draws on Sadler's proposal (1989,2007,2010) who advocates that feedback should make accessible to pupils what quality entails in a piece of work. This, in turn, brings to the fore three important educational challenges, as this author asserts: firstly, it demands externalising aspects of quality out of the teachers' thought, which does not seem straightforward, namely, descriptive statements and key exemplars are needed to illustrate aspects of quality when a learning task is in progress. Secondly, it requires expanding students' abilities to make complex and holistic judgements on their work which should be substantiated on intertwined criteria, trying to avoid the practice of sharing a check list that comprises separated fixed components against which their work will be assessed. Thirdly, feedback seeks at developing pupils' capacity into self- assessment by fostering them to make their own choices about the pertinent strategies to enrich their tasks. Thereby, Sadler's approach to feedback (1989,2007,2010) stands out not just how teachers communicate concepts of quality to their students, but also how pupils themselves come to an in-depth understanding of this sense of quality. This is to say, the way feedback messages are conveyed by teachers and interpreted by pupils matters a great deal when seeking that the formative purpose of assessment is not being subverted in practice.

It could be ascertained that a large body of research has been concentrated in exploring feedback quality and the role it plays in learning. Kluger & Denisi's (1996) meta-analysis investigated the effects of feedback interventions on performance. Hattie & Timperley (2007) expound that feedback can be accomplished at different levels: providing helpful information for knowing how to complete the work, searching for and the use of strategies and processes implied in doing the task, fostering pupils self-regulation and giving comments about the self as a person. These levels concern to diverse feedback focus which influence differently teaching and learning processes. Bearing this in mind, Brookhart (2008) contends that feedback inside the classroom should be descriptive and criterion-referenced, giving guidance on how to improve the task at hand and also enlightening pupils in making sense of the involved processes, so they might identify the next learning goal. By contrast, this author does not recommend norm-referenced feedback, in her view, it encourages competitiveness, which is especially threatening for low achievers.

This paper examines some developments from two inquiries. It is grounded on the theoretical insights and findings from a doctoral research carried out in England, which addresses feedback from the part of the teachers, since 'it can lay the foundations for pupils to develop a sense of quality and be able to use that knowledge to analyse their work' (Yanez-Monje, 2017:42). The overarching learnt lessons from this study shaped our decisions for conducting a subsequent research initiative in Chile with a focus on written forms of feedback. Hence, this article reports on a variety of perspectives that drive feedback practices given by teachers to pupil's writing assignments and how these endeavours seem to trigger different possibilities for students in terms of strengthening or hindering their understanding.

2. Methodology

The studies followed a qualitative paradigm (Mason, 2022; Berg & Lune, 2012; Silverman, 2011) seeking consistency with its focus on practices, interpretations and processes being carried out as well as addressing teachers' reflections in these respects. The enquiries sought to have access to the meanings that participants attributed to their feedback strategies that were applied. These were small-scale studies that addressed how two different groups of participant teachers see themselves dealing with the object of the study (Hammersley & Atkinson, 2007).

2.1. Research questions

Both studies have a broader scope and perspective, in what follows the research questions that are answered in the context of this report are considered:

- How do teachers interpret feedback from a theoretical and practical standpoint in relation to their teaching and their students' learning?
- What are the teachers' feedback practices and the underlying principles that guide them in the actual conducting of classroom interaction and through pupils written assignments?

The focus within this paper regards mainly to written forms of feedback.

2.2. Participants

In England, the teachers were selected on the basis of their having declared and interest in implementing feedback as a strategy for formative assessment. It was also a criterion to choose participants with different teaching experiences and backgrounds and pertained to schools with distinctive sociocultural context. In addition to this, it was deemed that only those teaching Y5 or Y4 classes would be included, because these schools years may have been less influenced by the external accountability purposes of assessment.

In Chile, 60 primary teachers took part of the initiative. A scholarship was granted for them to attend the two-years teaching professional development programme at the University of Concepción. They were taught, amongst other subjects, on written production assessment within the context of an assessment for learning approach.

Accordingly, the same tenet drove sampling selection through these studies. It was purposive, within a qualitative stance (Mason, 2002, Cohen & Manion, 2011). It was strategic or theoretical in nature, for it sought to capture diversity in relation to a wider universe, but did not involve pursuing representativeness (Mason, 2002).

2.3. Data collection and analysis

Within the study conducted in England classroom observation and participant interviews were selected as methods for gathering information. The observation process aimed to document events in which feedback have occurred. An event was understood as a theoretical construct or a heuristic deployed to

investigate how people can create meanings when they are acting and reacting to each other (Bloom et al., 2008; Bloom et al., 2009). Follow-up interviews were carried out seeking to enrich the understanding of feedback events observed. A semi-structured format was adopted for the interviews so as to explore the teachers' intentions in the feedback process with reference to pupils' written assignments. To analyse the interview data, 'meaning coding', as suggested by Kvale & Brinkmann (2009) was applied. This within an iterative process that allowed the data to be constantly compared (Charmaz, 2006)

Regarding the study undertaken in Chile, the main source of data comprised feedback messages devised by teachers to their students' writing tasks. The messages were analysed by using Brookhart' (2008, 2009) framework, which focused on the content of the teachers' comments, trying to elucidate its focus, kind of comparisons used, function, orientation, clarity, specificity and tone.

3. Results & discussion

A number of key elements can be identified in the ways that participants-teachers from the three schools in England enacted feedback: The first was in relation to the basics of the writing, whereas the second concerned the dimensions that emerged from the content of the feedback messages and the third, had to do with their views about pupils' possibilities to recognise quality in a piece of writing.

The data illustrated a common orientation towards correcting basic errors, although with distinctive underlying emphasis. For instance, *Teacher 1* came up with a strategy focusing on marking misspelled words that were familiar to the students and those directly linked to the subject matter. This teacher was highly concerned with not discouraging students, who were very weak in spelling, by correcting all the mistakes in their work. *Teacher 2* did not appear to use a selective strategy, he underlined all spelling and punctuations mistakes that needed to be amended but giving the students the responsibility of checking their own work and making corrections by themselves. *Teacher 3*, began by stating that basic errors should not be at the center in marking, but in practice all these technical aspects did appear to take on more importance as she tended to spell out all these sorts of details within the children's work. Whilst *Teacher 4* reported spotlighting some aspects related to grammar, but not stressing what was wrong, and rather pointing out what was right. Hence, the results revealed differing choices made by the participants to deal with this part of the feedback process and their practices remained aligned with the strategies and procedures suggested within the policy documents of each school.

Three main dimensions were involved within the feedback messages devised by the participants as part of their written comments; to communicate to their students whether they had met the learning objective or the success criteria, to give positive information by recognising students' effort, and to provide advice on follow-up action. The analysis of these purposes from their perspectives allow to understand what they believed quality involves in a piece of writing. *Teacher 1* accentuated mainly on the comprehension of the topic and adjusted her prompts to meet the needs of the pupils whom she considered to be low, middle, or high achievers. *Teacher 2* made suggestions centred on the use of language to clarify meaning. *Teacher 3* placed emphasis on the key elements according to the conventions of a particular genre, as well as aspects of grammar or punctuation, where appropriate. *Teacher 4* also paid attention to the use of words and structures within specific sorts of texts. In addition, she stated that written comments should be composed of differentiated questions attuned to children abilities. These teachers' outlooks on their feedback messages were consistent with what was observed in the excerpts from the students' books. These examples suggest that quality was delineated according to the curriculum content. The judgments were made in terms of the particulars words or phrases that characterized the kind of text intended to be produced. The sort of advice was offered as discrete points of information and not in the form of holistic comments. Consequently, it became more difficult to pay attention to the overall purpose of a piece of writing. This notion was still more evident when the participant teachers devised comments according to a list of specified and pre-established criteria. This has implications in the ways that teachers approach feedback, namely: a) In some cases, the students were able to follow the teachers' guidance and corrected isolated features of their work, but remains unclear whether they could understand the reasons underpinning the teachers' advice. b) the messages focused on the particulars were tied with that the teachers asked the students to do in the follow up action or what they needed to do next. However, this last part of the message seemed to be overwhelmed by the emphasis on what was still missing, rather than telling the students how to make quality-based improvements in the current piece of work.

The results suggest that although written forms of feedback were highly structured in terms of making learning objectives and success criteria transparent, the teachers developed the view that pupils' engagement with these seem to have been problematic at the time that the study was undertaken. *Teacher 1* reported that the students had not yet grasped the intended goal that underpin specific tasks, thereby,

they might not be able to analyse quality in their pieces of writing. *Teachers 3 and 4*, in a similar vein, both claimed that children were not skilled enough to recognise what quality meant and thus, be able to communicate its aspects to others. They also shared the opinion that this was particularly hard for those who were low achievers. By contrast, *teacher 2* indicated that he had developed a strategy of using the learning objective flexibly. He had built up an idea of his students playing an active role in interpreting not only the criteria but also the comments given. Nevertheless, there was not further evidence from the data about how this method was unfolded or whether it thrived.

Data gathered from the study conducted in Chile shed light on the process experienced by teachers when devising written comments. It would be important to note that since the year 2018 the National Curricula adopted and Assessment Policy that accentuates its formative purpose (MINEDUC-UCE,2017). This framed the schools' concerns in terms of modifying not only the regulations but also, and still more important, the tenets that drive their assessment practices. This can help to contextualise the participants' engagement to discuss the rationale introduced by the policy and its implications for their ensuing feedback practices. Throughout the training programme the teachers were involved within an iterative process of reflection that considered the insightful findings from previous research, the analysis of their own examples of feedback messages, and the enhancement of these exemplars. Broadly, the main changes produced over time within the drafting of feedback messages were the following: a) from providing indetermined information about the task at hand, *Good Work!*, towards a more precise focus by explaining the specific characteristics of the task that define quality. b) from being normative and evaluative, *This is the best essays I ever seen!*, to making reference to those criteria already discussed with the children, using descriptive judgments c) exerting a negative orientation by only pointing out what is wrong or missing *you need to include this time connective!* towards a more descriptive advices on what has been done well or suggesting how to improve. d) from just rephrasing the students answers into more appropriate forms, namely, correcting the work for the pupil, to asking questions fostering pupils to think by themselves how the work can be amended. As stated earlier the comments were analysed by using Brookhart (2008) proposal. This helped to realise, from this initiative, that the teachers were on the road of improving written comments, but, there is a still a long road to state the issues were solved. Particularly, what still needed to be accomplished is the feedback focus on the processes implied on the learning tasks and how the suggestions can foster students' self-regulation.

All in all, it could be surmised that, despite the nuances and contextual issues around the participants from both studies some commonalities could be identified. The feedback messages fostered students correcting their work, acting on the teacher advice, but still not reflecting on a broader sense capturing the concepts and principles they should use in future similar tasks.

4. Conclusions

Despite the singularities on the ways that participant-teachers enacted feedback practices from both studies the complex nature of the devised written comments was noted. This regarding the extent to which they support pupils in the improvement of their pieces of work. Focusing on what elements were present or absent within the learning task, then giving advice so that the students might recall what to include next time has resemblance with a convergent view of assessment. (Torrance & Pryor,2001).

The teachers expected pupils responded to their feedback. Thus, they asked further action. The character of these requirements or recommendations reflected the scope and the possibilities for students understanding of what count as good work. The data evoked testing and remediation which in turn meant restricted or limited exploration of quality by the students.

The notion that remained stable across the participants from both inquiries is that there is a need for expanding the students' opportunities to grasp a sense of quality. Nevertheless, in the actual drafting of written comments this purpose seemed to be entangled within other pedagogical priorities.

References

- Berg, B. & Lune, H. (2012). *Qualitative Research Methods for the Social Sciences*. California: Pearson.
- Black, P. & Wiliam, D. (1998). Assessment and Classroom Learning. *Assessment in Education. Principles, Policy & Practice*, 5 (1), 7–74.
- Black, P. & Wiliam, D. (2003). In praise of educational research: Formative assessment. *British Educational Research Journal*, 29 (5), 623-637.
- Black, P. & Wiliam, D. (2009). Developing a Theory of Formative Assessment. *Educational Assessment Evaluation and Accountability*, 21, 5–31.

- Black, P., Harrison, C., Lee, C., Marshall, B. & Wiliam, D. (2003). *Assessment for Learning: Putting it into Practice*. Maidenhead: Open University Press.
- Black, P. & Wiliam, D. (2012). Developing a Theory of Formative Assessment. In J. Gardner (Ed.) *Assessment and Learning* (Assessment in Education) (pp. 206-229). California: SAGE Publications.
- Bloom, D., Power Carter, S., Beth Morton, C., Madrid, S., Otto, S.; Shuart – Faris, N. & Smith, M., (2008). *On Discourse Analysis in Classrooms. Approaches to Language and Literacy Research*. New York: Teachers College Press, Columbia University.
- Bloom, D., Beirle, M., Grigorenko, M. & Goldman, S. (2009). Learning over time: uses of intercontextuality, collective memories, and classroom chronotopes in the construction of learning opportunities in a ninth-grade language arts classroom. *Language and education*, 23 (4), 313-334.
- Brookhart, S. M. (2008). *How to Give Effective Feedback to Your Students*. USA: Association for Supervision and Curriculum Development (ASCD).
- Brookhart, S. M. (2009). *Exploring Formative Assessment*. USA: Association for Supervision and Curriculum Development (ASCD).
- Cohen, L., Manion, L. & Morrison, K. (2011). *Research Methods in Education* (seventh ed.). London: Routledge.
- Charmaz, K. (2006). *Constructing grounded theory: A practical guide through qualitative research*. London: Sage Publications Ltd.
- Hammersley, M. & Atkinson, P. (2007). *Ethnography*. London: Taylor & Francis Group.
- Hattie, J. & Timperley, H. (2007). The Power of Feedback. *Review of Educational Research*, 77 (1), 81 -112.
- Heritage, M. (2007). Formative Assessment: What the teachers need to know and do? *Assessment in Education: Principles, Policy & Practice*, 5 (1), 111–122.
- Kluger, A. & DeNisi, A. (1996). The effects of Feedback Interventions on Performance: A Historical Review, a Meta-Analysis, and Preliminary Feedback Intervention Theory. *Psychological Bulletin*, 119 (2), 254-284.
- Kvale, S. & Brinkmann, S. (2009). *Interviews: Learning the craft of qualitative research* (second ed.) California: SAGE Publications.
- Mason, J. (2002). *Qualitative Researching* (second ed.). London: SAGE Publications.
- Ministerio de Educación. (2017). *Evaluación formativa en el aula. Orientaciones para docentes*. Santiago, Chile: Author.
- Sadler, D. R. (1989). Formative Assessment and the Design of Instructional Systems. *Instructional Science*, 18, 119–144.
- Sadler, D. R. (2007). Perils in the meticulous specification of goals and assessment criteria. *Assessment in education: Principles, Policy & Practice*, 14 (3), 387-392.
- Sadler, D. R. (2010). Beyond feedback: developing student capability in complex appraisal. *Assessment & Evaluation in Higher Education*, 35 (5), 535-550.
- Silverman, D. (2011). *Interpreting Qualitative Data* (fourth ed.). London: SAGE Publications Ltd.
- Swaffield, S. (2011). Getting to the heart of authentic Assessment for Learning. *Assessment in Education: Principles, Policy & Practice*, 18 (4), 433-449.
- Torrance, H. & Pryor, J. (2001). Developing Formative Assessment in the Classroom: using action research to explore and modify theory. *British Educational Research Journal*, 27 (5), 616-631.
- Yáñez - Monje, V. (2017). Exploring Teachers' Interpretations of Feedback in Primary Literacy Classroom Settings (Doctoral's thesis, King's College London, England). Retrieved from [https://kclpure.kcl.ac.uk/portal/en/persons/veronica-yanezmonje\(9432e582-108b-489e-9db7-9aec91dd227d\).html](https://kclpure.kcl.ac.uk/portal/en/persons/veronica-yanezmonje(9432e582-108b-489e-9db7-9aec91dd227d).html)

TRAINING SYSTEMIC FAMILY THERAPISTS RELATED TO PSYCHOSOCIAL INTERVENTION

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Abstract

The purpose of this paper is to focus the need of a reflexive stand about systemic training in family therapy in a higher education program.

This training is associated to diverse social interrelationships that combines theoretical and clinical objectives, as well as research activities and community issues. We have been working in training programs at the National Autonomous University of Mexico, Iztacala Faculty, since 2001. The epistemological basis of this training are the systemic and cybernetic perspectives, and constructionist view about social construction of meanings in therapy and in educational processes. We emphasize observer implication, where the student/therapist in training is observer and observant in the therapeutic and educational process. The community context is where the therapy occurs which represents complex problems of reality. We focus at individual and community influences in problem construction and at the diverse ways the systems structure is organized. We attend the emotional, cognitive, situational, social aspects of the person of the therapist. The dialogical systemic approach lead us to consider the situation of the therapist, the supervisors and the consultants. We focus on the ethics, the relational responsibility, of the systems participants involved. We propose the search for contradictions, concordances or dilemmas, associated to family, social and gender diversity, oriented to look for alternative ways of connecting with consultants and therapists. We emphasize the positioning of persons as subjects who can act upon their realities, that can explore different ways of action upon society, at the actual historical context where we live, trying to search for individual and collective strengths and possibilities.

We propose a reflexive stand when we focus our educational work, about what we do, in which theoretical and ethical perspectives we base our proposals, in order to anticipate and promote responsible professionals in connection with community needs.

This reflective processes can take in account dimensions such as: plurality, complexity, diversity, systemic relationships, meaning construction, history, contexts, social resources, gender perspective, power and the implication of the person of the therapist. Power relationships between professors, clinical supervisors, students, consultants, institutional systems, could be externalized in order to approach ethical considerations in the clinical and educational processes.

Keywords: *Education, family therapists, systemic, social historical context, interrelationships.*

1. Introduction and context

The ideas expressed in this paper derive from the author's participation as professor and coordinator of the Postgraduate Program in Family Therapy at the Iztacala Faculty of the National Autonomous University of Mexico (UNAM) from 2001 to 2022. This program receives psychology graduates seeking a master's degree in psychology in the area of specialization in systemic and social constructionist therapy, with a duration of two years, where they develop clinical skills to work as psychotherapists for individuals, families, couples and groups. To date, 21 generations have entered the program, and each school year, between 8 and 12 students are admitted after a very difficult selection process, given the great demand for this program, which is taught in a very prestigious public university. The students who enter receive a scholarship for the two years, the program has no cost; the students are advised by a tutor until they achieve the degree of master and specialty, after they have completed the courses and a research thesis or report of the theoretical, clinical and research experience developed in the program. About 12 to 15 professors participate per school semester, all with experience as teachers and researchers, and as therapists in family therapy based on these models. The skills and profile that the graduate will achieve are: conceptual theoretical, clinical, research abilities, prevention, ethics and social commitment, scientific and pluralistic thinking, recognizing human needs and diversity.

2. Objectives

The purpose of this paper is to propose the need for a reflective stance on the educational aspects of a program aimed at training family therapists from a systemic perspective; to focus on the curricular processes and the theoretical, clinical and community care training that characterize a postgraduate program at a public university in Mexico (UNAM). We also propose the reflection on how the different educational, relational and psychosocial processes interrelate in a curriculum are relevant and contribute to a systemic and socially responsible educational model (Desatnik, 2010).

3. Methodology

The professional and academic training of family therapists studying at a public university such as the UNAM in Mexico, leads us to propose a systemic and complexity posture that is oriented to recognize the different integrated systems and subsystems, where the educational dimensions of the subjects involved, the characteristics of the institutions converge. The intention is to promote an integrative vision to address clinical problems from an interactional angle between community practice, clinical supervision, case analysis, where the therapeutic processes include the various theoretical concepts, as well as the implications for the therapist are discussed. The main epistemological models are based on the systemic perspective (Von Bertalanffy, 1987; Papp, 1987), as well as the systemic-dialogical (Bertrando, 2011) and postmodern perspectives (Hoffman, 1997, Gergen, 1996). Cybernetics (Bateson, 1991) is relevant, as well as the complexity proposal (Morin, 2007) and the gender perspective (Walters, Carter, Papp and Silverstein, 1996).

In the formal educational process, an integrative and complexity perspective is also included, where the institutional regulations, economic resources, agreements with other institutions; we focus on the relevance to analyse the social, political and economic context in which it participates, the characteristics and influences of society that influence and are mutually influenced in community life are analyzed. (Bauman, 1999, Byung-Chul Han, 2010). At the curriculum level, theoretical and research seminars, clinical care scenarios with consultants in various community, school and health institutions are scheduled. This activity is given through clinical supervision that integrates epistemological, relational and ethical aspects for the prevention, evaluation and treatment of the different problems presented by families, couples, groups and individuals in the community. This supervision is done individually, in groups, with Gessell cameras, or by participating in the same scenario in which the patients are, by digital means, (mainly since the beginning of the pandemic by Covid 19), co-therapy, multifamily therapy, therapy with groups of people with similar problems (for example, groups of women who experience violence, groups of adolescents, groups of people who want to reduce violence, groups of parents who want to improve their parenting skills, people with anxiety or depression). Research is an important aspect of the training. Quantitative, qualitative and applied clinical research on therapeutic processes is encouraged. Research results are published in specialized journals and presented in academic forums. We are proposing a continuous interrelationship between the three components: system - individual - context. The focus on each of these elements would always be linked to their participation in this continuous feedback loop, where they influence each other continuously.

4. Analysis

We have observed a series of dilemmas in our applied program, when we try to have a look at complexity, which allows us to observe some of the contradictions or concordances. Regarding research, we ask ourselves: What do we research? How do we research? What problems do we focus on? What are the relevant methodologies and congruent with our epistemology, as well as with the relevant topics to investigate? What is the congruence between research, in the clinic and the systemic and postmodern epistemologies? How are meanings, processes, behaviors and relationships constructed? Qualitative and quantitative methods respond to different ways of explaining reality. The former can focus on relationships, processes, from a perspective that recognizes circularity and systemic relationships. The latter point to causal relationships where one variable determines others, which does not coincide with a perspective that sees circularity in relationships (Cecchin, 1987). The proposal to analyze how meanings are constructed, how these meanings are shared, and how they are expressed in the context of a systemic relationship, is not the same as in the case of a circularity perspective.

The proposal to return to recognize the subject (Ibáñez, 1994), where the focus is on understanding people and not necessarily on determining the linear influence between variables. Second-order cybernetics (Bateson, 1991), says that we are part of the observed systems, so that in therapy, learning and research, we must include in the system the observed, the student and teacher, the

researchers and their subjects under investigation, since it is not possible to be alien or outside the observed system. Based on the above, it is also important to study the type of link that exists with the researchers and the therapists, as well as the links between them. We can ask ourselves, what is the relationship and difference between the roles of researchers, therapists and teachers/supervisors/students/therapists?

We can point out some dimensions in the training of therapists:

- The recognition of the significant other.
- The internal dialogue of the therapist
- The questioning the expert position
- The exercise of power and knowledge
- Ethical posture
- Therapeutic relationship
- Work on the therapist's person
- Attention and respect for diversity
- Plurality
- Complexity
- Breadth of perspectives and constructions of reality
- Positioning of the therapist
- Emotions of the student/therapist/teacher/supervisor/researcher
- Contexts
- Resources and networks
- Historicity
- Gender perspective

Involvement of the different actors in the system from the second order cybernetics (Bateson, 1991).

The systemic relationships and the observation of the therapist's positioning are congruent with second-order cybernetics (Bateson, 1991), which implies that there is an inclusion of the observer in the observed system. This leads us to the continuous revision of the therapeutic framing, to careful attention in the therapeutic relationship (or in school relationships) (Desatnik, 2010; 2015). The look at how the therapeutic relationship flows, at the way in which hierarchical or horizontal relationships are presented, we would be choosing the way in which we address students, therapists, consultants, in the different contexts in which we participate., consultants, in the different contexts in which we participate. It would be important to investigate the history of the relationship as well as the ways of bonding, often unequal, in order to find spaces where egalitarian, respectful and equitable relationships can be fostered in the different areas of human coexistence, age, gender, social class, ethnicity, educational level. As a suggestion, we could analyze how power relations are conceptualized and practiced in a congruent manner with the epistemology of the theoretical models, the relations between people and institutions that are at different levels of responsibility and power. The idea of intervention would be subject to debate, since in horizontal relationships there would be no possibility of intervening but of co-constructing, both educationally and therapeutically. This is something that is continuously debated in this program, which assumes that people have an active participation in their processes, where they analyze and deliberate based on their perspective of reality, which may or may not be shared. The systemic view allows us to ask questions such as, for example, what is the therapist's tendency towards the process of change or homeostasis in school or therapeutic relationships? who is the promoter of change? how is the co-participation of the different actors in the system, according to second-order cybernetics (Bateson, 1991)? how are rules and limits proposed? How is a therapeutic framework decided, and from there, when to call, who to call, who to include in the system? Who defines and how, the inclusion in the therapeutic and school system according to the conceptions of family, system, linkage between the different actors? How are the degrees of horizontality or verticality, closeness or distance, in the relationship defined? If these processes occur in institutions, it is necessary to coordinate needs, policies, processes and structure of the systems involved.

5. Conclusions

The evolution of an academic program requires a continuous look at different aspects of the formal curriculum as well as the lived curriculum, where it is seen together with the daily situations of its application, as well as the way in which contradictions arise and are solved, integrations, elements that cannot coexist or also those that potentiate its development and its results. We can consider some relevant

aspects when we observe the evolution of programs where we assume that we are an interacting part in all its dimensions and also, we consider the different gears that integrate and continuously feedback in a systemic way. We can mention:

Expectations: these can be shared or not shared by the different actors that co-participate; it is important to consider how they are understood in the historical, cultural and political context in which they arise and are maintained or if they can be flexible and modifiable according to the processes of their application.

The needs of individuals and groups: programs are not successful if they only define quantitative results, scopes reflected by figures derived from research results that only take into consideration demographic variables, learning results or isolated variables without taking into account integration, co-participation, expectations. Learning and emotional needs of all those who participate in these processes. The needs of people, whether they are students, teachers, consultants, planners and coordinators, are relevant to any academic program.

Skills development and community care: there is the dilemma of what to prioritize, the training of students or the clinical care of consultants. Both objectives are important and both consultants and students experience anxious situations, challenges that require them to attend to different roles and aim at solving different problems. For the tutor or professor, there are priorities in the training of therapists, in the compliance of institutional norms and program guidelines. For the student who wishes to train as a therapist, it is important to achieve the proposed educational and professional objectives, but also to attend to the people who request therapy.

Interrelation among actors: some achievements of the graduates of this program are related to the confirmation of a professional network among teachers and graduates of this postgraduate program. They have participated in the organization of study groups, clinical, scientific and plural work in complex situations of family and community life. The program has been a seedbed for students and graduates from other universities and doctoral degrees. Many are teachers and researchers in public and private universities; the skills and perspectives learned are cascaded. Many participate in governmental, non-governmental and civil society organizations serving clients with a wide range of needs and problems. Some have done postgraduate studies abroad, others have worked in private and public clinics in Mexico and the United States.

Graduates have made proposals for action in health, mental health and attention to complex problems in the pandemic stage. They have shown adaptability and commitment in communities that experience stress and diverse problems; they have shared their knowledge and experience in critical situations, some of them of high impact and seriousness, such as attention to victims of violence, disappearances, vulnerable groups, masculinities and empowerment of women, problems related to addictions and diverse disorders.

References

- Bateson, G. (1991). *Pasos hacia una ecología de la mente*. Buenos Aires: Gedisa.
- Bauman, Z. (1999). *Modernidad líquida*. México: Fondo de Cultura Económica.
- Bertrando, P. (2011). *El terapeuta dialógico*. México: Ed. Pax México.
- Byun Chul Han (2010). *La sociedad del cansancio*. Barcelona: Herder.
- Cecchin, G. (1987). Hypothesizing-circularity-neutrality revisited: An invitation to curiosity. *Family Process*, 26, 405-413.
- Desatnik, O. (2010). *Las Relaciones Escolares*. México: Castellanos Eds.
- Desatnik, O. (2015). *La relación terapéutica, el proceso de la terapia y la formación de terapeutas sistémicos. Una mirada desde la teoría de las representaciones sociales*. México: UNAM-Iztacala.
- Gergen, K. (1996). La Construcción Social. Emergencia y potencial. En M. Pakman: (Comp.). *Construcciones de la experiencia humana. Vol. 1*. Madrid: Gedisa.
- Ibañez, J. (1994). *El regreso del sujeto. Investigación social de segundo orden*. Madrid: Siglo XXI.
- Hoffman, L. (1997). A Reflective stance for family therapy. *Journal of Strategic and Systemic Therapies. Vol. 3, Numero 3-4*, 4-14.
- Lini, C. y Bertrando, P. (en prensa). Situar: posicionamiento y emociones en terapia sistémica.
- Morin, E. (2007). *Introducción al pensamiento complejo*. Barcelona: Gedisa.
- Papp, P. (1987). *El proceso de cambio*. Buenos Aires; Paidós.
- Von Bertalanffy, L. (1987). *Teoría General de los Sistemas*. México: Fondo de Cultura Económica.
- Walters, M., Carter, B., Papp, P. y Silverstein, O. (1996). *La red invisible. Pautas vinculadas al género*. Barcelona: Herder.

COMPETENCE ASSESSMENT USING RUBRICS AND SOCIAL NETWORKS AND BRINGING YOUR OWN DEVICE (BYOD)

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Abstract

The European Higher Education Area (EHEA) promotes the competence-based assessment using varied, diverse and innovative assessment tools. In this sense, in previous teaching innovation projects we have developed rubrics to align the evaluation with the competences that the student needs to acquire. Moreover, we have explored how to strengthen the G15 competence of critical thinking using social networks because we observed is the competence that our students need to reinforce most. However, we have observed in our agricultural engineering students, that if they forgot to bring their device to the center, did not usually have alternative digital resources, and others did not have any account on social networks. Despite the young people in Spain recognize an intensive use of electronics, the 90% of them own 2-5 electronic devices, they little use them for learning purposes. Taking into account that digital resources and social networks are tools increasingly used by companies, we consider the need to explore bring your own device teaching method. BYOD (Bring Your Own Device) or BYOT (Bring Your Own Technology) initiatives allow students to bring their own mobile devices (laptops, netbooks, tablets, smartphones, etc.) to their centers, and connect them to a Wi-Fi network, to access institutional and educational applications and services. This experience can be a good preparation for the working context that the students will face soon. The aim of this teaching innovation project was to use BYOD initiatives to evaluate, using e-rubrics and social networks, the competences that students need to acquire. The methodology included i) the creation of a subject practice using social media to strengthen the critical thinking competence, ii) the design of a rubric using CoRubrics to assess the practice, iii) the teacher evaluation of the practice and self- and co-evaluation by the students and iv) the analysis of the results and of the teaching-learning process. The results show that high school students had the least access to mobile devices. Undergraduate and master's students in Agronomic Sciences initially brought their devices when requested and with the progress of the course, they brought it regularly. Not all students use social networks regularly and they value their use in the practice that brings them closer to the professional sector. The teachers concluded that the project provides varied, diverse and innovative assessment tools aligned with the competence-based assessment promoted by EHEA.

Keywords: *Teaching innovation project, competency-based assessment, Agronomic sciences, ICT, ECTS.*

1. Introduction

The European Higher Education Area (EHEA) promotes the competence-based assessment using varied, diverse and innovative assessment tools (EACEA, 2014). In this line, there is unanimity in the scientific community on the need to improve the quality of the assessment, revising and revamping the evaluation (Zabala and Arnau, 2007). In doing so, the rubrics are assessment tools that align the evaluation with the competences that the student needs to acquire (Reddy and Andrade, 2010). The rubrics allow align the assessment with the Higher Education teaching-learning model, the assessment by all the participants involved in the teaching-learning process, the students' self-assessment of their progress and promote their own responsibility in the learning process with the self-assessment of the quality of their work and the ways they could improve (Panadero and Jonsson, 2013). Therefore, in previous teaching innovation projects we have developed rubrics to align the evaluation with the competences that the student needs to acquire. Moreover, we have explored how to strengthen the G15 competence of critical thinking using social networks because we observed is the competence that our students need to reinforce most (Urbano et al., 2019). G15 competence of critical thinking needs to be strengthened in Agriculture students at University of Valladolid in Spain and activities are required in the

teaching-learning process in order to strengthen the G15 competence. We proved that social networks and ICT, due to students' familiarity and interest created students' own innovative recommendations and critiques and improved students' critical thinking (Urbano et al., 2020). However, in these previous experiences we have observed that in Agronomic Sciences, when some students forgot to bring their device to the center, they did not have alternative digital resources, and others did not have any account on social networks. In this vein, the study developed by Aid against Drug Addiction Foundation, Google and BBVA in the framework of the Connected Project (Proyectoconectados.es, 2019) shows that the 90% of the young people in Spain own 2-5 electronic devices, standing out smartphone in the first position (89.9%), followed by laptop (76%) and tablet (69%). Most of them recognized an intensive use of mobile telephone (83.6%) despite they do not use them for learning purposes. The most popular social media are, Facebook with 2,271 million users in 2019, Youtube with 1,900 million, WhatsApp with 1,500 million and Instagram with 1,000 million (marketing4ecommerce, 2019). Taking into account that digital resources and social networks are tools increasingly used by companies due to their contribution the development of employee skills and leadership (Garcia, 2011), we consider the need to explore bring your own device teaching method (BYOD) because this initiative can be a good preparation for the working context that the students will face soon. Authors highlighted how digital resources and social networks improve in companies the cooperation and internal communication (Felix et al., 2017), the integration, loyalty and commitment of employees to the company (Jacobs et al., 2016), the creation of informal relationships, the identification of mentors, the facilitation of teleworking and the development of social activities (Garcia, 2011). BYOD (Bring Your Own Device) or BYOT (Bring Your Own Technology) initiatives allow students to bring their own mobile devices (laptops, netbooks, tablets, smartphones, etc.) to their centers, and connect them to a Wi-Fi network, to access institutional and educational applications and services (INTEF, 2016). Additionally, the use of devices in the center by students facilitates pedagogical innovation and increases opportunities to learn through exploration and investigation. It increases the degree to which teachers can provide differentiated activities, adapted to the individual needs of students, students and their learning styles. It helps to improve students' motivation, especially that of those students who are not too involved and feel unmotivated and it helps students with less prepared to use ICT.

2. Objectives

The aim of this teaching innovation project was to use BYOD initiatives to evaluate, using e-rubrics and social networks, the competences that students need to acquire.

In doing so, the specific objectives of the teaching innovation project are:

- Objective 1: Develop e-rubrics that allow students and teachers to evaluate competences in agricultural studies, considering all the participants involved in the evaluation and align with the EHEA model and using initiatives to bring your own devices (BYOD).
- Objective 2: Design a subject practice using social networks and bringing students closer to the sector in which they will develop their future work using to bring their own devices initiatives (BYOD).
- Objective 3: Implement the model of e-rubrics and practices with social networks for the evaluation of competences in six Undergraduate and Master studies in Agronomic Sciences at the CEI Triangular E³ using initiatives to bring your own devices (BYOD).
- Objective 4: Analyze and disseminate the e-rubrics that allow online evaluation of competences and practices with social networks in Agronomic Sciences and the evaluation of initiatives to bring your own devices (BYOD).

3. Methodology

The teaching innovation project followed a linear methodology. In a first step, the competences need to be acquired by the Agronomic Sciences students were identified. Three competencies were considered to be assessed, i) C1: Critical thinking, ii) C2: Ability to synthesize and iii) C3: Ability to express in expert and non-expert forums, along with the competence G15: Critical thinking using social networks. In a second step, we developed a subject practice solving companies' problems using social networks in order to strengthen the G15 competence of critical thinking. Then, rubrics were design to complete the evaluation and implemented in students of the Degrees and Masters of Agronomic Sciences

at the University of Valladolid, including a group of students from the High School Excellence Program at the University of Valladolid. The rubric was delivered to the students at the beginning of the semester using the University of Valladolid Moodle platform. Students were invited to bring their own devices (BYOD) to the center to complete the subject practices and the evaluation with e-rubric. Once, the students presented their subject practices to the classroom, all the students and the teachers were invited to give marks using CoRubrics tool using their own devices. CoRubrics tool output the students' co-evaluation and the teacher's evaluation for each student. CoRubrics is a digital tool that allows, i) create the rubric, ii) launch it to students and teachers by mail for evaluation, iii) data gather from students self-evaluation, teachers-evaluation and students co-evaluation, iv) assign a weight to each item measured and v) get the weigh averages of the students self-evaluation, teachers-evaluation and students co-evaluation. Finally, the evaluation and dissemination of the results was conduct.

Table 1. Sample of students that implemented the teaching innovation project 'Competence assessment using rubrics and social networks and bringing your own device (BYOD)' by level, subjects, semester and number of students during the academic year 2021-2022 at the University of Valladolid.

Degree/Master/Program	Course	Semester	Subject	Students
Degree Enology	4	1	Wine Marketing	8
Degree Agricultural Engineering	4	1	Agrarian Commercialization	9
Degree Agrifood Industries	2	2	Commercialization	10
Master Agricultural Engineering	1	2	Marketing	3
Master International Cooperation	1	2	Rural Development	3
Master in Food Quality	1	1	Marketing	19
High School Excellence Program	4	1	Excellence	21

4. Results and discussion

The results of the initiative of bring your own device (BYOD) to the center (Table 2) show that high school students had the least access to digital devices. Undergraduate and master's students in Agronomic Sciences initially brought their devices when requested and with the progress of the course, they brought it regularly (Table 2). Not all students used social networks regularly and they value their use in the practice that brings them closer to the professional sector. The teachers concluded that the project provides varied, diverse and innovative assessment tools aligned with the competence-based assessment promoted by EHEA.

Table 2. Results of the initiative "Bring your own Device (BYOD)" by subjects, sessions, students cases, devices and percentage of students with positive response during the academic year 2021-2022.

Degree/Master/Program	Subject	Sessions	Cases	Devices	%
Degree Enology	Marketing	3	22	Computer+mobile	100%
Degree Agricultural Engineering	Commercialization	2	17	Computer	100%
Degree Agrifood Industries	Commercialization	3	40	Computer+mobile	100%
Master Agricultural Engineering	Marketing	5	15	Computer	100%
Master International Cooperation	Rural Development	2	6	Computer	100%
Master in Food Quality	Marketing	4	75	Computer+tablet	93%
High School Excellence Program	Excellence	2	40	Mobile phone	8%

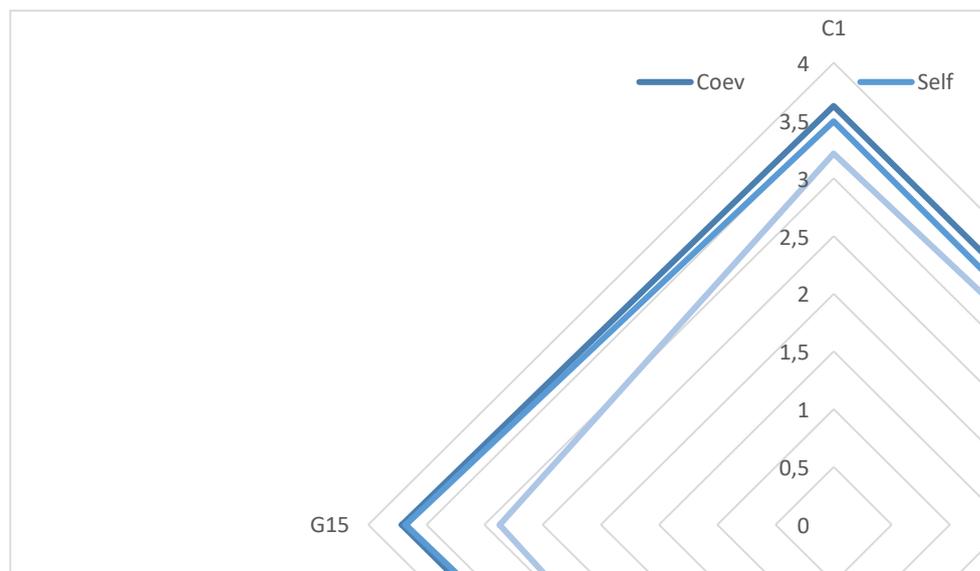
The implementation of the model of e-rubrics and practices with social networks for the evaluation of competences in six Undergraduate and Master's in Agronomic Sciences of the CEI Triangular E³ using initiatives of bring your own devices (BYOD) shows the co-evaluation gave higher marks than the self-evaluation. It is concluded that the students' self-assessment with the rubrics promote their own responsibility in the learning process within the self-assessment of the quality of their work and the ways they could improve.

Table 3. Results of the implementation of the model of e-rubrics and practices with social networks for the evaluation of competences in six Undergraduate and Master's degree subjects in Agronomic Sciences during the academic year 2021-2022.

Competence/Social Networks	Co-evaluation	Self-evaluation	Teacher evaluation
C1: Critical thinking: Economic solution	3.63	3.49	3.21
C2: Ability to synthesize: Technical solution	3.66	3.47	3.39
C3: Ability to express in expert and non-expert forums	3.7	3.54	3.17
G15: Critical thinking: Social networks	3.71	3.68	2.87

The results confirm that the students gave higher marks than teachers. In the case of the differences in the social media analysis, the results could be explained due to students' perception of their knowledge and expertise of social media skills whilst the competence that was assessed by the teacher was the student critical thinking and their innovative recommendations and critiques as it was exposed above. The higher marks along with the comments of the students towards the subject practice using social networks confirm their satisfaction with the use of ICT in the learning framework. The differences in the expression competence could be explain due to the students' perception of their ability to communicate in experts forums that are relatively unknown for them by now. In their oral presentations, the terms used by students were sometimes very colloquial, lack of content, with many changes of direction and evading the core of the topic.

Figure 1. Comparison of co-evaluation, self- and teacher evaluation of competences using e-rubrics and practices with social networks during the academic year 2021-2022.



5. Conclusions

This teaching innovation project implemented BYOD initiatives to evaluate using e-rubrics and social networks the competences that students need to acquire, and concluded that:

1. High school students have the least access to digital devices.
2. Not all students use social networks regularly and they value their use in the practice that brings them closer to the professional sector.
3. The co-evaluation gives higher marks than the self-evaluation promoting students own responsibility in the learning process within the self-assessment of the quality of their work and the ways they could improve.
4. The students give higher marks than teachers' marks.
5. The higher marks along with the comments of the students towards the subject practice using social networks confirm their satisfaction with the use of ICT in the learning framework.
6. The teachers concluded that the project provides varied, diverse and innovative assessment tools aligned with the competence-based assessment promoted by EHEA.

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References

- EACEA: Education, Audiovisual and Culture Executive Agency, European Commission. (2014). *Modernization of Higher Education in Europe: Access, Retention and Employability* (Eurydice Report). Luxembourg: European Commission Publications.
- Felix, R., Rauschnabel, P., & Hinsch, C. (2017). Elements of strategic social media marketing: A holistic framework. *Journal of Business Research*, 70: 118-126.
- Garcia G.S. (2011). Social media analysis: exploring the hidden face of the organizations. *Revista Empresa y Humanismo*, 15(1): 43-62.
- INTEF. (2016). *Designing the classroom of the future. Bring your own device (BYOD): a guide for directors and teachers*. Madrid: Spanish Ministry of Education, Culture and Sports.
- Jacobs, M.A., Yu, W., & Chavez, R. (2016). The effect of internal communication and employee satisfaction on supply chain integration. *International Journal Production Economy*, 171(1): 60-70.
- Marketing4ecommerce. (2019). Which are the social networks more used in the world. Retrieved May 23, 2022 from: <https://marketing4ecommerce.net/cuales-redes-sociales-con-mas-usuariosmundo-2019-top/>
- Panadero, E., & Jonsson, A. (2013). The use of scoring rubrics for formative assessment purposes revisited: A review. *Educational Research Review*, 9(0): 129-144.
- Proyectoconectados.es. (n.d.). ITCs and its influence in teenagers' socialization. Retrieved May 23, 2022 from: <https://proyectoconectados.es/investigaciones/>
- Reddy, M., & Andrade, H. (2010). A review of rubric use in higher education. *Assessment & Evaluation in Higher Education*, 35: 435-448.
- Urbano, B., Carpio, D., & González-Andrés, F. (2019). Validation of Rubrics to Assess Competences in Agricultural Engineering Higher Education. *Conference Proceedings 13th International Technology, Education and Development Conference INTED2019*. Valencia (Spain). IATED.
- Urbano, B., Carpio, D., & González-Andrés, F. (2020). Strengthening the critical thinking competence G15 using Social Media and its assessment by CoRubrics. *Proceedings of EDULEARN20 Conference*. Valencia. IATED.
- Zabala, A., & Arnau, L. (2007). *Eleven ideas to learn and teach competences*. Barcelona: Graó.

CHANGING THE TEACHING METHODOLOGY: HOW MUCH DOES IT COST?

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Abstract

The paper describes selected results of a multifaceted intervention study aimed primarily at nurturing and assessing critical thinking (CT) competence in a sample of primary school children in the North-East of Italy. The core of the study comprises the implementation of a new learning framework considered effective in promoting thinking and problem-solving skills, the development of an assessment tool to appraise CT performances during peer dialogue tasks, and the comparison over time of the results achieved by participants in the intervention and control classes. As part of the same research, an exploratory survey was undertaken through a voluntary questionnaire with the twofold aim of knowing the most common teaching style among primary school teachers in the region and selecting the experimental classes. The analysis of the questionnaire data showed that the use of traditional methods is still prevalent among teachers. Italian schools have a tradition of using content-based approaches and, since these are considered ineffective in promoting CT competence, one of the research questions of the study, and the focus of this paper, was how teachers deal with the implementation of a new learning framework and whether it enables them to change their teaching towards more student-centered approaches. For this purpose, the 13 teachers in the experimental group were first trained about the “Thinking Actively in a Social Context” (TASC; Wallace, 2001) learning framework. After its implementation in the experimental classes for nine months, data were collected through logbooks, lesson plans, and a final questionnaire. Furthermore, data collected from those sources were analyzed and the words of teachers from formal and informal communications were considered.

Throughout the implementation period, quantitative (e.g., number of TASC learning plans implemented) and qualitative (e.g., ways in which teachers had applied the learning framework) differences in the TASC use were observed among teachers. One group stayed with traditional approaches, keeping a more teacher-centered focus, another small group used TASC from a student-centered perspective, and a smaller group accommodated their usual learning plans within the TASC framework. Although some teachers had difficulty applying the new approach, most of them found it valuable in challenging their teaching style. The costs for changing teaching methods include extended times to fully develop the school curriculum with student-centered approaches and teachers’ efforts to re-frame practices and explore strategies within new learning perspectives. Both aspects should be taken into account when rethinking school system reforms and the training of future teachers.

Keywords: *Teaching methods, traditional approaches, active learning, primary education, intervention study.*

1. Introduction

The existing literature on educational change is extensive, and has often dealt with issues of *what* and *how* educators should teach (Hargreaves, Lieberman, Fullan, & Hopkins, 2005). Teachers have always been the main agents of educational change, either through *top-down* decisions or *personal* motivations based on teaching experience and practice.

The quasi-experimental intervention study, which is only partially described in this paper, embraces issues as well as impulses to change. Indeed, the study was planned to foster critical thinking (CT) education (the *what*) as one of the goals set by the European Community (Council of the European Union, 2018; Sala, Punie, Garkov, & Cabrera, 2020) and the Italian curriculum guidelines (Ministero dell’Istruzione, dell’Università e della Ricerca [MIUR], 2018; the *top-down* impulse). Moreover, the research design included the implementation in six primary school classes in the North-East of Italy of a

learning framework considered effective for the promotion of CT competence (the *how*) through the voluntary participation of teachers and their students (the *individual* impulse).

Italian schools have a tradition of content-based and expository teaching approaches (Capaldo & Rondanini, 2002). Traditional teacher-centered approaches are known to not be effective in promoting CT competence (Halpern, 1998) compared to other constructivist ones. Moreover, constructivist learning theory “does not translate directly into teaching practices”, and most teachers have “not experienced constructivist classrooms” during their own time as students (Richardson & Placier, 2001, p. 913). For these reasons, one of the objectives of the study was to find out about the actual situation concerning the most commonly used teaching style in primary schools.

It is acknowledged that teachers need to keep looking for new approaches and ideas, checking what works and what does not (Johnson et al., 2009), and, indeed, this is what usually happens in schools, but many efforts at change seem to be ineffective (Hargreaves, 2005). Furthermore, although the literature suggests that most teachers are constantly changing (Richardson & Placier, 2001), “it is hard to break a habit” (Johnson et al., 2009, p. 156). Changing from a traditional to a non-traditional teaching style requires several substantial changes, including beliefs and practices (Johnson et al., 2009; Richardson & Placier, 2001). Moreover, nowadays educators face manifold demands for change which are proving to be more complex than those of the past (Hargreaves et al., 2005). In addition, since the teaching-learning process should be considered a sociocultural phenomenon, the multitude of existing studies in the literature on teacher change might not be sufficient when placed in different cultural and social contexts.

The paper aims to contribute to the field of research on teacher change taking into account the above issues. After a brief description of the general research design, the paper focuses on a selected research question related to how teachers approach a new learning framework and how such a framework contributes to their teacher change. Then the methodology is outlined, and the results are discussed.

2. The overall design of the intervention study

The core study (Imperio, 2022) was designed as quasi-experimental research *with* the school and *for* the school. The theoretical framework underpinning the entire research project refers to the existing perspectives on CT (see Imperio, Kleine Staarman, & Basso, 2020): the *normative* conceptualization of philosophers (among others, Ennis, 1964), the *procedure descriptive* perspective of cognitive psychology (among others, Sternberg, 1986), and the *process* or *task* approach of educational sciences (among others Bloom, 1956). Each of these positions has been taken into account when drawing up a definition of CT and other choices related to educating students in CT and assessing their CT competence. In particular, in order for a choice to be made regarding the learning framework and the development of the assessment tool, a fourth position on *teaching thinking* was considered, which is the *dialogic* perspective of socio-cultural pedagogy (among others, Mercer & Littleton, 2007).

The learning framework entitled Thinking Actively in a Social Context (TASC), developed by Wallace and Adams (Wallace, 2001) was chosen among the many existing resources for teaching thinking (see Moseley et al., 2005). Several aspects were considered when making the choice. It had to be a student-centered approach, applicable to all disciplines, suitable for the design of authentic and cooperative learning tasks, with a solid theoretical basis of reference, easily teachable during training, especially in terms of time, and adaptable to the context of Italian schools.

As mentioned above, the research project had several objectives that are congruent with the phases of the study, i.e., to learn about the most common teaching style in primary schools in the Friuli Venezia Giulia region; to train teachers to use a new student-centered learning framework meant to promote CT competence; to implement this approach in six primary school classrooms; to develop a tool for assessing students' performance in CT within the context of peer dialogue tasks; to compare results between students in the experimental and control group; and to understand how children think critically, by means of observing how children express their thoughts and attitudes or dispositions.

2.1. Research question

The present paper focuses on how teachers implement the new learning framework and whether it enables them to move from their usual approach to a more student-centered one.

2.2. Participants

Seventy-two teachers with their 51 classes applied for the project and then confirmed their interest. The application was made through an online exploratory survey sent to all headteachers in the region along with a description of the research project. The survey also aimed to provide information on primary school teachers in the region and learn about the most common teaching style. Six primary school classes (three 2nd grade and three 4th grade) were selected with their 13 teachers as the

experimental group. The selection was based on several criteria: the non-use by teachers of innovative methodologies in the classroom, the grade, the number of applicant teachers for that class, the subjects involved, and the school time. By means of snowball sampling a further six classes of equal grade, their students and teachers were selected to form the control group. A total of 229 primary school children from 12 classes in eight different schools in the region participated in the main study.

2.3. Methods

All teachers who applied for the project were offered training on the TASC framework, although they were not ultimately selected for the study. Training sessions were organized at four different venues to encourage participation. There were four meetings per location, each lasting two hours. At the end of the implementation period, teachers in the control group voluntarily attended the same training. The intervention was planned over two school years, from February 2018 to April 2020. Actually, due to the Covid-19 pandemic emergency, it finished at the end of February 2020, and without the summer holidays, the total duration of the intervention was about nine months.

Many data collection tools were employed to answer the research question topic of this paper. First, teachers developed multiple TASC lesson plans collected by the researcher. Throughout the implementation period, the researcher mentored the teachers and initiated a community of practices, helped them with their planning, facilitated the exchange of lesson plans between teachers, answered questions, and found solutions. Therefore, there was a significant exchange of emails, text messages, and some planning meetings. In this way, relevant information about the teachers' way of working, critical issues, and goals they observed were gathered and noted. During those nine months, they also filled in a logbook. For each lesson plan developed, the logbook recorded the TASC stages and teaching strategies used, some relevant notes about the effectiveness or failure of the planning, any modifications made, and the results observed. As a last stage, teachers completed a final questionnaire.

The final questionnaire was helpful for data triangulation since it offered the opportunity to compare teachers' perceptions with the researcher's analysis of data collected through the other tools in order to infer adherence to the trial. It is structured in sessions dealing with active learning strategies, learning outcomes, other findings, tools provided, researcher support, level of satisfaction and reasons. All questions, except those of the last session which are open-ended, are on a 6-point Likert scale format.

3. Data analysis and findings

In the nine months of intervention, differences in the number of TASC lesson plans developed in each classroom (*Minimum* = 16, *Maximum* = 44) and their quality were observed. Indeed, alongside the quantitative observation, lesson plans were analyzed qualitatively. In each lesson plan, the relevant expressions that were used to describe the teacher's actions and the learners' tasks were underlined. Lesson plans were classified as teacher-centered or student-centered according to these expressions. Consequently, trendlines of the teaching style of those who developed the plans were inferred. Notes collected through formal and informal communication, such as by email and text messages or during planning meetings, contributed to the interpretation of data. Logbooks provided additional support for data triangulation.

A consistent group of lesson plans seems to be oriented towards lectures, with a teacher-centered approach. Elements that have led to this conclusion can be found in the linguistic choices that describe the teaching design and the actions contained therein. For instance, many expressions such as "I explain...", "I have presented the theme of...", "I have introduced...", are common. In other lesson plans, the teachers claimed to make the pupils practice using TASC after a lecture-style lesson or with content already known to the pupils. The crucial element is that in their planning, teachers describe tasks that train executive cognitive processes without co-construction of new knowledge among peers, despite the fact that TASC clearly involves the use of higher-order thinking skills in many of its stages. On one hand, the teacher is portrayed as holding the knowledge and guiding actions by making decisions for the students. On the other hand, children have few moments to explore materials independently and co-construct new knowledge with their peers. A smaller group of plans is student-oriented and well placed within the TASC framework. The actions of retrieving prior information, sharing and processing it, deciding, creating, comparing, proposing changes, motivating choices, evaluating, communicating findings, and reflecting on the work done, are always carried out by the students, whether alone, in pairs, or groups, depending on the task. The plans are structured accordingly for authentic and transversal tasks but also with disciplinary content, which might sometimes be more complex to tackle if the teacher were not to use the lecture-style approach. Finally, very few other educational designs seem to have been retrospectively tailored to the TASC framework. However, even if it is not known how the content has been mastered by the students, the plans feature reality tasks.

Therefore, matching the lesson plans with the teachers who developed them, it was possible to draw the following picture. For a group of teachers (30.8%), TASC became the reference model for designing and implementing student-centered lesson plans in all subjects, regularly or occasionally. Several teachers (53.9%) developed lesson plans following the lecture type of teaching method, strongly influenced by tradition. These teachers easily employed TASC with content already familiar to the students. A small final group (15.3%) chose the topics or activities most easily adaptable to the TASC framework, i.e., cross-curricular reality tasks. Essentially, these teachers continued with their way of working, and the TASC framework seemed to be more of a constraint for them. These results are reasonably consistent with the teachers' self-perceived and self-reported teaching styles in the initial survey, where multivariate data analysis showed a relevant presence of the lecture pattern (teacher-oriented) in at least 50.4% of the sample of teachers responding to the questionnaire ($N = 236$; for a full analysis see Imperio, 2022).

Data collected by means of the final questionnaire were statistically explored with SPSS software. Only the questions concerning the focus of this paper are discussed here. At first, descriptive statistics were produced and presented in bar charts. The first question asked teachers to rate on a 6-point Likert scale (1 = *easy*, 6 = *difficult*) some aspects connected to active learning practices: planning with TASC, identifying which active strategies to employ, stopping using a lecture-style teaching method, implementing cooperative learning techniques, organizing student-centered activities, managing the class (with issues such as groups, noise, desk arrangement). About half of the teachers (46.2%; showing rates from 4 to 6) indicated that shifting the focus to the student ($Mdn = 3$; $Mo = 2$ and 4) and planning with TASC ($Mdn = 3$; $Mo = 2$) was a challenging task. However, 76.9% (rates from 1 to 3) found breaking away from the traditional lecture style ($Mdn = 3$; $Mo = 2$ and 3) and identifying active learning strategies ($Mdn = 3$; $Mo = 2$ and 3) fairly easy. Putting into practice cooperative-learning techniques ($Mdn = 2$; $Mo = 1$ and 2) was judged as easy (with rates from 1 to 3) by most of the teachers (84.6%). These inconsistencies in ratings seem to suggest that some teachers may not be fully aware of the influence of traditional approaches on their teaching style. Finally, classroom management (dealing with issues such as group management, noise etc.) was found to be rather easy by approximately 70% of them ($Mdn = Mo = 2$). In the third question, with rates ranging from 1 (*not at all*) to 6 (*a lot*), all teachers rated TASC ($Mdn = Mo = 5$), and the cooperative learning strategies learned during the training ($Mdn = Mo = 6$) as useful. Both their written (email, text messages) and oral statements (during planning meetings) supported TASC as helpful to enhance reflection on their own teaching, even if it was considered as not easy to put into practice for some teachers. One issue that may have represented an obstacle in implementing TASC emerged in the fourth question, again ranging from 1 to 6 (*not at all* and *a lot*, respectively), and related to the time needed to deal with the same amount of content compared to the previous teaching habits. Indeed, 61.5% of the teachers (with rates from 4 to 6) felt that the amount of time required increased due to this teaching approach ($Mdn = 4$; $Mo = 5$). Nevertheless, in the final session, teachers gave an average satisfaction level of 91.2% ($SD = 8.2$) and stated that they would take part in the project again. To corroborate this last answer, teachers referred to their professional growth and the results achieved by the pupils. Only one teacher reported that she already used similar approaches.

4. Final discussion and conclusions

The differences observed in teachers' plans, their statements through the different communication channels and answers to the final questionnaire suggest that the costs of teacher change can be summarized in two words: time and effort. Findings confirm what has already been described in the literature (among others, Hoekstra & Beijaard, 2006; Johnson et al., 2009). To quote the teachers themselves, some costs of change are: time for awareness and changing beliefs, time and efforts for “shaking off traditional, almost always frontal teaching”, “a first period spent understanding” and exploring new strategies and approaches, a “longer time to do things [of the curriculum] but with better results”. The amount of time and effort seems to be individual, and could be affected by a range of variables that should be investigated in further studies, like those described by Hoekstra and Beijaard (2006). Some constraints that emerged from teachers' statements were: a feeling of pressure to complete the content program (which actually should no longer exist in Italy), the expectations of parents, the assessment at a national level, the challenge of not knowing where children's actions might lead to.

Among the questions that remain unanswered, there is the influence of university education on future teachers, and how much university education's approaches are still mono-directional and content-focused, and do not provide a concrete model of what is meant by active learning.

In conclusion, the complete study has explored at least two areas of research for a better understanding of teacher change: the effects of changing teacher practices on students' learning

outcomes, and the development of a community of practice among a group of teachers moved by the same interest (see Richardson & Placier, 2001, p. 939). The former has not been discussed in this paper. As for the latter, teachers' statements confirm that the community of practices was helpful for them, as was the ongoing dialogue among teachers and between teachers and the researcher. Most teachers found TASC "an opportunity to challenge oneself, to stop and reflect". Moreover, the study has helped to understand once again that many teachers need more time and support to move toward, apply and retain effectively a new teaching style.

References

- Bloom, B. S. (Ed.) (1956). *Taxonomy of Educational Objectives. The Classification of Educational Goals*. Vol. 1: Cognitive Domain. USA: David McKay Company, Inc.
- Capaldo, N., & Rondanini, L. (2002). *La scuola italiana al bivio: modelli e ordinamenti a confronto* [The Italian school at the crossroads: comparing models and systems]. Gardolo, Italy: Erickson.
- Council of the European Union (2018). *Council Recommendation of 22 May 2018 on key competences for lifelong learning* (2018/C 189/01). Brussels, Belgium: Official Journal of the European Union. Retrieved May 3, 2022, from: [https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018H0604\(01\)&rid=7](https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018H0604(01)&rid=7).
- Ennis, R. H. (1964). A Definition of Critical Thinking. *The Reading Teacher*, 17(8), 599-612.
- Halpern, D. F. (1998). Teaching Critical Thinking for Transfer Across Domains: Dispositions, Skills, Structure Training, and Metacognitive Monitoring. *American Psychologist*, 53(4), 449-455.
- Hargreaves, A., Lieberman, A., Fullan, M., & Hopkins, D. (2005). International Handbook of Educational Change – Introduction. In A. Hargreaves (Ed.), *Extending Educational Change. International Handbook of Educational Change* (pp. vii-xi). The Netherlands: Springer.
- Hargreaves, A. (2005). Introduction. Pushing the Boundaries of Educational Change. In A. Hargreaves (Ed.), *Extending Educational Change. International Handbook of Educational Change* (pp. 1-14). The Netherlands: Springer.
- Hoekstra, A., & Beijaard, D. (2006). *Teacher Change: when, how and why?* [Draft copy]. Paper presented at AERA 2006. Retrieved April 28, 2022, from: https://www.researchgate.net/publication/27701606_Teacher_Change_When_How_and_Why.
- Imperio, A. (2022). *L'educazione al pensiero critico a scuola* [Critical thinking education at school; e-book]. Collana Umberto Margiotta. Roma, Italy: Armando Editore.
- Imperio, A., Kleine Staarman, J., Basso, D. (2020). Relevance of the socio-cultural perspective in the discussion about critical thinking. *Ricerche di Pedagogia e Didattica. Journal of Theories and Research in Education*, 15(1), 1-19. Retrieved April 30, 2022, from: <https://doi.org/10.6092/issn.1970-2221/9882>.
- Johnson, A., Kimball, R., Melendez, B., Myers, L., Rhea, K.K., & Travis, B. (2009). Breaking with Tradition: Preparing Faculty to Teach in a Student-Centered or Problem-Solving Environment. *Primus: Problems, Resources, and Issues in Mathematics Undergraduate Studies*, 19(2), 146-160.
- Mercer, N. & Littleton K. (2007). *Dialogue and the Development of Children's Thinking. A sociocultural approach*. London, England: Routledge.
- Ministero dell'Istruzione, dell'Università e della Ricerca [MIUR] (2018). *Indicazioni Nazionali e Nuovi Scenari* [National Indications and New Scenarios] (Ministerial notice 3645/18). Retrieved April 30, 2022, from: <https://www.miur.gov.it/-/nota-di-trasmissione-documento-indicazioni-nazionali-e-nuovi-scenari>
- Moseley, D., Baumfield, V., Elliott, J., Higgins, S., Miller, J., Newton, D., & Gregson, M. (2005). *Frameworks for Thinking: A Handbook for Teaching and Learning*. Cambridge, England: Cambridge University Press.
- Richardson, V., & Placier, P. (2001). Teacher change. In V. Richardson (Ed.), *Handbook of research on teaching* (pp. 905- 947). Washington, DC: American Educational Research Association.
- Sala, A., Punie, Y., Garkov, V., & Cabrera Giraldez, M. (2020). *LifeComp: The European Framework for Personal, Social and Learning to Learn Key Competence* (EUR 30246 EN). Luxembourg: Publications Office of the European Union. Retrieved January 24, 2021, from: <https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/lifecomp-european-framework-personal-social-and-learning-learn-key-competence>.
- Sternberg, R. J. (1986). *Critical thinking: Its nature, measurement, and improvement* (ED272882). Retrieved April 30, 2022, from ERIC database.
- Wallace, B. (2001). *Teaching Thinking Skills Across the Primary Curriculum*. London, England: David Fulton Publishers.

WHY DO A MASTER'S? UNDERSTANDING THE MOTIVATIONS OF MASTER'S STUDENTS IN IRELAND, NORTH AND SOUTH

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Abstract

This research considers the role of Master's study in the Continuing Professional Development (CPD) of teachers in Ireland, North and South. Countries with the highest pupil assessment outcomes emphasise the importance of teachers having Master's degrees and effective CPD for teachers has been widely acknowledged as a key characteristic of mature systems of teacher education. There has also been a developing focus on the concept of teachers as researchers which clearly places an onus upon teachers to reframe and reconceptualise their work; in this sense, it can be seen how the Master's qualification can have increasing relevance.

Despite attempts to better understand and standardise the general definition of Master's qualifications there is still much variation in terms of its value in relation to the professional status, identity and practice of teachers. In addition, whilst there is some evidence to suggest that teacher confidence can benefit from Master's study, there is limited research on the extent to which Master's work can influence professional identity and subsequent practice.

This research aims to address some of these questions by generating a profile of teachers studying for Master's degrees in Education across the island of Ireland. The research aims to clarify issues around motivation and the influence that having a Master's degree might have on the participants' professional identity and practice. Working within a qualitative, interpretative design and using a mixed methods approach employing survey and focus groups, primary survey data were collected from cohorts of students studying for Master's in Education in all universities across Ireland in the time period 2017 – 2022. This first round of data collection will be presented here.

The research may help inform programme design and also have the potential to influence policy-makers in terms of developing coherency around the professional development of teachers, beyond the initial stage.

Keywords: *Master's study, continuing professional development.*

1. Introduction

The importance of teachers has been long-recognised as central not only to the educational and personal development of children, but also to societal wellbeing and economic growth (OECD, 2018). It therefore follows that careful consideration needs to be given to the processes of professional learning to ensure the highest quality teachers are in place to meet these aspirations. Effective Continuous Professional Development (CPD) for teachers has been widely acknowledged as a key characteristic of mature systems of teacher education (Scheerens, 2010). Stronach (2010:10) suggests that it is integral to a hegemonic 'hypernarrative' which associates teacher quality with pupil outcomes and national economic wellbeing and competitiveness. Kennedy (2015) highlights the fact that countries with the highest pupil assessment outcomes emphasise the importance of teachers having Master's degrees which, by implication, has led to a discourse recommending Master's degrees for teachers in other jurisdictions.

Allied to this, the importance for teachers developing research competence in order to raise the credibility of the profession (BERA, 2014), build collective capacity for improvement (Mincu, 2014) and enhance the quality of teaching and learning in schools (Cochran-Smith and Zeichner, 2006) has also been recognised in most international contexts. The need for research competence clearly places the onus upon teachers to reframe and reconceptualise their work from being a straightforward practical activity, to one which demands complex, theoretical knowledge and understanding which must then be applied to the problems of practice in context.

It is against this background, focussing on effective, high quality, research-based CPD for teachers, that we consider the role of the Master's qualification for teachers in Ireland, North and South. The research, supported by seed funding from the International Professional Development Association (IPDA), aims to generate a profile of teachers who are studying for, or who have achieved a Master's degree in Education across the island. By so doing, we aim to develop greater understanding of their motivation for study and the challenges and opportunities they experience. In addition, we aim to better understand the extent to which the Master's qualification influences their sense of professional identity and ultimately, their professional practice as teachers.

2. Literature review

There is considerable research in relation to non-accredited CPD for teachers (Ponte, et al. 2004), with some suggesting that teachers favour school-based CPD to a greater degree than other accredited forms of provision including Master's (Pedder et al. 2008). By contrast, there is very limited evidence regarding the impact of the Master's on the professional development of teachers generally, or on the extent to which Master's work can influence professional identity and subsequent practice. Similarly, evidence which suggests that teacher confidence can benefit through engagement at this level is equally very scant (Castle, et al. 2012).

Some attempts have been made to standardise the general definition of Masters qualifications (Bologna Declaration 1999; QAA, 2014) and the Quality Assurance Agency (QAA) has suggested that Master's degrees can be categorised into three groups: research; specialised/advanced study; professional/practice (QAA, 2020:3). Despite this, there is still much variation in terms of understanding the Master's qualification in terms of its value and purpose in relation to the professional status, identity and practice of teachers.

An additional complication relates to national discourses on education. In the UK for example, there has been an increasing 'problematization' of teacher education focussing on the extent to which it is perceived to support the desired outcomes of academic and economic development. This has prompted increased prescription and a focus on 'evidence-based 'best' practice' (Helgetun and Menter, 2020) and a discourse on teacher learning as a process of 'training' with a strong emphasis on the achievement of 'professional standards' (DE, 2010). By contrast, across Ireland, teaching is viewed as an intellectual and values-based profession, based on a reflective and reflexive approach to professional learning and development; a discourse which has been well established by the respective teaching councils (GTCNI, 2007; The Teaching Council, 2016). Whilst some writers (Graham-Matheson, 2010) have raised the question as to whether Master's is simply about gaining credentials as 'evidence' of a drive to improve outcomes for others, there is a general recognition in Ireland that quality CPD provision is necessary in order to enhance the status of teaching as a profession, enrich the quality of the educational experiences of pupils in schools and support better overall academic achievement (Sahlberg, et al. Kirk, 2014; The Teaching Council, 2016).

With these perspectives in mind, this paper presents the first round of data collected in a larger study and considers the profile of teachers across Ireland engaged in master's study and their motivation for doing so.

3. Methods

Given that the research focusses on individual experience, a qualitative, interpretative design using mixed methods was developed. Initially, a desktop search was conducted to discover Master's in Education programmes offered across all the Higher Education Institutions (HEIs) across Ireland resulting in four being identified in NI and eight in RoI. Following this, a survey was circulated to all Master's students across the institutions. This was distributed via personal communications with programme leaders and through institutional and personal social media accounts. Three overarching categories were established: 'Beginning' Masters (those beginning the programme); 'Established Masters' (those in, or approaching the dissertation stage; and 'Graduate Masters' (those in the first 3 years post-graduation). The survey was initially subjected to descriptive analysis and then inferential analysis (De Vaus, 2002) to establish a range of associations between variables.

4. Findings

The findings reported here relate to the first stage of data collection for the overall project and outline the respondent profile, along with their reported motivation for undertaking Master's study. A total of 94 responded to the survey: 47 from NI; and 47 from RoI. Forty-nine were current Master's students and 45 had graduated since 2017.

4.1. Profile

Table 1 provides an overview of the overall age and gender profile of the participants and their jurisdiction.

Table 1. Overview of age and gender profile of participants by jurisdiction.

Gender	Age										Totals
	20-29		30-39		40-49		50-59		60 or over		
Female	12		18		31		7		1		69
Male	7		11		5		2		0		25
Other	0		0		0		0		0		0
No answer	0		0		0		0		0		0
Totals	19		29		36		9		1		94
Jurisdiction	RoI	NI	RoI	NI	RoI	NI	RoI	NI	RoI	NI	
	5	14	15	14	20	16	6	3	1	0	94

Overall, the number of male respondents was 25 (26.6%) and the number of females was 69 (73.4%). Of these, the largest number, 36 (38.3%) fell into the 40-49 age group. However, when taken collectively, more than half of the respondents, 48 (51.1%) were within the 20-39 group. Interestingly, it seemed that more younger teachers (20-39) had embarked upon master's study in NI than in RoI.

The vast majority (77.6%) were working in either primary or secondary education, with just slightly more primary teachers ($n=38$; 40.4% as opposed to $n=35$; 37.2%) taking Master's degrees. Other categories included: Early Childhood (4.3%); Further Education (3.2%); and Special Education (7.4%). A further 7.4% designated themselves in 'Other' which included International Schools, Youth Ministry, Educational Outreach Services and Managing Authorities.

In terms of starting a Master's degree, Table 2 shows that 22.4% started between 0-7 years post-qualification with 29.8% between 8-15 years and 28.7% between 16-23 years. Of these, 73.4% were female ($n=69$) as compared to 26.5% ($n=25$) male. Cross tabulation also shows that 10.6% ($n=47$) of RoI teachers began their studies within 7 years of qualification, compared to 34% ($n=47$) of NI teachers. Teachers from RoI were more likely to begin their studies during the 8 – 23 years post qualification (63.8%) compared to 53% of the NI teachers undertaking studies during those years.

With regard to stage of study, 10.6% were in the 'Beginning' category; 41.4% in the 'Continuing'; and 57.4% in the 'Graduate' category. From the participants who responded, there were more teachers in the 'Beginning' and 'Continuing' categories in NI whereas more who had completed the programme responded from RoI. As can be seen from Table 3, 73.4% across all categories were female ($n=69$).

Table 2. Years qualified by gender.

Gender	Number of years qualified									Totals
	0-3	4-7	8-15	16-23	24-30	31-35	36-40	40+	Not qualified teacher	
Female	4	9	17	25	9	2	1	0	2	69
Male	0	8	11	2	2	2	0	0	0	25
Other	0	0	0	0	0	0	0	0	0	0
No answer	0	0	0	0	0	0	0	0	0	0
Totals	4 4.3%	17 18.1%	28 26.8%	27 28.7%	11 11.7%	4 4.3%	1 1.1%	0 0%	2 2.1%	94

Table 3. Stage of degree and gender.

Stage	Gender				Total	
	Female		Male		n	%
	n	%	n	%		
Beginning	8	8.5	2	2.1	10	10.6
Continuing	24	25.5	15	15.9	39	41.4
Graduate	37	39.3	8	8.5	45	47.8
Totals	69	73.4	25	26.5	94	100

4.2. Motivation

Table 4 outlines the motivational reasons for engaging with Master's study. It seemed that the key driving factor for most (88.2%) was to deepen their professional knowledge, followed by a desire to enhance professional status (54.2%). Next came promotion purposes (52.1%). Lowest scoring, was for professional networking (21.2%) with the intention of developing research skills only slightly higher at 24.4%.

Table 4. Stage and motivation.

Stage	For promotion		For professional networking		To deepen professional knowledge		To enhance professional status		To expand professional interests		To develop research skills	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Beginning	5	5.3	1	1	9	9.5	5	5.3	7	7.4	3	3.1
Continuing	21	22.3	9	9.5	34	36.1	24	25.5	8	8.5	6	6.3
Graduate	23	24.4	10	10.6	40	42.5	22	23.4	24	25.5	14	14.8
Totals	49	52.1	20	21.1	83	88.2	51	54.2	39	41.4	23	24.4

With regard to the Master's providing motivation for further study post-qualification, of the 'Continuing' and 'Graduate' groups, 5.3% (*n*5) indicated that they required the Master's degree as a pathway to further studies e.g. Doctoral study. Table 5 shows that 47.8% stated that they would engage in further studies post-Master's with 34% being unsure and 18% stating that they would not.

Table 5. Motivation for further study.

Stage	Yes		No		Unsure		Total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Beginning	4	4.2	1	1	5	5.3	10	10.6
Continuing	17	18	11	11.7	11	11.7	39	41.4
Graduate	24	25.5	5	5.3	16	17	45	47.8
Totals	45	47.8	17	18	32	34	94	100

5. Discussion

Even at this early stage, a range of factors have emerged. Firstly, the data suggests that for teachers, the decision to study for a master's degree is mostly taken between 8 and 23 years post-initial teacher qualification and as such, remains the preserve of middle career teachers. Having said that, it seems that increasingly, younger teachers, particularly in NI are considering taking the Master's as a viable option as part of the normal continuum of professional learning for teachers. Different reasons may be postulated for this but perhaps of most importance is the recognised lack of coherent and consistent CPD for teachers in NI which therefore leaves Master's study as perhaps the only way that teachers can access the provision they feel necessary to support their development (Hagan and Eaton, 2020). The introduction of the Professional Master of Education as an initial teacher education qualification in the RoI may be a factor in the reduced uptake of Master's study by newly qualified teachers in the RoI.

A second key finding suggests that there are significantly more female teachers embarking upon higher study than males. This is interesting when we consider motivational reasons reported by the participants to the survey. The highest category here related to 'deepening professional knowledge', with 'enhancing professional status' coming second and 'promotion' coming third. This seems to align with the general discourse on teaching in Ireland as outlined above. Further analysis of the survey and more in-depth data is required from the focus groups to determine any gender differences related to motivation and it would also be interesting to explore differences with teachers doing Master's degrees in other jurisdictions to consider the influence of discourse.

6. Conclusion

This study presents significant benefit in terms of developing a coherency of understanding of the nature of CPD through Master's across the island of Ireland. This is particularly relevant as in NI, the Department of Education is developing a new strategy, '*Learning Leaders: A Strategy for Teacher Professional Learning*' (DENI, 2016) and in RoI, '*Cosán: Framework for Teachers' Learning*' (Teaching Council, 2016) is also being implemented. Both strategies have significant implications for teacher development at all career stages. As such, the research may be of value to policy-makers in terms of setting appropriate priorities and also to teacher educators as it may help inform the design of suitable and appropriate Master's programmes. Fundamentally, it is also of benefit to teachers considering study at Master's level to help them more fully understand the expectations and challenges of such an endeavour. It is also hoped that this research will have resonance with, and be of immediate interest to policy makers and institutional providers of Master's programmes in other international jurisdictions.

References

- An Chomhairle Mhúinteoireachta The Teaching Council (2016). *Cosán: Framework for Teachers' Learning*. Maynooth: An Chomhairle Mhúinteoireachta. The Teaching Council.
- Bailey, M., & Sorensen, P. (2013). Reclaiming the ground of master's education for teachers: Lessons to be learned from a case study of the east midlands masters in teaching and learning. *Journal of Education for Teaching: International Research and Pedagogy*, 39(1), pp. 39–59.
- Bologna Declaration (1999). Retrieved 05.17.2022 from https://www.eurashe.eu/library/bologna_1999_bologna-declaration-pdf/
- Braun, V. and Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3, pp. 77-101.
- British Educational Research Association (BERA). (2014). *Research and the Teaching Profession: Building the capacity for a self-improving education system*. Retrieved 05.17.2022 from <https://www.bera.ac.uk/wp-content/uploads/2013/12/BERA-RSA-Research-Teaching-Profession-FULL-REPORT-for-web.pdf>
- Castle, K. Peiser, G. & Smith, E. (2012). Teacher development through the Masters in Teaching and Learning: a lost opportunity. *Journal of Education for Teaching*, Vol. 39(1), pp. 30-38.
- Cochran-Smith, M., & Zeichner, K. (2006). *Studying teacher education*. Washington DC: American Educational Research Association.
- Department for Education. (2010). *The importance of teaching*. London: HMSO.
- Department of Education for Northern Ireland (DENI). (2016). *Learning Leaders: A Strategy for Teacher Professional Learning*. Bangor: DENI.
- De Vaus, D. (2002). *Surveys in Social Research*. 5th Edition, London: George Allen and Unwin.
- Flick, U. (2009). *An Introduction to Qualitative Research*. 4th Edition, London: Sage.
- General Teaching Council for Northern Ireland (GTCNI). (2007). *Teaching: The Reflective Profession*. Belfast: GTCNI. Retrieved 05.18.2022 from http://www.gtcni.org.uk/uploads/docs/GTCNI_Comp_Bmrk%20%20Aug%2007.pdf
- Graham-Matheson, L. (2010). Masters of the Game: Teacher Educators and the M-Level PGCE. *TEAN Journal*. Vol 1(1) May. Retrieved 05.17.2022 from <https://ojs.cumbria.ac.uk/index.php/TEAN/article/view/51/59>
- Hagan, M. and Eaton, P. (2020). Teacher Education in Northern Ireland: Reasons to be Cheerful or a 'Wicked Problem'? *Teacher Development*, Vol. 24 No. 2, pp. 258-273.
- Helgetun, J. B., & Menter, I. (2020). From an age of measurement to an evidence era? Policy-making in teacher education in England. *Journal of Education Policy*, 1-18.
- Kennedy, A. (2015). What do professional learning policies say about purposes of teacher education? *Asia-Pacific Journal of Teacher Education*. Vol 43(3), pp, 183-194.
- Mincu, M. (2014), Teacher Quality and School improvement: What is The role of Research?, Paper 6 in *Research and Teacher education: The BERA-RSA Inquiry*. Retrieved 05.17.2022 from https://www.researchgate.net/publication/316663882_BERA_Inquiry_paper_6_Teacher_Quality_and_School_improvement_What_is_the_role_of_research
- Organisation for Economic Co-operation and Development (OECD). (2018). *Effective Teacher Policies: Insights from PISA*. OECD Publishing. Retrieved 05.17.2022 from <http://dx.doi.org/10.1787/9789264301603-en>
- Quality Assurance Agency (QAA). (2014). *UK Quality Code for Higher Education Part A: Setting and Maintaining Academic Standards*. Retrieved 05.17.2022 from <file:///C:/Users/m.hagan/Downloads/qualifications-frameworks.pdf>
- Quality Assurance Agency (QAA). (2014). *Characteristics Statement: Master's Degree*. Retrieved 05.18.2022 from [Characteristics Statement: Master's Degree \(qaa.ac.uk\)](https://www.qaa.ac.uk/characteristics-statement/master-degree).
- Pedder, D., Storey, A. & Opfer, V. D. (2008). *Schools and Continuing Professional Development in England: the State of the Nation research project*. T34718 Teacher Development Agency.
- Ponte, P., J. Ax, D. Beijjaard & T. Wubbels. 2004. Teachers' Development of Professional Knowledge through Action Research and the Facilitation of this by Teacher Educators, *Teaching and Teacher Education*, 20: 571-588.
- Sahlberg, P., Broadfoot, J. Coolahan, J. Furlong, J. & Kirk, G. 2014. *Aspiring to Excellence: Final Report of the International Review Panel on the Structure of Initial Teacher Education in Northern Ireland*. Conducted for the Minister of Employment and Learning. Belfast: Department of Employment and Learning.
- Scheerens, J. (Ed.). (2010). *Teachers' professional development: Europe in international comparison*. Luxembourg: European Union.
- Stewart, D., Shandasani, P. & Rook, D. (2007). *Focus Groups: Theory and Practice*. 2nd Edition. Thousand Oaks, CA: Sage.
- Stronach, I. (2010). *Globalizing Education, Educating the Local: How method made us mad*. Abingdon: Routledge.

USE OF LINKEDIN ENDORSEMENTS IN RECOMMENDER SYSTEMS

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Abstract

Social networks have become an important source of information, especially professional networks, where users share information about their academic and professional qualifications, skills and work experience. Nowadays, where the updating and development of professional skills is becoming more and more relevant for professionals, this information is of great interest, since it allows to know the trend of the labor market. In this regard, LinkedIn, in particular, has become one of the most widely used professional networks for this purpose, designed for professional networking and job search. From the professional profiles shared in this media, it is possible to retrieve relevant information for the labor sector, to know information about the professional profiles according to their competencies, as well as the most demanded competencies in the different job positions. This makes it possible to detect formation needs to improve or develop new skills. Additionally, LinkedIn has a particular element, the endorsements, through which it allows members of the network to acknowledge the skills of other members, which could provide information related to the level of development of a given skill. The analysis of this information, in addition to detecting training needs, can be used to adapt curricula to meet these needs, as well as in the field of human resources, to find the right candidates for the job. Currently, recommender systems have become a powerful tool for suggesting relevant articles to users. In the field of education, they have become very powerful, making it possible to link the training offer with the training needs of users, especially in the field of continuing education, in order to meet the need to develop professional skills. In a previous work, we have developed a recommendation system based on machine learning and ontology to recommend continuing education courses to LinkedIn users. As an extension of our work, we propose to incorporate the endorsement information to the user profiles to determine the improvement in the recommendations of our recommendation system. The results obtained showed an improvement in the recommendations, obtaining an accuracy of 94%.

Keywords: *LinkedIn, endorsements, recommendation systems, machine learning, ontology.*

1. Introduction

Nowadays, the use of Social Networks Sites (SNSs) has evolved in different fields, which has meant for users a means, par excellence, for interaction and communication in different areas of interest. They have become one of the main sources of information, generating a large amount of data, which once extracted, analyzed and treated, become an asset of great value in organizations. According to the work presented by (Urdaneta Ponte, Mendez Zorrilla and Oleagordia Ruiz 2022), organizations use social media in order to analyze their content and identify new opportunities.

Among the SNSs, the professional ones have positioned themselves in recent times. For (Urdaneta Ponte, Mendez Zorrilla and Oleagordia Ruiz 2022) these are used by different types of organizations to gather information on job positions, user profiles, identifying the most in-demand skills, labor market trends and adjusting academic programs. In this respect, (Wu, et. al., 2018) indicates that companies use this information in their recruitment processes to select the best candidates for their jobs.

According to (Wu, et. al., 2018), LinkedIn is considered to be the world's most important professional network, whose main objective is to match jobs with the right professionals. (Yan, et. al., 2019) and allows a user's skills to be endorsed by other users in the network.

The work presented by (Benkhedda, Azouaou and Abbar 2020) indicates that the data obtained from SNSs have become of great interest for the construction of user profiles used in applications such as personalized advertising and expert recommendation. Furthermore, it indicates that the analysis of SNSs and professional data has set a standard and, together with Recommender Systems (RS), can classify

profiles based on skills, endorsements or recommendations from colleagues, as well as analyze learning areas and provide possible corrections to study plans.

The RSs, which collect the information that links users to the articles and use it to make relevant and meaningful suggestions. According to (Bakhshinategh, et. al., 2017), RSs are based on the prediction of users' interests, on their explicit or implicit preferences.

For (Urdeneta Ponte, Mendez Zorrilla and Oleagordia Ruiz 2022), RSs manipulate a large amount of data that, due to the diversity of sources, such as the SNSs are characterized by their heterogeneity, so they make use of the semantic web to represent reality in a specific domain, in a way that is readable by machines. Additionally, they are combined with Machine Learning (ML) techniques, to exploit knowledge, update it and to infer new relationships between data. On the other hand, (Huang, et. al., 2019) indicates the use of ML as a means to study the relationship between SNSs entities. The combination of ontology-based recommender system with ML techniques has been used as an approach to improve the accuracy of recommendations.

Based on the above, it is proposed to use professional profile data extracted from LinkedIn, to build user profiles for a SR of Lifelong Learning (LLL) courses, to develop and/or improve professional skills. An ontology is used to model employment sectors and knowledge areas to represent professional skills. The ontology is updated through events and using ML to group entities in order to make predictions about new data. An ontology is used to model employment sectors and knowledge areas to represent professional skills. The ontology is updated through events and using ML to group entities in order to make predictions about new data.

This article is structured as follows: Section 2 contains a review of related studies; Section 3 presents the SR proposal; Section 4 describes the evaluation of the proposal; and Section 5 presents conclusions and recommendations for future research.

2. Related studies

In accordance with (Obadã and Dabija 2022), the number of Internet users has grown significantly in recent years, with an estimated 4.62 billion active users of SNSs, which has generated the current information economy. To the extent that users of SNSs, the use of information shared in these media is used in different areas, generating great interest among researchers, due to the potential value of the information.

According to (Urdeneta Ponte, Méndez Zorrilla and Oleagordia Ruíz 2021) the use of SNSs has led many organizations to incorporate this new source of information in their selection processes, one of the most used being LinkedIn, where users share information in the labor field, such as employment, training and skills; characteristics to consider when proposing a learning itinerary to improve and/or develop professional competencies. For (Rapanta and Cantoni 2017) LinkedIn is the most influential web resource in terms of professional use, allowing members to endorse the skills of other members. Given this last feature of LinkedIn, some research has recently emerged around endorsements.

The research presented by (Yan, et. al., 2019) uses endorsements to measure the level of skills and thus estimate the expertise of LinkedIn members. The proposal of (Drakopoulos, et. al., 2020), uses endorsements to determine a user's skills and measure a candidate's reliability for startups. (Rapanta and Cantoni 2017) carries out an analysis on the reliability of endorsements, to identify the motivation behind LinkedIn usage behavior. The work of (Pérez-Rosés and Sebé 2017), uses endorsements to score a particular profile, according to the number and quality of these endorsements. In the work proposed by (Constantinov, et. al., 2015), extract the skills from LinkedIn and determine their level according to the endorsements, and thus determine a set of competencies required by the market on which the curriculum should focus.

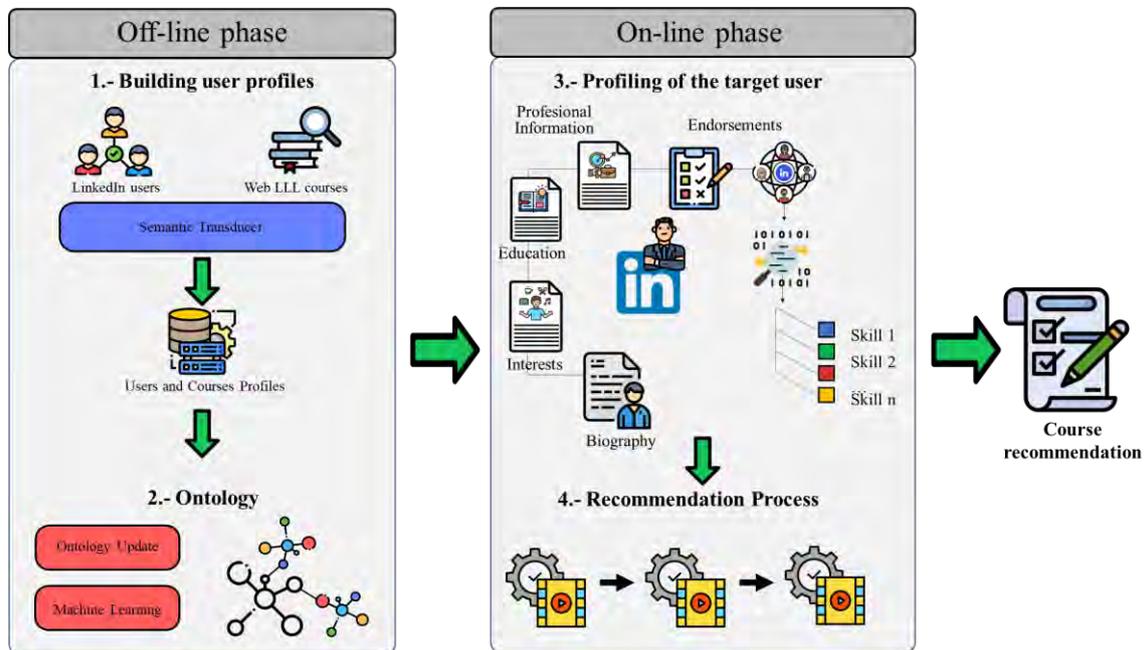
From this review, it is proposed to extract user profiles from LinkedIn to build user profiles for a semantic RS that recommends LLL courses to improve professional skills. The system will use the skills endorsements in order to validate the skills obtained in the user profile building stage to optimize the performance of the RS.

3. Material and methods

For the testing and evaluation of the proposal, data was extracted from LinkedIn professionals in software engineering. The information extracted for this purpose was: user ID, job title, location, summary, education, skills, interests, and endorsements. Similarly, information on LLL courses was retrieved from different websites.

The data, codified in the profiles, will be the input of the RS, which consists of multiple filtering techniques, and has as output an ordered list of LL courses for the improvement and/or development of the user's professional skills. Figure 1. shows the proposed processes for the SR.

Figure 1. Recommender System Processes.



The SR is executed in two phases, an off-line phase, consisting of the profile and ontology construction processes and the recommendation process, and an on-line phase, consisting of the target user profiling and the recommendation engine.

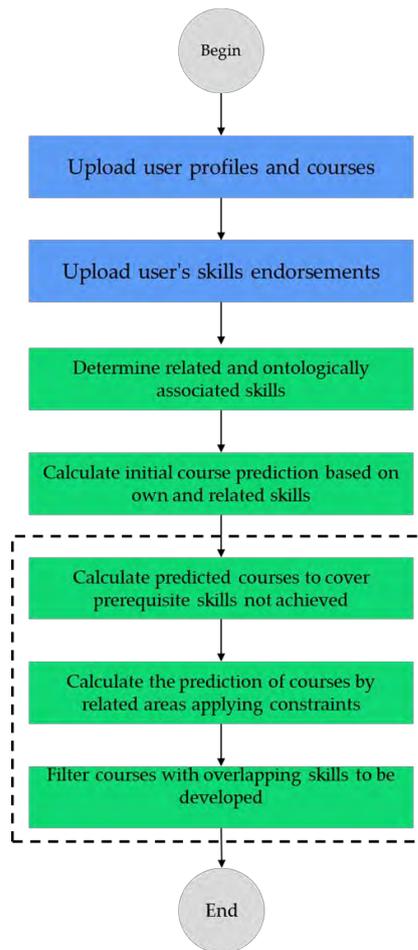
1.- Profile creation. Profiles are created using a semantic process based on ontology, making use of taxonomies, which were used to represent the areas of knowledge associated with skills, and employment information. For each user, the skills related to the work performance sector and position are stored, with their respective attributes. For course profiles, the skills to be developed. This made it possible to relate user information with course information.

2.- Ontology. The ontology is used to store the relationship between the positions and the areas of knowledge, which is given by the skills with attributes, as well as the number of times that this skill is present, the average level of specialization and its degree of updating. Clustering algorithms are used on the ontology to group similar positions, these groupings are based on the similarity of the skills associated with the positions, with the objective of inferring new information. This information can be used to determine the set of jobs related to a particular position, or a set of skills of a particular user.

3.- Profiling of the target user. The coding algorithms use heuristics that consider the relative frequency of the number of users that endorse the skill for the level of specialization and degree of updating for the user profile.

4.- Recommendation process. For the recommendation process, it is necessary to determine the user's skills to be improved. The process is implemented in three stages. The first stage corresponds to a semantic filtering to determine own, related, and ontological skills; a second filtering based on content, for the initial prediction of courses, and finally, filtering and sorting heuristics are applied for the final recommendation of LL courses for the improvement and/or development of professional skills based on a user's record.

Figure 2. General Recommendation Algorithm.



4. Results

In order to evaluate the SR, different metrics were calculated to measure the performance of the RS. Tests were performed for the different system configurations with the different data sets: training, test and total. The configurations are the result of combining the different similarity functions with the different clustering algorithms. The best results were obtained with the configuration using semantic filtering using rules to determine related job performance sectors and related skills (S1) and with the configuration using semantic filtering using DBSCAN clustering to determine related job performance sectors and semantic rules to determine related skills (S2). The results obtained are presented in Table 1, together with those obtained in our previous work (Urdaneta Ponte, Méndez Zorrilla and Oleagordia Ruíz 2021).

Table 1. Result of Evaluation Metrics of the Recommendation System.

Setting	Data	MAE	RMSE	Coverage	Precision	Recall	Novelty	Serendipity
S1	(Urdaneta Ponte, Méndez Zorrilla and Oleagordia Ruíz 2021)	0,25	4,44	0,91	0,83	0,82	0,46	0,07
	Author's proposal	0,24	4,14	0,91	0,85	0,82	0,46	0,07
S2	(Urdaneta Ponte, Méndez Zorrilla and Oleagordia Ruíz 2021)	0,18	2,92	0,91	0,91	0,80	0,52	0,07
	Author's proposal	0,16	2,58	0,91	0,94	0,80	0,52	0,07

5. Discussion and conclusions

SNSs sites provide significant information when building user profiles. Endorsements offer the possibility of determining their level of specialization.

When evaluating the incorporation of the endorsements in the creation of the user profiles, an improvement in the performance of the RS was observed in the configuration that makes use of the DBSCAN algorithm, improving the values of the root mean square error (RMSE) and mean absolute error (MAE), as well as in the metrics of precision, novelty, and coverage. With the incorporation of the endorsements, it was possible to obtain more information on the user profile, which made it possible to incorporate skills that were not evident in the data related to current employment, which were useful when refining the recommendation of courses.

Below are some guidelines for future work and further progress in this area:

Implement methods to determine the veracity of the endorsements.

In order to evaluate the behavior of the system for multiple domains, updating the ontology with new instances associated to new domains. As well as to evaluate the use of ontologies already built, new forms of representation of knowledge areas and occupational sectors of performance.

References

- Bakhshinategh, B., G. Spanakis, O. Zaïane, and S. ElAtia. 2017. «A Course Recommender System based on Graduating Attributes» 9th International Conference on Computer Supported Education. Porto, Portugal.
- Bejtkovský, Jiří. 2012. «LinkedIn, a vocational social network, as a tool for promotion in selected healthcare service providers» *Management & Marketing* 16 (3): 286-299.
- Benkhedda, Y., F. Azouaou, and S. Abbar. 2020. «Identity Linkage Across Diverse Social Networks» *IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining (ASONAM)*. Virtual.
- Constantinov, C., P. Ş. Popescu, C. M. Poteraş, and M. L. Mocanu. 2015. «Preliminary results of a curriculum adjuster based on professional network analysis» *19th International Conference on System Theory, Control and Computing (ICSTCC)*. Cheile Gradistei, Romania. 860 - 865.
- Drakopoulos, Georgios, Eleana Kafeza, Phivos Mylonas, and Haseena Alkatheeri. 2020. «Building Trusted Startup Teams From LinkedIn Attributes: A Higher Order Probabilistic Analysis» *32nd IEEE International Conference on Tools with Artificial Intelligence (ICTAI)*. Baltimore. 867-874.
- Huang, Qian, Bi Liu, Ningshe Zhao, Zhiyong Zhang, Qirong Wang, Xiaoli Zhang, Tang Xun, Xiaoyu Ge, Jianlan Ding, and Sai-Fu Fung. 2019. «Modeling for professional athletes' social networks based on statistical machine learning» *IEE Access* 8: 4301 - 4310.
- Obadã, Daniel-Rareş, and Dan-Cristian Dabija. 2022. «“In flow”! why do users share fake news about environmentally friendly brands on social media?» *International Journal of Environmental Research and Public Health* 19 (4861).
- Pérez-Rosés, Hebert, and Francesc Sebé. 2017. «Iterated endorsement deduction and ranking.» *Computing* 99: 431-446.
- Rapanta, Chrysi, and Lorenzo Cantoni. 2017. «The LinkedIn Endorsement Game: Why and How Professionals Attribute Skills to Others.» *Business and Professional Communication Quarterly* 80 (4): 443-459.
- Urdaneta Ponte, María Cora, Amaia Méndez Zorrilla, and Ibon Oleagordia Ruíz. 2021. «Lifelong Learning Courses Recommendation System to Improve Professional Skills Using Ontology and Machine Learning» *Appl. Sci.* 11 (3839).
- Urdaneta Ponte, María Cora, Amaia Mendez Zorrilla, and Ibon Oleagordia Ruiz. 2022. «Using LinkedIn Endorsements to Reinforce an Ontology and Machine Learning-Based Recommender System to Improve Professional Skills» *Electronics* 11 (1190).
- Wu, Y., N. Dhakal, D. Xu, and J. Cho. 2018. «Analysis and Prediction of Endorsement-Based Skill Assessment in LinkedIn» *2018 IEEE 42nd Annual Computer Software and Applications Conference (COMPSAC)*. Tokyo, Japan. 461-470.
- Yan, Xiao, Jaewon Yang, Mikhail Obukhov, Lin Zhu, Joey Bai, Shiqi Wu, and Qi He. 2019. «Social Skill Validation at LinkedIn» *ACM SIGKDD International Conference on Knowledge Discovery & Data Mining (KDD '19)*. New York, NY, USA: Association for Computing Machinery. 2943-2951.

THE CONTRIBUTION OF LEARNING SEQUENCES DESIGN FOR TEACHER PROFESSIONAL DEVELOPMENT IN HIGH SCHOOL VOCATIONAL EDUCATION

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Abstract

This article, generated from the thesis presented in the Master's Program in Education, Art and History of Culture at Mackenzie Presbyterian University (São Paulo – Brazil), refers to research intended, through the analysis of a teaching learning process related to performance in Technical High School, to verify the contribution of learning sequences design as a formative strategy to the professional development of teachers in this context. To support the analysis, we mainly adopted Carlos Marcelo Garcia's studies on teacher professional development and the formal and informal process of learning to teach. In his investigations, the author draws attention to the potential of learning sequences design as a strategy focused on the construction of pedagogical content knowledge and teachers' professional identity. We were also supported, among other authors, by Lee S. Shulman's work on the knowledge basis for teaching, as well as Donald A. Schön's studies on the reflective practice inherent in teaching. The research was conducted with a team of teachers from the São Miguel Paulista branch at Senac São Paulo, a professional education institution with a wide presence throughout Brazil. The team of educators was made up within the implementation framework of the IT Technical High School (EMED), a course characterized by its interdisciplinary curriculum. Through the analysis of statements collected from surveys and the examination of reports produced during these teachers' continuing education process, their various experiences of formal and informal learning at different moments of their training course were recognized, as well as their perceptions regarding the impact of those experiences on teaching learning and teaching practice itself. It is worth mentioning that the period analyzed begins in their first contact with the school (still as candidates in the selection process) and goes up to the conclusion of their first working year at the institution. In this context, and from the information and statements collected, the experiences characterized by the design of learning sequences were described and analyzed with regard to their incidence in their professional development, resulting in the recognition, based on the point of view of educators participating in the research, of the relevance of each activity performed, the main learning process generated, the main challenges and difficulties faced and the possibilities of process improvement.

Keywords: *Teacher professional development, high school vocational education, formal and informal learning, learning sequences design.*

1. The teaching learning path understood as a process of teacher professional development: knowledge inherent to teaching and ways to build it

In the scope of the research that originated this article, the teaching learning path followed by EMED teachers was understood as a process of teacher professional development – TPD (García, 1999, 2009; Marcelo, 2009; Vaillant & Marcelo, 2012), characterized as "an individual and collective process that must be actualized in the teacher's workplace: the school; and it contributes to the development of their professional skills, through experiences of a different nature, both formal and formal." (Marcelo,

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2009, p. 7). The adoption of this concept as a framework for the analysis reflects the need to highlight the teacher's conception as a teaching professional, as well as the understanding of teaching learning as a continuous and long-term process. In this context, when we seek to identify the characteristics of the teaching learning process led by EMED teachers involved in the research, the questions formulated by Marcelo (2009) about the contents of the TPD have gained relevance: "What is teacher professional development about? What are your stories and contents? [...] What knowledge is relevant to teaching and to the professional development of teachers? How is this knowledge acquired? (Marcelo, 2009, p. 17).

To answer these questions, Marcelo (2009) cites the studies by Cochran-Smith and Lytle (1999), related to the classification of the knowledge necessary for teaching considering its origin, its production process and the role played by teachers in this process. Thus, knowledge *for* practice is evident – being formal, it is useful to organize and plan the practice; knowledge *in* practice – implicit in practice, in the reflection on practice and in the inquiry and narrative of this practice; and knowledge *of* practice – associated with the idea of the teacher as a researcher (Cochran-Smith & Lytle, 1999, apud Marcelo, 2009, p. 17, 18). At the same time, Marcelo (2009) relies on the model proposed by Grossman (1990) and modified by Morine-Dersheimer and Kent (2003) about knowledge of teachers, in which pedagogical knowledge of content is considered the main element (Morine-Dersheimer & Kent, 2003, apud Marcelo, 2009, p. 18). Thus, from the answers constructed by Marcelo (2009) about the content of the TPD, and considering the teaching training actions carried out in the context of EMED, we adopted as epistemological bases for the research reported in this article the concepts related to the knowledge base for teaching (Shulman, 1986, 2005, 2014) and to the reflective practice inherent in teaching (Schön, 1983, 1992, 1997, 2000), explained in the thesis cited in the initial paragraph of this text.

Based on the studies of Shulman (1986), Carlos Marcelo García defines the pedagogical content knowledge as "the appropriate combination between the knowledge of the subject to teach and the didactic-pedagogical knowledge related to how to teach it" (García, 2009, p. 48). García also states that its construction is essential to the professional development of teachers and highlights the potential of learning sequences design as a strategy for the TPD through the construction of pedagogical content knowledge.

On my part, I will focus on one of the aspects that I consider can provide to teachers in training an approximation to the professional identity that we want to build: the construction of pedagogical content knowledge through the design of learning sequences. (García, 2009, p. 48)

To characterize learning sequences design, García (2009) draws upon the definition of Koper & Olivier (2004).

A learning design is defined as an application of a pedagogical model to achieve a concrete learning goal, for a particular group of students and for a specific context or a particular domain of knowledge. The learning design specifies teaching-learning processes. More specifically, it specifies the conditions under which teachers and students should carry out the activities that allow students to achieve the desired learning objectives. (Koper & Olivier, 2004, p. 98, apud García, 2009, p. 49)

García (2009) also emphasizes the importance that the design of learning sequences, as a strategy focused on TPD, include not only teaching practices, but mainly activities performed by students in the learning dimension.

In our research group, we are working on the identification and description of learning sequences by teachers, which can illustrate students' learning processes and that can be applied to different teaching content. What do we ask the teachers? Through an interview, we ask them to describe a complete sequence (which can cover a theme, module, or complete course) emphasizing that they need to describe not only what they do, but especially what learning tasks students should perform. These learning tasks are varied: individual, group, assimilation, communication, application, production, etc. And the learning tasks are associated with the support that students and teachers receive for their development, as well as the resources employed. (García, 2009, p. 50, 51)

It is from this perspective that, in the research reported here, we analyze the intentional use of learning sequences design, as a formative strategy, in the TPD process linked to EMED.

2. Teacher professional development in EMED and learning sequences design as a formative strategy: the research and its results'

In the TPD process in question, the design of learning sequences was used as a formative strategy in four moments:

- The hiring process of the teachers participating in the research, still as applicants, between September and December 2018, in which educators had to design learning sequences in three different stages (written exam, group dynamics and test class).
- The teacher training course held in January 2019 (before the start of EMED classes) by educators hired as mentioned in the previous topic, which included the design of learning sequences by the participating teachers.
- The weekly EMED teacher planning meetings, held from January 2019 onwards, in which the teachers of each area of knowledge designed learning sequences.
- The process of preparing the Offer's Orientation Plan (PO) for the first year of EMED (Senac, 2020), carried out during 2019. The PO is a guiding document that includes suggestions for teaching practice (including learning sequences) based on experiences obtained by the teachers themselves in the course in question.

Six teachers of the Technical High School of Information Technology (EMED) of Senac São Paulo participated in the research. All of them entered the school at the same time, in the phase of implementation of the course at the São Miguel Paulista branch and participated together in the four moments mentioned above. It is a team composed of educators who were between 25 and 35 years of age when they joined the EMED, and had been teaching for ten years at most. All of them had, at the time of their hiring, an academic background in the area of knowledge in which they work at EMED (graduation with their degree), in most cases complemented with *lato* or *stricto sensu* postgraduate courses. The data we will present below reflect the perceptions of these teachers about the four moments in which the learning sequences design was used as a teacher professional development strategy in EMED. The teachers' perceptions were obtained through a questionnaire conducted between December 2020 and January 2021, which asked about the following aspects related to each of the four moments mentioned above: a) relevance of the activities carried out, in terms of teacher professional development (high, medium, low or zero); b) reasons that originated this perception about the relevance of the activities performed, focusing on the main learning generated; c) difficulties and/or problems faced in carrying out the activities; d) suggestions for improvement of the activities in question (Zatti, 2021, p. 87 - 103).

The first feedback from educators is about the relevance perceived by them, in terms of contribution to TPD, in the learning sequences design in general, considering the four moments analyzed. In this sense, 71% of the answers to the questionnaire showed that these activities were considered of high relevance, while 21% of the returns judged the relevance of the same activities as medium, and 8% as low. When looking precisely at each of the four contexts in which the design of learning sequences occurred, we found that the perception of relevance varied within a level of positive evaluation: the educational training prior to the beginning of classes and weekly planning meetings were considered the most important moments: in both cases, the relevance was high for five of the six teachers consulted (83.3% of the total) and medium for one educator (16.7%). The process of preparing the PO, in turn, was considered of high relevance by four teachers (66.7% of respondents), of medium relevance by a teacher (16.7%) and of low relevance also by one educator (16.7%). Finally, the hiring process had high relevance for three study participants (50%), medium relevance for two teachers (33.3%) and low for one educator (16.7%).

Regarding the learning generated (criterion indicated in the questionnaire to assess the relevance of learning sequences design), the most recurrently cited gain was the understanding of the proposal of the course and the school (curriculum, pedagogical proposal, teaching methodology, available tools and resources), an aspect highlighted by four of the six teachers (66.7% of the total). Moreover, three teachers (50% of the respondents) pointed out the construction of a collective and interdisciplinary view as a positive result, while two educators (33.3% of the total) said that the design of learning sequences provided the construction of educational planning practices based on continuous evaluation of teaching-learning processes and constant replanning.

About the main difficulties mentioned in relation to the four moments analyzed in the questionnaire, the first factor pointed out was the short time given by the school (especially in weekly planning meetings) for the design of learning sequences based on the collective view – by area of knowledge and counting on the participation of all teachers in the area, which was mentioned by six teachers (100% of the total). Another factor highlighted were the difficulties faced by educators, still as applicants, during the hiring process (estrangement with the proposal, insecurity, nervousness, lack of

clarity about expected performance, competitiveness). This situation reported by five of the six teachers (83.3% of respondents). The teachers also mentioned difficulties they faced to integrate the design of learning sequences held in weekly planning meetings with the design done in the preparation of the PO, considering the pedagogical intention of the document and its particularities (cited by four of the six participants, 66.7% of the total). Lastly, the deconstruction of the "traditional" view of teaching and learning and the construction of an interdisciplinary approach was characterized as a difficulty by three teachers (50% of respondents). In relation to this last point, it is worth noting that it was considered, at the same time, as a difficulty and as one of the most important elements learned in the process.

Finally, we found that the suggestions for improvement given by the research participants are directly related to the difficulties reported by them. Thus, first, there is the proposal to assign more time to the weekly planning meetings (cited by four teachers, 66.7% of the total). Subsequently, two suggestions formulated, in both cases, by three teachers (50% of respondents): providing spaces for collective analysis and review of the learning sequences available in the PO; and a greater emphasis on projects (Project Based Learning) as a starting point for the design of learning sequences during the initial training program and/or in weekly planning meetings. Two teachers (33.3% of the participants) also suggested the improvement of the group dynamics in the hiring process, fundamentally about the composition of the work teams and the clarification of the performance parameters observed.

3. Final considerations

As a synthesis of our study, we observed, first, that the analysis of the statements of the teachers who participated in the research corroborated our initial perception (obtained through the documentary research focused on the records of the formative actions performed in EMED and supported by the investigation of the theoretical assumptions implicit in these actions) that learning sequences design as a formative strategy was relevant to the TPD in the context of EMED. At the same time, although it is possible (both by the documentary research mentioned above, and by the feedback of the teachers in the questionnaire) to deduce that the design of learning sequences was relevant not only for teacher professional development in general, but also for the construction of pedagogical content knowledge (largely, taking into account the interdisciplinary proposal of the course and the teaching practices consequently required), we consider that the research did not generate sufficient evidence as to support this statement, which would require complementary studies to be verified. Finally, we consider that the reports of the educators who participated in the study brought evidence that the relevance of learning sequences design for teacher professional development is invariably conditioned to the adequate configuration of various dimensions of the school organization, both from the pedagogical and administrative point of view. Using this information as a starting point for further academic studies that deepen this analysis, as well as for the planning of teacher training programs and actions in different school contexts, can contribute to the construction of spaces favorable to the emergence of teacher professional development processes characterized by efficiency and authenticity, which, in turn, can bring us closer to a perspective of constant improvement of teaching practices and, thus collaborating with the necessary transformation of the Brazilian and Latin American educational scene.

References

- García, C. M. (1999). *Formação de professores: para uma mudança educativa*. Porto: Porto Editora.
- _____ (2009, September-December). Formalidad e informalidad en el proceso de aprender a enseñar. *Revista de Educación*, 350, 31-55.
- Marcelo, C. (2009, January-April). Desenvolvimento profissional docente: passado e futuro. *Sísifo: Revista de Ciências da Educação*, 8, 7-22.
- Mizukami, M. G. N. (2004). Aprendizagem da docência: algumas contribuições de L.S. Shulman. *Revista do Centro de Educação da UFSM*, 29 (2).
- Mizukami, M. G. N., & Reali, A. (2010). *Escola e aprendizagem da docência: Processos de investigação e formação*. São Carlos: EdUFSCar.
- _____, & Reali, A. M. de M. R. (Eds.). (2002). *Formação de professores, práticas pedagógicas e escola*. São Carlos: EdUFSCar.
- Schön, D. A. (2000). *Educando o profissional reflexivo: um novo design para o ensino e a aprendizagem*. Porto Alegre: Artmed.
- _____ (1997). Formar professores como profissionais reflexivos. In A. Nóvoa (Ed.). *Os professores e sua formação* (pp. 77-92). Lisboa: Dom Quixote.
- _____ (1992). *La formación de profesionales reflexivos*. Barcelona: Paidós.

- _____ (1983). *The reflective practitioner*. Nova York: Basic Books.
- Senac São Paulo. (2018). *Plano de Curso do Ensino Médio Técnico em Informática*.
- _____ (2020). *Plano de Orientação para a Oferta do Ensino Médio Técnico em Informática*.
- Shulman, L. S. (2014, December). Conhecimento e ensino: fundamentos para a nova reforma. *Cadernos Cenpec São Paulo*, 4 (2), 196-229.
- _____ (2005). Knowledge and teaching: foundations of the new reform. *Profesorado - Revista de curriculum y formación del profesorado*, 9 (2), 1-30.
- _____ (1986, February). Those who understand: knowledge growth in teaching. *Educational Researcher*, 15 (2), 4-14.
- Vaillant, D. & Marcelo, C. (2012). *Ensinando a ensinar: as quatro etapas de uma aprendizagem*. Curitiba: 2012.
- Zatti, J. P. (2021). *O desenho de sequências de aprendizagem como estratégia para o desenvolvimento profissional docente no ensino médio técnico do Senac São Paulo*. (Master's thesis, Universidade Presbiteriana Mackenzie, São Paulo, Brasil). Retrieved from <https://dspace.mackenzie.br/handle/10899/28540>

THE DUAL ROLE OF SCHOOL MENTORS: HOW TO ESTABLISH TEACHING AND SUPERVISION GOALS?

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Abstract

In several countries, the schools' responsibilities in preparing student teachers for their future work have increased over the last decade (Sandvik et al., 2019). In cooperation with the universities, school mentors are expected to set an example of how to teach pupils and use appropriate teaching practices in lessons. School mentors are expected to be capable of choosing teaching practices that achieve several educational goals and to connect student teachers' theoretical concepts with practical training. However, not all school mentors are sufficiently prepared to supervise students and many do not appreciate the importance of their role in training future teachers. The purpose of the present study was to investigate Estonian school mentors' teaching and supervising goals when they teach pupils and supervise student teachers as well as to identify how teachers in the role of mentors understand university expectations. The sample included 16 teachers, all of them had supervision experience with student teachers and they all taught various subjects at university teacher training schools (in grades 1 to 6). Observations and stimulated recall interviews were used to collect the data. Thematic analysis indicated that teachers have difficulty establishing goals for themselves as teachers and mentors. The results demonstrated that Estonian school mentors have the challenge of combining two responsibilities: how to maintain balance between their teaching and supervising. It also appeared that mentors did not perceive clearly what universities expected from them as supervisors and, therefore, relied rather on their personal perception and experience than a clear knowledge of their supervision goals. Mentors' main goal in model lessons for student teachers was to establish good teaching experience. To conclude, it is necessary to encourage cooperation between teachers and universities and support mentors' professional development.

Keywords: *Mentor teacher, teaching goals, student teachers, improving the competence of mentors, thematic analysis.*

1. Introduction

Transforming teacher education from university to a school-based system heightens the teachers' and school mentors' responsibility to prepare student teachers for their future work (White, Dickerson, & Weston, 2015). School mentors who supervise student teachers' school practice are expected to set an example of how to teach pupils and use appropriate teaching practices (Cohen, Hoz, & Kaplan 2013), to be capable of choosing practices that achieve several goals and to connect student teachers' theoretical concepts with practical training (Clarke, Triggs, & Nielsen, 2014). Teachers may establish different goals for their teaching; for example, some might focus on motivating pupils and developing their social skills (Mansfield & Beltman, 2014; Vaughn, 2014) or recognising a pupil's individuality and personal achievements (Deemer, 2004); others might concentrate on national curriculum performance (Kuzborska, 2011). Furthermore, school mentors should support student teachers in obtaining a set of core practices for teaching, e.g., developing a classroom culture, learning about pupils, planning lessons, and leading classroom discussions (Grossman, Hammerness, & McDonald, 2009).

Although, the school mentors must be prepared to perform two roles: teaching subject to their pupils and supporting a future teacher's teaching competencies (Langdon, 2017; White, 2014), not all of them are sufficiently prepared to supervise and many do not appreciate the importance of their role in training future teachers. Moreover, some teachers have referred to the lack of time needed to supervise students (Hodgson, 2014) and some of them prioritise the pupils' academic progress over supervising student teachers (Ambrosetti, 2014; Jaspers et al., 2014). To achieve initial training requirements, school

mentors should be familiar with university expectations of them as supervisors (Butler & Cuenca, 2012) and receive training in supervising from universities (Ng & Chan, 2012).

Based on the overview of previous studies and educational documents the universities expect from school mentors setting good teaching examples (Cheng, Cheng, & Tang, 2010), helping students to prepare and to carry out trial lessons (Butler & Cuenca, 2012), and providing students with feedback on their teaching (TÜ Pedagogicum, 2019). University expectations may also depend on how the school practice is organised and how particular the roles of school mentor are in conducting the school practice. If the students' school practice is carried out at the same time as their studies and during the whole period of their studies, then contacts with school mentors are frequent and their responsibility in the process of shaping student teachers is rather substantial (Eurydice, 2012). School mentors may not understand exactly how they should support students during school practice (Van Velzen & Volman, 2009) and they tend to set aside supervising of students (Clarke et al., 2014).

2. Objectives

Little is known about the teaching goals of teachers, who perform two roles: first, teach pupils, and second, supervise and set an example of teaching for future teachers during their school practice (Ambrosetti 2014; Sandvik et al. 2019). The purpose of the present study was to investigate Estonian school mentors' teaching and supervising goals when they teach pupils and supervise student teachers as well as to identify how teachers in the role of mentors understand university expectations. To achieve the objective, two research questions were asked.

RQ1: How do school mentors explain and clarify their teaching and supervising goals, established for supervising student teachers during in-school training?

RQ2: How do teachers perceive university expectations of them when they perform the role of school mentors?

3. Method

In the present research, a comprehensive identification of the dual role of school mentors was studied. In order to describe the teaching and supervision goals of school mentors and determine how they apply teaching practices and interpret them in the context of supervising student teachers, observations and stimulated recall interviews were used. The data collection process contained three stages: 1) school mentors' lessons were observed and recorded, 2) recorded situations were selected for stimulated recall interviews (SRIs), and 3) based on the teachers' video-recorded lessons stimulated recall interviews (SRIs) were conducted. Using an inductive approach, the coding process was elaborated, and sub-themes and themes were identified (Braun & Clarke, 2006).

3.1. Sample

Based on purposeful sampling, 16 teachers were selected from previous studies (Salo et al., 2015; Uibu et al., 2017). The choice of teachers was based on three criteria. First, they taught various subjects in grades 1 to 6. Second, they had supervision experience with future teachers (min = 1 year, max = 30 years). Third, they had participated in a one-year mentor training program for school mentors, organized by the universities. Teachers' average age was 47 years (min = 32, max = 63) and their teaching experience varied from 7 to 40 years.

3.2. Instruments

Observations. The authors compiled the observation sheet describing 18 teaching practices aimed at 18 pupils' cognitive and social development goals. The observation criteria included individual and collaborative practice according to pupils' cognitive and social development. All the practices that teachers used during the introduction, body and end of lessons were video recorded and noted in the checklist. Thereafter, two situations were chosen, one of them contained practices supporting pupils' cognitive development, the other included example of social development (Lyle, 2003).

Stimulated recall interview (SRI). The SRI was compiled based on the teachers' video-recorded lessons and focused on stimulating class situations. Topics for the interview were chosen according to the results of earlier studies and the aims of the present study. The interview consisted of 12 questions covering topics related to the teachers' goals in teaching pupils, supervising student teachers and university expectations. Teachers were encouraged to explain their teaching practices in relation to supervising student teachers (*How could this practice be useful to pupils?*) and perceptions about

university expectations (*What do you think the university expects of you as a supervisor?*). Thematic analysis was implemented to examine the teachers' teaching and supervising goals. To ensure trustworthiness of the study double-coding was used and inter-coder reliability coefficient Cohen's kappa was calculated for the topics of supervising practices (k ranged from 0.74 to 1.00).

4. Discussion

Thematic analysis indicated that teachers have difficulty establishing goals for themselves as teachers and mentors. The goals that teachers set on supervision depend on several factors. They might arise partly from the teachers' understanding of what universities expect from them as mentors (Uusimäki, 2013). If mentors have not been adequately trained and supported, they determine supervision goals according to their understandings and skills, and this may lead to results that do not satisfy future teachers (Butler & Cuenca, 2012). Nevertheless, teachers considered most important the setting of the pattern of carrying out lessons by using teaching practices and communicating with pupils. It was assumed that students can get acquainted with the best practices in lessons given by school mentor who have good teaching skills. School mentors reported it important to support future teachers during teaching as, student teachers should have the chance to show during the school practice that they are able to make teaching-related decisions and take responsibility. Mentors also aimed to observe how students cope with planning and carrying out the teaching process and giving advice to students. However, evaluation of student teachers' actions, were somewhat put aside because school mentors felt uncertain in these areas. They thought that giving negative feedback was necessary, but they were afraid that their criticism would influence the students' future teaching practices. When setting goals for their supervision, school mentors wanted to ensure that student teachers learned how and what to teach during their school practice.

Our study showed that in Estonia, similar to other countries (Jenset et al., 2018), one of the problems with supervising future teachers is that school mentors do not explain to students how they should analyse pupils' development. Due to the fact that teachers think that it is their responsibility to monitor the professional development of future teachers (Ambrosetti, 2014), they focus on how the students perform in lessons (Hall et al., 2008). Although, student teachers are interested in the application of different teaching practices which will improve their teaching skills (Cohen et al., 2013), school mentors focus on practical advice when giving feedback to student teachers. The reason might be that mentors are not in command of the theoretical educational terminology (Van Velzen, 2013). Also, school mentors fail to explain to student teachers how pupils learn during the learning process. The analysis of lessons carried out together with student teachers helped them to give meaning to their actions. The same tendency was also referred by White and her colleagues (2015).

Answering to the second research question, how do teachers perceive university expectations of them when they perform the role of school mentors, has indicated that school mentors did not know exactly what universities expect from them. The first reason why they were unsure about the university expectations might be limited cooperation with the universities. In concordance with previous studies (Hodgson, 2014; Van Velzen et al., 2012), the mentors referred to a lack of time as a factor that hinders cooperation between schools and universities. Another reason might be a lack of clearly formulated requirements for supervisors. Although mentors were unsure about university expectations, they figured that universities expect them to help students to connect their theoretical knowledge with the practical experience of teaching. Based on previous research the one other reason might be that universities do not pay enough attention to identifying the training needs of teachers who supervise students during their school practice (Ambrosetti, 2014; Young & MacPhail, 2014). In their study, O'Dwyer and Atli (2015) highlighted that teachers need more support than just passing a training programme, because many questions emerge during the real process of supervision.

5. Conclusions

School mentors have many responsibilities; for example, guiding student teachers in planning and carrying out lessons, setting the pattern of teaching in model lessons and giving feedback on the students' performance (Clarke et al., 2014; Cohen et al., 2013). The results demonstrated that Estonian school mentors have the challenge of combining two responsibilities: how to maintain balance between their teaching and supervising. Mentors' main goal in example lessons for student teachers was to establish good teaching experience. However, when setting an example for student teachers, teachers should pay more attention to teaching practices that support the comprehensive development of pupils. School mentors admitted that supervising student teachers is a bidirectional process which, in addition to the development of students, improves the teachers' knowledge about teaching.

It also appeared that mentors did not perceive clearly what universities expected from them as supervisors and, therefore, relied rather on their personal perception and experience than a clear knowledge of their supervision goals. Teachers perceive university expectations better, and feel more confident when supervising students, if universities have involved them in the research and development of teacher education. Thus, school mentors need more support from the universities during the students' school practice. The universities should clearly express their expectations to teachers who supervise student teachers and provide them with back-up materials.

References

- Ambrosetti, A. (2014). Are You Ready to be a Mentor? Preparing Teachers for Mentoring Pre-Service Teachers. *Australian Journal of Teacher Education*, 39(6), 30–42.
- Butler, B. M., & Cuenca, A. (2012). Conceptualizing the Roles of Mentor Teachers in Student Teaching. *Action in Teacher Education*, 34(4), 296–308.
- Cheng, M. M., Cheng, A. Y., & Tang, S. Y. (2010). Closing the Gap between the Theory and Practice of Teaching: Implications for Teacher Education Programmes in Hong Kong. *Journal of Education for Teaching*, 36(1), 91–104.
- Clarke, A., Triggs, V., & Nielsen, W. (2014). Cooperating Teacher Participation in Teacher Education: A Review of the Literature. *Review of Educational Research*, 84(2), 163–202.
- Cohen, E., Hoz, R., & Kaplan, H. (2013). The Practicum in Preservice Teacher Education: A Review of Empirical Studies. *Teaching Education*, 24(4), 345–380.
- Deemer, S. (2004). Classroom Goal Orientation in High School Classrooms: Revealing Links between Teacher's Beliefs and Classroom Environments. *Educational Research*, 46(1), 73–90.
- Eurydice. (2012). *The European Higher Education Area in 2012: Bologna process implementation report*. Brussels, Education, Audiovisual and Culture Executive Agency.
- Grossman, P., Hammerness, K., & McDonald, M. (2009). Redefining teaching, re-imagining teacher education. *Teachers and Teaching: theory and practice*, 15(2), 273–289.
- Hall, K. M., Draper, R. J., Smith, L. K., & Bullough, R. V. (2008). More Than a Place to Teach: Exploring the Perceptions of the Roles and Responsibilities of Mentor Teachers. *Mentoring & Tutoring: Partnership in Learning*, 16(3), 328–345.
- Hodgson, J. (2014). Surveying the Wreckage: The Professional Response to Changes in Initial Teacher Training in the UK. *English in Education*, 48(1), 7–25.
- Jaspers, W. M., Meijer, P. C., Prins, F., & Wubbels, T. (2014). Mentor Teachers: Their Perceived Possibilities and Challenges as Mentor and Teacher. *Teaching and Teacher Education*, 44, 106–116.
- Jenset, I. S., Klette, K., & Hammerness, K. (2018). Grounding Teacher Education in Practice around the World: An Examination of Teacher Education Coursework in Teacher Education Programs in Finland, Norway, and the United States. *Journal of Teacher Education*, 69(2), 184–197.
- Kuzborska, I. (2011). Links between Teachers' Beliefs and Practices and Research on Reading. *Reading in a Foreign Language*, 23(1), 102–128.
- Langdon, F. J. (2017). Learning to Mentor: Unravelling Routine Practice to Develop Adaptive Mentoring Expertise. *Teacher Development*, 21(4), 528–546. doi:10.1080/13664530.2016.1267036.
- Lyle, J. (2003). Stimulated Recall: A Report on Its Use in Naturalistic Research. *British Educational Research Journal*, 29(6), 861–878.
- Mansfield, C. F., & Beltman, S. (2014). Teacher Motivation from a Goal Content Perspective: Beginning Teachers' Goals for Teaching. *International Journal of Educational Research*, 65, 54–64.
- Ng, S., & Chan, E. (2012). School–University Partnership: Challenges and Visions in the New Decade. *Global Studies of Childhood*, 2(1), 38–56. doi:10.2304/gsch.2012.2.1.38.
- Salo, A., Uibu, K., Ugaste, A., & Rasku-Puttonen, H. (2015). Student-Teachers' And School-Based Teacher Educators' Beliefs About Teaching Practices and Instructional Goals. *Procedia-Social and Behavioral Sciences*, 191, 2203–2212.
- Sandvik, L., Solhaug, V., T., Lejonberg, E., Elstad, E., & K. A. Christophersen, K. A. (2019). Predictions of School Mentors' Effort in Teacher Education Programmes. *European Journal of Teacher Education*, 42(5), 574–590. doi:10.1080/02619768.2019.1652902.
- TÜ Pedagogicum. (2019). Tartu Ülikooli pedagoogilise praktika üldjuhend. [General Guides to Pedagogical Practice; in Estonian]. Retrieved from <https://www.pedagogicum.ut.ee/et/opetajakoolitus/leping-juhend-praktikaasutuste>

- Uibu, K., Salo, A., Ugaste, A., & Rasku-Puttonen, H. (2017). Beliefs about Teaching held by Student Teachers and School-Based Teacher Educators. *Teaching and Teacher Education*, *63*, 396–404.
- Uusimäki, L. (2013). Empowering Pre-Service Teacher Supervisors' Perspectives: A Relational-Cultural Approach Towards Mentoring. *Australian Journal of Teacher Education*, *38*(7), 42–58.
- Van Velzen, C., & Volman, M. (2009). The Activities of a School-Based Teacher Educator: A Theoretical and Empirical Exploration. *European Journal of Teacher Education*, *32*(4), 345–67.
- Van Velzen, C. (2013). *Guiding Learning Teaching. Towards a Pedagogy of Work-based Teacher Education*. Amsterdam: VU University.
- Vaughn, M. (2014). Aligning Visions: Striking a Balance between Personal Convictions for Teaching and Instructional Goals. *The Educational Forum*, *78*(3), 305–313.
- White, E., Dickerson, C., & Weston, K. (2015). Developing an Appreciation of What It Means to be a School-based Teacher Educator. *European Journal of Teacher Education*, *38*(4), 445–459.
- White, E. (2014). Being a Teacher and a Teacher Educator – Developing a New Identity? *Professional Development in Education*, *40*(3), 436–449. doi:10.1080/19415257.2013.782062.
- Young, A. M., & MacPhail, A. (2015). 'Standing on the Periphery' Cooperating Teachers' Perceptions and Responses to the Role of Supervision. *European Physical Education Review*, *21*(2), 222–237.

“I FEEL LIKE ANOTHER I HAS GROWN”: BIOGRAPHICAL LEGACY OF THE COMMUNITY-ENGAGED LEARNING IN HIGHER EDUCATION

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Abstract

Anchored in a qualitative approach, yet informed by the constructivist theoretical perspective, this paper addresses a research issue related to the transformative potential and biographical legacy and impact of community-engaged learning model (service-learning) on twelve students who participated in the *Gender, Sexuality, Identities - From Oppression to Equality* course. This course is the first such in Croatian universities that, integrating the community-engaged learning model, covered the thematic areas of human rights, gender equality, gender-based violence and gender theory. For students who participated in this research, all of it represents the first such educational experience - so far they have not been exposed to the mentioned contents, they have not participated in a course of such specific didactic and methodological features, they have never collaborated with civil society organisations, they have never written reflective diaries, nor were they previously engaged in tasks similar to those that awaited them in this course. This paper therefore intends to contribute to the current academic debate on the positive outcomes of community-engaged learning for students in the context of its transformative potential viewed from the perspective of contributing to changes in student biographies. In addition, the paper seeks to answer the (research) question of whether the narratives of students who participated in such a course for the first time are narratives of disappointment or empowerment, continuity or change, and whether they have developed a tendency to modify (their) habitus? The main identified dimensions of the students' experienced change are classified through new knowledge or competencies, educational and professional paths, intentions of further (civic) engagement and personal development. Drawing on Turner's concept of "liminality" (1969), Bourdieu's habitus (1977, 1984) and Mezirow's Theory of transformative learning (1981), students' participation in the course with full integration of community-engaged learning model is interpreted in this paper as a liminal phenomenon of the otherwise traditional (higher education) teaching and learning field, which led to the modification of students' habitus, while indicating their empowerment and propensity for further socially responsible and active contribution within their communities.

Keywords: *Community-engaged learning, service-learning, transformative teaching & learning, liminal experience, habitus modification.*

1. Introduction

On the basis of a qualitative research approach and within the framework of participatory research, this paper presents research findings regarding an educational intervention carried out in the form of a (new) elective course at a higher education institution. It stands out by its complete integration of the community-engaged learning model, which still represents an innovation in the national higher education space. Community-engaged model of teaching and learning (also known as service-learning) has been systematically researched for decades so there is a plethora of studies that point to its transformative potential in different contexts of (academic, personal and professional) growth and development of students, and its positive developmental impact on student biographies. A higher education teaching process that integrates a community-engaged learning model is organised in such a way, according to Ćulum and Ledić (2010), that it encourages purposeful and active participation of students in activities carefully designed in collaboration with representatives of organisations and institutions in the local community. In addition to encouraging the adoption of course content-related learning outcomes, the model also affects the development (of a wider range) of knowledge and skills of students, contributing to their deeper understanding of the needs and problems of the community and to more active civic engagement in the community. Numerous authors, as Furco (2011) points out, describe

this model as a balanced approach to experiential student education that has the potential of contributing to active citizenship education. Through a review of a series of research Brown (2011) concludes that unlike the traditional approach, community-engaged learning is far more successful in encouraging civic responsibility and active citizenship of the younger generations. There is a broad consensus in the literature today that the experience of participating in a teaching process that integrates community-engaged learning is associated with later civic participation (Billig, 2000; Hart et al., 2007).

Drawing on previous research, this paper seeks to address the research question related to the biographical impact of community-engaged learning models on students taking the course *Gender, Sexuality, Identities - from Oppression to Equality*, for whom participation in this course was the first such experience in their educational paths. The course and complementary mentoring programmes were co-created and implemented in partnership between Faculty's Centre for Women's Studies and civil society organizations from the local community - Lesbian Organization Rijeka "LORI", Human Rights and Civic Participation Association "PaRiter", and SOS Rijeka - Centre for Nonviolence and Human Rights.¹ This paper intends to contribute to the current academic debate on the positive outcomes of community-engaged learning for students in the context of its transformative potential viewed from the perspective of contributing to changes in student biographies. In addition, the paper seeks to answer the research question of whether the narratives of students are narratives of disappointment or empowerment, continuity or change, and whether they have developed a tendency to modify (their) habitus? Relying on Turner's concept of "liminality" (1969), Bourdieu's theoretical concept of "habitus" (1977, 1984) and Mezirow's theory of transformative learning (1981), student participation in the course with full integration of community-engaged learning models is interpreted as a liminal phenomenon of the otherwise traditional (higher education) teaching field, which has led to the modification of the habitus of students and indicates their empowerment and propensity for further socially responsible and active participation in the community.

2. Theoretical design: Liminality, habitus and the transformative learning theory

Turner (1969) describes liminality as a phase that has few or no characteristics of the previous or the next phase and in which an individual or group has ambiguous characteristics. It is the state of 'in-between', the state of interspace in which one passes from one experience to another. In this liminal 'space and time', individuals are deprived of their usual identity while on the verge of personal (or social) transformation. This liminal situation for Turner is characterised by freedom, egalitarianism, informal togetherness and creativity. Liminality can be observed in individuals, groups, or society as a whole. As this paper is oriented to the level of individuals, i.e. students attending the course, liminality is observed and interpreted in it precisely from this point of view. An innovative course that fully integrates the community-engaged learning model is viewed as a liminal phase, i.e. as that (educational, innovative, creative, interdisciplinary) interspace into which students have moved from previous experiences of attending (dominantly) traditional teaching in a chosen disciplinary field.

Bourdieu (1989) describes habitus as a set of symbolically structured, historically inherited, enduring, and transferable dispositions adopted during socialisation that guide individual action, perception, and interpretation of the world, and that turns the individual, through customary norms, to institutional rules. For him, habitus is the mental structure through which the social world is observed, i.e. the unconscious and internalised 'map' of the path to action with coded beliefs, social class and action strategies, which becomes a *modus operandi* for action, which the individual continuously regulates and (re) defines. Nevertheless, the 'life' of students is shaped in predominantly traditional educational fields and therefore has a tendency of (continuous) empowerment of traditional patterns, rather than change (Ćulum and Doolan, 2015). However, Fanuko (2008) recalls that habitus is not *fatum* - it is permanent, but not eternal. This is an open system of dispositions that is constantly subject to the influence of (new) experiences, thus reproducing its structure, as well as modifying it. Accordingly, habitus change is possible.

Mezirow's transformative learning theory (1981) seems to be a "fertile" platform for observing such inclinations. Mezirow (1981) understands learning as the process of using a previous interpretation to construct a new or revised interpretation of one's experience in order to direct future action. Mezirow (2009) describes transformative learning as transforming problematic frameworks of reference to make them more inclusive, less discriminatory, more reflective, more open, and more emotionally capable of change. In an institutional educational context, usually three situations that follow one another, says Mezirow (2009), can lead to transformative learning - experience, critical thinking, and reflection on lived experience accompanied by a substantiated discussion.

¹Authors have the consent of all the above collaborators to publish their data.

3. Methodology

The focus of this paper is the experiences of twelve students attending a course based on the full integration of the community-engaged learning model, and the meanings they give it in the context of transformative potential (of the new) learning experience and, consequently, its biographical legacy framed as modifications of their own *habitus*. Although heterogeneous in their disciplinary areas, the students participating in this research are connected by two realities - (I) participation in this course was the first such (teaching, educational, didactic-methodological) experience for all of them, and (II) they have not yet been exposed to the content brought before them by the course.

The process of collecting data through a focus group, structured interviews and creative qualitative research procedures (example of writing a 'farewell letter' to their mentors in collaborating organisations) took place during February and March 2020. The focus group represented a central data collection process, and its protocol was focused on issues related to various aspects of students' experience (motivation, satisfaction with content and didactic-methodological determinants, acquired knowledge, (value) position in relation to new knowledge, cognitive and emotional experience, attitudes, reflection on oneself before and after the course, future plans, challenges, etc.). Structured interviews and qualitative creative research techniques were the complementary methods used, and the technique of writing 'farewell letters' enabled researchers insights into deeper spheres of students' experience. Mason (2006, according to Richards and Morse, 2013) states that creatively combining different methods can make it easier for researchers to think "beyond boundaries and frameworks" and generate new ways of researching and understanding one's reality. The issue of research ethics was answered from the aspect of the approach to participants, (written and audio) informed consent and accountability towards the participants. All collected data were transcribed, and the Dedoose software for qualitative data processing was used for their analysis. Coded data were subjected to a thematic analysis - a method adequate for the analysis of qualitative data and in particular the interpretation of their meanings (Schreier, 2012), and/or an analytical process focused on the inductive identification of recognizable patterns (Taylor and Bogdan, 1984).

4. Analysis and discussion: The New 'I' as an experienced change of course participation

The analysis unequivocally speaks in favour of a series of cognitive, emotional and value changes that students associate precisely with the experience of attending the course. The importance they attach to this experience is predominantly related to a number of different assignments they worked on, especially those of a reflective nature. Along with the acquisition of new knowledge and skills, those tasks enabled them to think critically about the current social problems related to the course topics, as well as themselves, their (dis)positions and the roles they have (or could/should have) in the context of addressing these same challenges and social problems in the community.

The students very openly shared impressions of their specific experiences as extremely significant, transformative, and in some cases emancipatory. For example, female students who were part of the PaRiter mentoring programme gained completely new insights into women's rights, especially labour and reproductive rights. Before taking this course, they were, in their own words, deeply convinced that in the modern social context women really enjoy great (labour) rights, but the research and analysis they studied while performing the tasks convinced them of a completely different reality, which they emphasise "*really stunned*" them. This course helped them to become more aware of this very moment of reality, which, as they ardently point out, made them especially angry because it shows them the denial and disrespect of their personal goals. Their (new) conscious attitudes is best illustrated by the following statement:

"The course helped me to become aware of the reality, which means that tomorrow they will look at me on the market as a woman, and then as a potential pregnant woman and mother, while men are not seen that way, regardless of the fact that they have the right to go on parental leave - I was not aware of that at all, and that is simply a fact - regardless of whether you want a child or not, the market is simply programmed to see you as a woman as a future pregnant woman and mother, regardless of the fact that your wishes and plans may not head at all in that direction."

Students involved in the LORI mentoring programme pay special attention to the new, deeper and different personal frame of reference for considering the rights, challenges and difficulties of people in the LGBTIQ community. One student puts in this context a re-experienced situation in which she witnessed the 'coming out' moment of her gay friend. The course allowed to observe and analyse the challenges and difficulties of LGBTIQ people in a multifaceted framework, which resulted in the

transformation of one (intimate) moment from the category of funny to the category of significant and true gratitude, as best evidenced by her words:

"My friend's first coming out was precisely to me ... at the time I didn't even realize what big a deal this was for him because I knew he was gay anyway, I even found it a bit silly that he told me that, of course I knew... but this course helped me understand how important this really was for him, to say it out loud to someone he trusted... Only now do I really understand what he had to go through."

Students engaged in the SOS mentoring programme also denote this course with the significance of being transformative and emancipatory. They did not know (much) about the topic of gender-based violence before the course or, at least, as they say, *"we did not understand or experience it as a neighbourhood phenomenon."* Their engagement in the course immersed them deeply in the topic, but also in the vivid and painful experiences of women who were (and/or still are) victims of violence, and with whom they had the opportunity to talk. The strength of the personal change they experienced is best illustrated by their statements that they have become different, better and richer people:

"We learned a lot about gender-based violence. I was very intrigued by the topic and I want to continue to deal with it somehow... I'm very glad we had this experience because I feel like a much better and richer person."

The achieved transformative potential of this course is best reflected in the students' behavioural dimension and selected personal "battles", that they decided to wage with people - among their friends and/or in their family environment. The new insights gained in the course, but especially the personal experience of these insights, awakened in them a strong feeling that they themselves should work to eliminate stereotypes and prejudices of people from their environment. In that sense, the students spoke openly about their *"hard core anti-gay roommates," "fathers who have backward attitudes," "grandmothers who just don't understand at all."* Their personal efforts and endeavours, as they say, have borne fruit, so, for example, the mentioned roommates *"hang out with my gay friends today."* Another student cites an example from the family environment and describes how, in addition to (persistently) passing on the acquired knowledge and current research findings, she presented a set of arguments to her family members that influenced their understanding of the context and consequently their change of attitudes towards LGBTIQ couples of the community.

Post-course reflections on the new 'I' are also placed by students in the context of their further educational and career paths. Namely, there is a consensus among the students that they are *"very taken"* with all the topics. Not only do they therefore want to continue to deal with them and further educate themselves, but they also want to continue to work with their mentors. It is interesting to note that in the context of the desire for future activities on these topics, students seem to be most held and pushed by the anger that this course aroused in them, i.e. the insights into the realities of the topics they dealt with.

"The course made me angry, it made me very angry; I mean, the topics we dealt with made me angry; in fact people who don't act the way they should; I was angered by the younger generations who are turning out even more stupid and more backward than us... and in general the attitudes about gender roles that are only passed on to new generations of children and young people. That's why I think we have to do something more with this, I don't yet know what, but we have to do something because the situation is very worrisome."

The anger expressed through this quote is not hidden by the students at all and they are considering how it can further direct them and lead them towards shaping their own meaningful future professional activity. Some of them are thus considering expanding on the activities that were developed in this course and raising them to a new level. Some of them are thinking about how they could integrate these topics into their chosen profession, especially valuing the newly acquired knowledge and diverse skills - *"this course enabled me my first experience of preparing a radio show and I think it's great to take something like this with you into life."* Some see their role in educating future youth generations, given that *"children and young people today are poorly educated about these topics, which is why we think it's really necessary to work on this and that these are ways we can influence future generations and society."* For some, this course, and especially the experience of reflection, stimulated thinking about their own future and the desired further professional orientation. Regardless of the mentioned (contextual) differences, it is certain that the course, in their own words *"got them very worked up"* and that everyone is seriously thinking about how to lead these new 'I's to the new professional challenges:

“This course helped me a lot, my knowledge on these topics was nothing; in addition to giving me such a corpus of new knowledge, it helped me to apply that same newly acquired knowledge further in my life and understand that I am an individual who now has that knowledge and that I should act accordingly... maybe to transfer that knowledge to someone else... and to change things for the better...”

5. Conclusions

The biographical impact of community-engaged learning model on students is analysed in order to contribute to understanding its transformative potential in the context of modifying the habitus of the students. As a transgressive ‘interspace’, in an otherwise traditional higher education teaching field (at least in the national setting), the course students attended ends up being surprisingly fruitful for a spectrum of personal change covering new knowledge, skills, values, attitudes, personal development, or simply put, ‘new students’, ready for socially responsible and active engagement in the community. Students’ ‘post-teaching’ habitus was clearly transformed in such a designed course which represented a liminal educational-activist experience - “I feel completely different after this course”. Relying on Crossley’s argument (2003) that activism implies a constant attempt to change our usual ways of existing in the world and its interpretation, it can be concluded that this ‘new’ student habitus, to which they testify in unison, is characterised by a propensity for activism and a strong need for personal contribution to (positive) social changes. In this context, the biographical impact of this (higher education) teaching experience reveals narratives of students’ empowerment and personal change.

How much of a biographical impact this experience has left on the students who have taken this course is best illustrated by one of students’ statements - *I feel like another I has grown.*”

References

- Billig, S. (2000). Research on K-12 school-based service-learning: The evidence builds, School K-12, Paper 3, *Phi Delta Kappan*, 81(9), 658–664, Omaha: University of Nebraska.
- Bourdieu, P. (1984). *Distinction: A Social Critique of the Judgement of Taste*. London: Routledge.
- Bourdieu, P. (1977). *Outline of a Theory of Practice*. Cambridge: CUP.
- Brown, J. (2011). Citizens fit for the 21st century? The role of school design in facilitating citizenship and self-governance in young people. *Education, Citizenship and Social Justice* 7(1), 19–31.
- Ćulum, B., Doolan, K. (2015). ‘A truly transformative experience’: the biographical legacy of student protest participation. In: Klemen i , M., Bergan, S., Primoži , R. (Eds.), *Student Engagement in Europe: Society, Higher Education and Student Governance* (99-113). Strasbourg: Council of Europe Higher Education Series.
- Ćulum, B., Ledić, J. (2010). U nje zalaganjem u zajednici - integracija visokoškolske nastave i zajednice u procesu obrazovanja društveno odgovornih i aktivnih građana. *Revija za socijalnu politiku*, 17(1), 71-88.
- Fanuko, N. (2008). Kulturni kapital i simbo a moć: tri aspekta Bourdieuove teorije ideologije. *Školski vjesnik*, 57, 1-2, 7-41.
- Furco, A. (2011). *Service-Learning: A Balanced Approach to Experiential Education. Expanding Boundaries: Service and Learning*. Washington DC: Corporation for National Service.
- Hart, D., Donnelly, T., Youniss, J. (2007). High school community service as a predictor of adult voting and volunteering. *American Educational Research Journal*, 44(1), 197–219.
- Mezirow, J. (2009). Transformative learning theory. In: J. Mezirow and E. W. Taylor (Eds.), *Transformative Learning in Practice: Insights from Community, Workplace, and Higher Education*, 18-33, San Francisco, CA: Jossey-Bass.
- Mezirow, J. (1981). A critical theory of adult learning and education. *Adult Education Quarterly*, 32(1), 3-24.
- Richards, L., Morse, J. M. (2013). *Readme first for a user’s guide to qualitative methods* (3rd ed.). Thousand Oaks, CA: Sage.
- Taylor, S., Bogdan, R. (1984). *Introduction to Qualitative Research Methods: The Search for Meanings*. New Jersey: Wiley Publishers
- Turner, V. (1969). *The Ritual Process: Structure and Anti-Structure*. New York: Aldine.

THE LOST ART OF LISTENING

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Abstract

One of the functions of education is the transmission of culture from generation to generation. (Taba, 1962). Yet it is questionable whether music educators are fulfilling this mission... Listeners at concerts of classical music (whether of Western or other traditions) are dwindling and the crowd that frequents the concert halls is mostly older. It seems that educational policy does not invest enough to preserve the gifts of previous generations. In many schools, teachers prefer to please their students by focusing on music that the students listen to (with great enjoyment and expertise without any need for guidance from their teachers) rather than challenging them to become acquainted with musical worlds that are not closed to them and thus complex, classical music is pushed to the margins. Yes, the ones who composed this music were mostly men, mostly white and are mostly dead. However, these unfortunate facts do not negate the fact that the music they created is a gift.

In this paper/presentation we will argue that what prevents teachers from introducing their pupils to this music is not political correctness but rather the absence of teaching methods that make listening to unfamiliar music challenging, engaging and fun. This introduce pedagogies for teaching classical music in primary schools and preschool. The rationale behind the methods will be discussed while looking at the applications in teaching complex music among elementary and preschool children.

One of the innovative methods for teaching is the "Musical Mirror Method" which was developed by Veronika Cohen (Cohen, 1997). This method is a tool for teaching music listening using simple movements. Based on the principle that movement gestures are the source of musical gestures, the movements project into space, make visible the underlying source of the musical events. The children observe, and join in the movements of the mirror which to evoke an intuitive and spontaneous understanding of the music. As children develop their own musical mirrors, they learn to reflect deeply about their own musical experience, their hearing of the particular piece. Alternatively, graphic representations are presented to the children and later developed by them. Children play, sing compose in these lessons – all develop familiarity with great music and some feel a deep connection which can enrich their lives. They learn how to construct music out of sound.

Keywords: Musical mirrors, involve musical listening, constructivism, musical cognition, emotion.

1. Introduction

Educational policy in the Western world does not appear to invest enough effort in preserving the arts. Arts education in schools is often relegated to outside the core curriculum (Dewey, 1919; Dewey, 1934; Heilig & Cole & Aguilar, 2010; Jorgensen, 2003; Katona, 2016), Even though one of the functions of education should be the transmission of culture from generation to generation. (Taba, 1962). Schools most often fail to fulfill this obligation in general, and very often in the case of transmission of musical culture. School music teachers prefer to teach other styles so that Western classical music is pushed to the margins. The music taught in schools is increasingly focused on teaching popular music, folk music, rock, etc. It seems that educational policy does not invest enough in preserving the gifts of previous generations. In many schools, teachers prefer to please their students by focusing on music that the students listen to (with great enjoyment and expertise without any need for guidance from their teachers) rather than challenging them to become acquainted with musical worlds that are closed to them. Thus complex, classical music of most cultures is pushed to the margins.

From a survey conducted in four countries (England, Germany, USA [in the state of North Carolina], and Finland) it was found that only in one place surveyed (North Carolina) was general music taught in elementary schools by music specialists. It is likely that general teachers who are not musicians do not have the ability to teach complex music and use methods for teaching music that require above-average musical skill. (Shvadron, 2019).

We believe that the main reason why children are not exposed to classical music is the lack of appropriate, profound, interesting, and creative teaching methods and learning strategies. This study will present the impact of the concert program "Touch the Music" which exposes preschool and elementary school children to classical music using a variety of active listening techniques, including "Musical Mirrors" a method developed by Veronika Cohen (1997). In this article we examine the impact of the "Touch the Music" concert program on music teachers who participated in the program and re-examined this impact ten year later.

1.1. Pedagogic approach

The goal of music education is to enable students to derive meaning from a musical experience, and to use music as a means of self-expression. Wiggins (2001) explains that in order to learn, one needs opportunities to construct personal understanding. In schools where the principles of constructivism are applied, students' original ideas are valued along with those of their teachers. Students are encouraged to be independent thinkers and decision makers who develop ideas and discuss them collaboratively. The social context of learning rests on ideas conceived by Vygotsky (1978). In the "Social Constructivist Theory" Vygotsky explains that everything we learn is absorbed first at the inter-psychological level and then at the intra-psychological level. Each student's unique awareness requires the lesson to be designed so that each student can participate on a different level of expertise, within the same experience (Wiggins, 2001). Moreover, since we perceive everything we do through the lens of our previous experience, we are, in essence, a summary of our previous experiences. Musical concepts should be taught in the context of a specific musical piece in which they appear (Wiggins, 2001). Studies show that when children listen to a musical work, they perceive the music as a whole and not as a collection of separate sounds. Thus, the teacher must not only engage in musical activities in a holistic approach that perceives the music in its entirety and addresses all of its components, without breaking it down into components, but must do so according to the child's level of development (Cohen, 1980).

1.2. Musical mirrors

Cohen created an approach, that she calls "Musical Mirrors", for learning music, through movement that allows a holistic perception and response, A musical mirror is the movement analog of the cognitive and emotional process of the listener. Mirror movements express an analysis of all the important aspects of a musical piece and reflect the organizing action of the listener (Cohen, 1997). The musical piece is presented to the learner as a gestalt and he/she intuitively captures its details from the movements. Next, the teacher asks questions that raise awareness of what the student has intuitively understood. At the end of the process the student is invited to present his/ her creative response through a dance, a graph, his/her own mirror, or a piece of music that he or she composed, each of these based on the musical ideas the student has learned to recognize in the piece.

1.3. Concert programs

Various scholars review live concerts for school children, but only a minority describe significant preparation for them. Brand (2000) writes "concerts of live music in various ensembles are perceived as part of music education around the world, and are considered as an effective way to develop musical appreciation, musical perception and appropriate behavior" (Brand, p. 2). Wasiac (2005) recommends deepening and exploring the educational effectiveness of children's concerts, as well as comparing different teaching methods. He also recommends close collaboration between music educators, musicians, and researchers - to maximize the educational value of children's concerts. The study presented below on "Touch the Music" program exemplifies such collaboration. The following explanation appears in Cohen (2004, p. 47-48):

Music educators should prepare the children for the musical encounter they will experience at concerts provided for them. The children should prepare for this active (mentally active) musical encounter with the same intensity and clarity of purpose with which they prepare for other musical events such as a school concert where they themselves perform. The principal of one of the schools where such an active partnership exists summarized the value of the project as follows: "The lessons give meaning to the concerts, the concert in turn give direction and meaning to the music curriculum."

The role of preparing the children for the concert is entrusted to the music teachers, while the selection of the repertoire and the preparation of the teachers are the responsibility of the academic team from the Jerusalem Academy of Music and Dance.

The program itself includes 1) Selecting a rich and varied repertoire; 2) Creating experiential pedagogic methods in accordance with the educational theories reviewed above; 3) Workshops with music teachers, including presentation of activities/lesson plans, and exchange of ideas between teachers;

4) Classroom implementation of “Touch the Music” at schools and kindergartens; 5) Presentation of pieces studied, in live concerts performed by professional musicians.

2. Procedure

The research reported here has two parts- a mixed method study conducted in 2011-2012 (Shmuelof, 2012) and a quantitative study conducted in 2022. In the first part, teachers from Jerusalem and the northern district of Israel were interviewed. These teachers participated in “Touch the Music” Program for several years. In-depth interviews were conducted with 12 teachers. In addition to interviews, written evaluations and personal reactions by teachers who participated in the program were examined. The interviews were analyzed for common themes regarding teacher satisfaction with the program, perceived success, suggestions for improvement, etc. Following the interviews, the principles that distinguish the plan became clearer, what’s in it that contributes to the teachers’ satisfaction as well as questions about how best to conduct future workshops. Following the analysis of the interviews a questionnaire was sent to other teachers who participated in the program in order to gain as full a picture as possible. The questionnaire was responded to, anonymously, by 30 teachers, who were asked specifically about the effect of the program on their teaching and also to answer two open questions.

Since the programs in Jerusalem has been ongoing for over 30 years and in the North for 18 years, we felt there was a need to re examine how teachers evaluate its effectiveness and its impact on their teaching today. For this purpose, questionnaires were distributed through digital platforms using WhatsApp teachers’ groups in the northern part of Israel and Jerusalem. The questionnaire had 5 items. The questionnaire data were transferred to an excel program.

3. Objectives

The quantitative study conducted 10 years ago presented a very favorable picture regarding the main questions we wanted to examine in this study: does the program encourage and support teachers in making the teaching of classical music an integral part of their teaching? Does the format of written materials, workshops, and live concerts prepare and support teachers so that they feel comfortable teaching complex music which expands their pupils’ musical horizon?

In the follow-up study this year we wanted to examine the effect of the concert program “Touch the Music” on teachers, 10 years later. Do teachers still feel confident in including listening to classical music in their teaching because of the program?

4. Findings

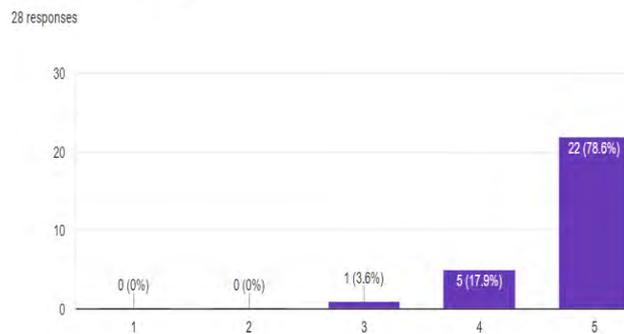
The original research revealed that participating in the program of “Touch the Music” put listening to complex artistic music at the center of the music lesson and improved the professional self-esteem of the teachers. In the words of one teacher: “Professionally, [participating in the program] upgraded me as a teacher, in active listening to classical pieces. It upgraded the lessons - brought interest and something new”.

What are the experiences that teachers underwent in the workshops that led them to feel that they “upgraded the lessons”? The interviews revealed two significant aspects that contributed to upgrading the lessons. One is procedural and the other relates to pedagogical approach. From the procedural aspect, defined goals and clear stages in the teaching/learning process gave teachers a sense of direction and purpose. A teacher explained: “When you have something organized - Step-by-step, you know what you are going to do, it gives you confidence and a better feeling – that I am more significant – I know where I’m leading my students.” The second relates to the inclusion of activities which were experiential and creative. As another teacher explained: “Most significant the children in my class had personal connection to the music. Before [participating in the program] I taught in frontal manner, I gave very little room for the experiential way to be manifested. The program gave place to the child – the creative and the experiential part of the child”. This teacher recognized that teaching while using the methods she learned in the workshops involved her students in the music lesson and the pieces she introduced to them.

Results from the recent research: Most of the participants had over 8 years of experience in music teaching, but there were quite a few novice teachers as well.

1. 100% of teachers indicated that the program had a positive impact on their teaching.
2. In response to the question about how confident the teacher feels about teaching classical music in your lessons 78.6% agreed strongly with the statement: *“I feel confident in including listening to classical music in my teaching, because of the suggestion of activities presented in the workshop/ booklet of the program”* (See Figure 1 below).

Figure 1.

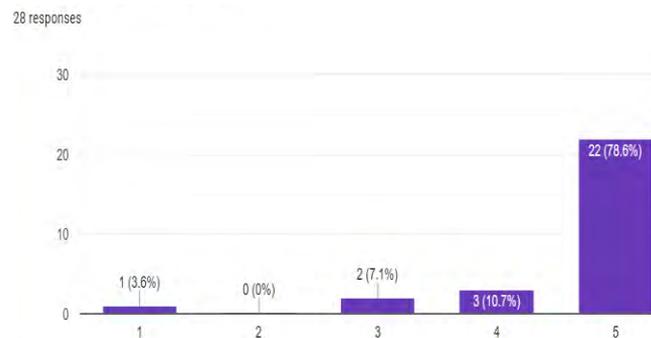


3. 74% of the respondents agreed strongly with the statement. *“Teaching with Musical Mirrors makes me feel that I teach music in a meaningful and deep way”.*

4. 89% agreed strongly with the statement *“Musical Mirrors enable children to be active listeners”.*

5. 78.6% agreed strongly with the statement *“Learning musical mirrors/ graphs brings me personally also closer to music I did not know/ like previously.”* (See Figure 2 below)

Figure 2.



5. Discussion

We found that teachers who participated in the "Touch the Music" concert program experienced improvement in their professional abilities to engage their pupils in in-depth listening experiences with complex music and in their students' attitude to the music lessons. In terms of the importance of workshops (in addition to written materials), the findings confirm that the learning process is a social act. A teacher explained: "There is a great importance in mutual learning, sharing, and creating experienced in the workshops by all the teachers who teach the program". In the program's workshops the atmosphere of enthusiasm affects the attitudes of the teachers who may find learning new pieces and new teaching methods difficult. In addition to sharing ideas with each other, participants become convinced that it is possible, fun, and worthwhile to teach complex music.

What is the role and importance of the live concert at the end of the program? This is where the need for a 'visible goal' arises in a program focused on musical listening. "For ... learning to be meaningful to young children, they need a 'visible goal'. A visible goal defines the path - the learning process, and gives meaning to lessons" (Rusinek, 2008). And indeed one of the teachers explained: "When there is preparation of the children for something, and they are waiting for it, it creates a fertile and fun learning atmosphere. Not only do children need a 'visible goal', so do teachers". The concert itself is the goal towards which the learning is oriented.

One of the teachers said that the concerts created a time frame and commitment for the entire curriculum, including the more challenging pieces. The very fact that the piece would be performed at the concert did not allow her to give up on herself and the children: "Before that if something did not work in a certain class, I would give up. Here I must look for and find something that will work". Another teacher, one whose school no longer participates in the program recounted how without the commitment to concerts she stopped teaching listening lessons: "... so without the program I unfortunately do not really

get to teach classical pieces". This finding underscores the importance of the concert program for preserving the "classical" artistic content of music lessons.

The concert is an opportunity for the teacher to exhibit the success of her work in the classroom. Through the observed engagement of the children with the music supervisors and organizers of the program can gauge the quality of the work done in the classroom and provide teachers with feedback and appreciation.

6. Conclusions

In a field where innovations come and go with great frequency this program has lasted for over three decades. Our research has revealed that the concert program and the "Mirror Method" are effective over time, the responses to our recent questionnaire were as positive as the responses of teachers ten years ago and meet a genuine need.

Our research shows that participation in such a program is essential for teachers. It refreshes and strengthens their sense of professionalism and their confidence in teaching complex classical works in an experiential way. It is important to constantly keep an open channel of communication between the organizers of the program and participating teachers and allow a place and time for exchanging ideas and experiences from the field. As we saw from both the in-depth study ten years ago and the recent study- the teaching of complex music is a worthy challenge that can be met with a program that is sensitive to both children and teachers' needs.

References

- Brand M. (2000). Music teachers' role in preparing students for live symphonic experiences. *Research studies in Music Education*, (15), 24-30.
- Cohen, V. (1997). Explorations of Kinesthetic Analogues for Musical Schemes. *Bulletin of the Council for Research in Music Education*, 131, (Winter 1997), 1-13.
- Cohen, V. (1980). The emergence of musical gestures in kindergarten children. (Unpublished Ph.D Dissertation). University of Illinois Urbana- Champaign, IL.
- Cohen V. (2004). Western Art Music: An Endangered Species?" in *Music Education Entering the 21st Century*, ISME, (Ed), Shand, P.M. <https://www.isme.org/sites/default/files/documents/proceedings/20002002%2BMISTEC%2BProceedings.pdf>.
- Dewey, J. (1919). Imagination and expression. *Teachers College Bulletin*, 10(10): 7–15.
- Dewey, J. (1934). *Art as experience*. New York: Penguin.
- Heilig, J.V& Cole, H. & Aguilar, A. (2010). From Dewey to no child left behind: The evaluation and devolution of public arts education. *Arts Education Policy Review*. 111: 136–145. <https://www.tandfonline.com/doi/full/10.1080/10632913.2010.490776>
- Jorgensen, E. R. (2003). Western classical music and general education. *Philosophy of Music Education Review*, 11(2), 130-140. https://www.jstor.org/stable/40327206?seq=1#metadata_info_tab_contents
- Katona, J. (2016). What Factors Influence urban school leaders arts programing decisions? Ph.D Dissertation. City University of New York.
- Rusinek G. (2008). Disaffected learners and school music culture: an opportunity for inclusion. *Research studies in music education*, 30(1) 9-23.
- Shmuelof S. (2012). The influence of the "Touch music" program on music teachers in Jerusalem and the Northern District. (Unpublished master's thesis). The Jerusalem Academy for Music and Dance, Jerusalem.
- Shvadron, Y. (2019). (n.d), Curriculum Overview in music around the world. Yozma - Center for Knowledge and Research in Education. <http://education.academy.ac.il/Index4/Entry.aspx?nodeId=992&entryId=21151>
- Taba, H. (1962). *Curriculum development: theory and practice*. New York, NY: Harcourt, Brace & World.
- Vygotskii, L. S. (1978). *Mind in society: the development of higher psychological processes*. Cambridge: Harvard University.
- Wasiak E. B. (2005). Iitaohkanao'pi – The meeting place project: an alternative approach to young people's concerts. *International journal of music education*, 23(1) 73-88.
- Wiggins J. (2001). *Teaching for musical understanding*. Boston: McGraw-Hill.

PROFESSIONAL IDENTITY AND PROFESSION VALUES TRANSPOSED INTO NURSING EDUCATION

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Abstract

Professional identity is the concept that describes how we perceive ourselves in our occupational context and how we communicate it to others. Professional identity is not static, but fluid. It is strongly influenced by how we see ourselves, how we perceive others and how we are viewed by society.

Professional values are inherent characteristics of every profession and are part of the professional identity. Personal values are a powerful tool that influences our lives. They are the standards that each of us defines in order to live according to them and often influence our attitude and behavior. The profession of nurse/ midwives is defined by the values that each practitioner experiences every day in relation to his profession and each patient with whom he interacts.

The professionalism of nursing profession requires that the nurses, midwives to be able to provide quality health care services adapted to the society healthy needs, no matter age, social position, gender, political and sexual orientation or other differentiation criteria. In this way they will be able to increase the population's health level.

The Order of Nurses and Midwives of Romania implemented POLMED project which objective was to develop a set of fundamental professional values for nurses and midwives, for the benefit of the medical-patient staff relationship. The project aimed at developing an analysis of European public policies on the values of nursing and midwifery, conducting a survey of the current situation in Romania on the values of nursing and midwifery by involvement of 200 nationally selected nurses and midwives, as well as the training of 45 nurses and midwives in the design and evaluation of public policies.

As a result, the ability of medical personnel to meet the citizen's need to have quality health system is directly linked first and foremost to the reform of the educational system of professional training, which internalizes a values system centered on professionalism, empathy towards the patient and cooperation with patients and other categories of professionals in the medical system.

The paper work is divide in two parts, the first part presents a survey in order to develop a set of fundamental professional values for nurses and midwives, and the second part presents the way these values were transposed in the nursing education. The paper presents a study on the ways of transposing the professional identity and profession values into the nursing education.

Keywords: *Education, values, identity, nursing, profession.*

1. Introduction

Founded in 1950, the current Sanitary Post High School "Fundeni" is the most important state educational institution in Romania in the field of training in Nursing and a center for continuous training of teachers in this field.

In collaboration with the Order of General Nurses, Midwives and Nurses in Romania (OAMGMAMR) which is a professional and regulatory organization with the role of developing norms and rules for practicing the profession of generalist nurse, midwife and nurse, so that professionals can provide quality services to patients, in safety and security conditions, the Sanitary Post High School "Fundeni" implemented the above mentioned POLMED project which objective was to develop a set of fundamental professional values for nurses and midwives, for the benefit of the medical-patient staff relationship.

The order authorizes the exercise of the profession, registers in its database all general nurses, midwives and nurses in Romania and also judges the deviations from the rules of ethics and deontology.

The Romanian health-care system has been the subject of a comprehensive reform process in recent years, which has sought to ensure increased quality in the health sector and patient confidence in the health services they receive. Actions to modernize health-care infrastructure, provision of equipment and devices to meet the current patient's expectations and technological innovation context, have been

consistently supported. A number of measures have also been adopted in recent years to financially stimulate the retention of medical staff in the country and thus counteract the negative effects of the migration of professionals from the system.

In this context, a joint, unified, coherent and committed action, aimed at improving the relationship between the patient and the health-care professionals (nurses and midwives), becomes necessary.

2. Research methodology

This project was prepared with participation, through a comprehensive consultation process of professionals in the field, members of OAMGMAMR, in order to identify essential values that must guide the professional activity of nurses and midwives in Romania.

The research explored two directions: a questionnaire-based survey to identify the main guidelines and options related to the values of the profession and developing a qualitative analysis of guidelines and options on the professional values of nurses and midwives, through the focus group technique. Both the analysis and report contributed to the elaboration of a public policy project on the values of the nurse and midwife professions.

The sample for qualitative analysis was 806 nurses and midwives from all 8 development regions of Romania that completed a questionnaire-based survey. The data processing has been done using SPSS 20.0.

Qualitative analysis of guidelines and options on the professional values of nurses and midwives through the focus group technique: within this subactivity, 200 participants, nurses and midwives from public health facilities were selected, taking part in 8 focus groups, organized one each in each development region. Moderated discussions with the participants took place in the focus groups, every important result of the quantitative research was analyzed, with all participants given the opportunity to express their views on it. A research report based on the qualitative data collected from the organized focus groups was prepared upon completion of this activity.

The qualitative and quantitative data and information obtained under the 2 sub-activities mentioned were integrated and the activity was completed by developing a survey into the current situation on the values of the nurse and midwife profession.

Three training (and implicitly consultation) sessions of 45 people from among OAMGMAMR representatives from all development regions, on public policies, were also organized. Experts from within the organization were identified; they worked as a team to develop a summary material reflecting the opinions expressed by their colleagues during the consultative process.

Thus, more than 1000 members of the organization were directly involved in this consultative process, representing all branches of OAMGMAMR and all types of fields of activity of nurses and midwives in Romania.

3. Results

3.1. For quantitative research

As part of the consultation process carried out at national level, the following were identified as essential values for the professions of nurse and midwife in Romania: **professionalism, cooperation and empathy**.

The three identified essential values are defined as follows:

Professionalism is the essential value in the exercise of the professions of nurse and midwife.

Cooperation involves establishing relationships with all persons involved – members of the medical team, patients, their families – based on real and open communication, so that the care act includes the perspectives of all those involved.

Empathy is an essential professional value in the profession of nurse/midwife, defined implicitly and explicitly by care for the patient.

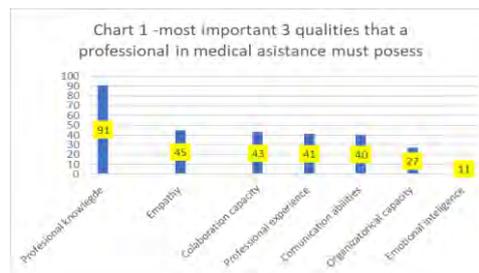
3.2. For qualitative research

The subjects of the research were approximately 200 nurses / midwives who participated in the 8 focus groups conducted between October and December 2018. The main objectives of the research were to obtain useful information to clarify / explain a number of issues that they resulted from quantitative research, as well as the analysis of the importance and applicability in practice of the specific values of the nursing and midwifery professions. The research data were collected using audio and video recordings, supplemented by notes taken by the three public policy experts who moderated the focus groups.

The information obtained in the qualitative research provided a number of clarifications and additions regarding this hierarchy of values. First of all, the majority focus group participants pointed out that having professional knowledge, it should be considered an a priori condition for practicing the profession and not necessarily a professional value in itself. Second, there were participants who claimed that having professional knowledge that is not implemented with empathy and collaboration are not enough. Third, many of the participants considered that, without a doubt, empathy and the ability to collaborate represent specific professional values that can make the difference between a good professional in the field and a weaker one, but often the oversupply of tasks is a serious obstacle for their transposition into everyday professional behaviors. In addition, empathy unaccompanied by self-protection can be dangerous to oneself mental integrity of staff (which can lead to burnout) and therefore unnecessary in itself.

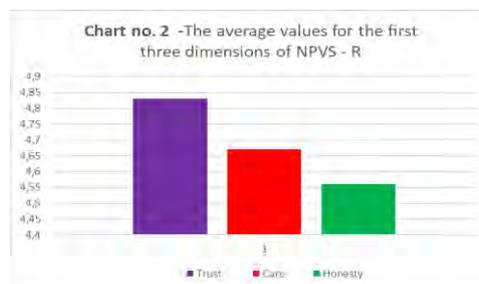
Last but not least for many participants "emotional intelligence" (last place in the table below) was in fact assimilated with empathy and the ability to collaborate, communication.

Chart 1.



For analyzing the specific of nursing profession in the survey was introduced a professional value scale specific to the nursing field, Nurses Professional Value Scale – Revised (NPVS-R). The results of the analysis of the data obtained at the NPVS-R scale will be presented below as average values, according to the way the original scale is used by the authors (maximum possible value - 5, minimum possible value - 1). The answers received from NPVS-R scale place in the first three places, were **trust**, **care** and **honesty** (chart no. 2). As we can see, all three value dimensions are "built" around the patient. Below are the elements of professional conduct / behaviors the most important professional values that are subsumed in the three values:

Chart 2.



The additions brought by the qualitative data, regarding these aspects related to the transposition of the values in appropriate professional conduct pointed out the following aspects:

- the need for continuing medical education to be real, not formal (determined only by the need to obtain the annual number of credits):

- the importance of education in general - the problem that those who are in initial training are either lacking a serious motivation or do not have the skills to recommend them for this profession; concern about the large number of diplomas offered by public and private institutions, without liability - which leads to a decrease in professional skills in the system; the need for nurses / midwives with more professional experience to take it upon themselves to raise the professional level of their younger colleagues:

Within the focus groups, most of the participants considered as most important and, at the same time, most possible to transpose, in practice, the values that are subsumed under the principle of respecting the rights of patients of different categories.

On the other hand, the professional values for which the highest differences between importance and applicability were recorded were respect for professional dignity, recognition of professional

boundaries and team spirit / collaboration. The main explanations for these gaps, provided by the focus group participants, were as follows:

- ✓ difficulties caused by the "damaged" image of the profession among the population, generated mainly by the way in which the media presents only the negative aspects;
- ✓ the distinction between autonomous and delegated competences (received from the doctors they work with) is not always clear and respected; in addition, the mentality that the nurse is subordinate to the doctor, having the obligation to carry out whatever is required of him is one that does not help in setting these limits;
- ✓ differences in medical teams (between doctors and nurses, but also between different generations of nurses).

As a result, the ability of medical personnel to meet the citizen's need to have quality health system is directly linked first and foremost to the reform of the educational system of professional training, which internalizes a values system centered on professionalism, empathy towards the patient and cooperation with patients and other categories of professionals in the medical system.

4. Professional identity and profession values transposed into nursing education

The practice of the nurse is incorporated into the social practice on a set of values that give it meaning and significance. These values form an axiogram (hierarchical scale) of the profession, which is the statement of guiding the nurse's practice and justifying his actions. Values are generally defined as beliefs or principles that influence the behavior. Values serve as a compass in setting standards for decision making and guiding individual behavior. Michal Rassin suggested that values are "basic beliefs that motivates both social and professional behavior".

The beginning of the professional practice of the nurse can be attributed to the England of the 9th century, respectively to the school founded by Florence Nightingale. Florence Nightingale (1860) defined the practice of the nurse as "responsible for one's personal health ... and what the nurse must do ... is to put the patient in his best condition"

Personal values are a powerful tool that influences our lives. They are the standards that each of us defines in order to live according to them and often influence our attitude and behavior. As each individual is characterized by his own values, so as the nursing profession is defined by the values that each practitioner experiences every day in relation to his profession and each patient with whom he interacts.

Professional identity is the concept that describes how we perceive ourselves in our occupational context and how we communicate it to others. Professional identity can mean different things to different professionals who are active in the field. Professional identity is not static, but fluid. It is strongly influenced by how we see ourselves, how we perceive others and how we are viewed by society.

In present the activity of the nurse is not always clear - for some the nurse helps the doctor, for others the nurse practices an autonomous profession. Depending on the activities they carry out, the role of the nurse can be: own or delegate.

Professional values are demonstrated in ethical codes. In fact, the ethical codes clarify nursing profession practices, the quality of professional care, and professional norms.

The code of ethics and deontology of the generalist nurse, the midwife and the Romanian nurse includes a set of principles and rules that represent the fundamental values on which the generalist nurse profession, the midwife profession and the nurse profession on the territory Romania is based.

The curriculum establishes the foundation of what students are expected to know, do and understand through their education experiences. In post-secondary education – level 5 the curriculum is focused on learning outcomes / competencies. The curriculum was developed based on professional training standards. Each of the school specializations has its own standards, curriculum and school programs for the professional qualification.

In post-secondary education - level 5, the curriculum is focused on learning outcomes / competencies. Competences, built in terms of expected learning outcomes at the end of the education and training process, are essential components of the vocational training standard and are grouped into units of learning outcomes/competencies. Before 2018 the learning outcomes were expressed only by knowledge and abilities. From the 2018 the new standard of professional training and the new curriculum were applied to the general nurse, according to Order of the Ministry of National Education no. 3499 / 29.03.2018 - regarding the approval of the professional training standard, of the curriculum and of the school programs for the professional qualification Generalist nurse, level 5, of the National Qualifications Framework for which the training is ensured through the postgraduate pre-university education.

Learning outcomes are expressed now through knowledge, skills and attitudes acquired during different formal, non-formal and informal learning experiences.

The key competencies referred to in the Vocational Training Standard are integrated in the units of results of general or specialized technical learning. They are also integrated into the units of results of general or specialized technical learning, professional knowledge and skills in Directive EU / 55/2013 on the recognition of professional qualifications.

In the Curriculum of Sanitary Post High School “Fundeni” are presented the core professional competencies of Directive EU /55/2013 integrated into content such as for example: competence to independently diagnose the necessary medical care, the ability to provide information to individuals, families and groups of people, competence to collaborate effectively with other actors in the health sector, the ability to independently ensure the quality of health care and its evaluation, the ability to analyze the quality of the assistance provided to improve its professional practice of generalist nurse. Also there are presented knowledge about the nature and ethics (fundamental values) of the nursing profession that a nurse must possess. The sanitary post high school emphasizes the professional values resulted from the research in the school Curriculum (in all nursing Modules).

5. Conclusions

1. The professional values (**professionalism, cooperation and empathy**), are seen as distinct but also as closely interconnected
2. The three professional values mentioned above can be transposed in terms of professional behaviors, as aspects that define an act of quality care through: **trust, care and honesty**.
3. The relationship between the patient and those involved in the act of care as an active type of relationship, in which the family of the patient is involved, consulted, informed.
4. The Sanitary School through its Curriculum emphasizes the professional values resulted from the research made by OAMGMAMR.

References

- A.Seada, W. Fathi Sleem Professional socialization process and acquisition professional nursing values among undergraduate nursing students. J AmSci.2012; 8(4): 678 – 83
- D. Weis, MJ Schank An instrument to measure professional nursing values. J. Nurs Scholarsh 2000; 32(2): 201 – 4.
- Debra S. McDonough, RN, MSN, EdD, Caring: The Core of Nursing Practice, <https://www.hurstreview.com/blog/caring-the-core-of-nursing-practice>, <https://www.oamr.ro/> accessed on 17.01.2022, <https://www.oamr.ro/9424-2/>, accessed on 10.01.2022, <https://www.nurses.com/doc/icn-code-of-ethics-pdf-file-0001>
- Directiva 2006/123/CE a Parlamentului European și a Consiliului din 12 decembrie 2006 privind serviciile în cadrul pieței interne. <https://eur-lex.europa.eu/legal-content/RO/TXT/HTML/?uri=CELEX:32006L0123&from=RO>
- DW. Leners, C. Roehrs, Av. Piccone Tracking the development of professional values in undergraduate nursing students, J Nurs educ. 2006;45(12): 504-11
- F. Borhani, F. Alhani, E. Mohammadi, A.Abbaszadeh Professional ethical competence in nursing: the role of nursing instructors, J. Med Ethics hist Med. 2010; 3;3
- Gilberto de Lima Guimarães et all. The core values of modern nursing in the light of Dilthey and Scheler <http://www.scielo.br/pdf/tce/2015nahead/0104-0707-tce-2015003480014>
- J. Williams, Th. Stickley, Empathy and nurse education, Nurse Education Today, 10.1016/j.nedt.2010.01.018,30,8, (752- 755), (2010) Crossref
- K. Mikkonen, H. Kyngas, M. Kaariainen, Nursing students’ experiences of the empathy of their teachers: a qualitative study, Advances in Helath Sciences Education, 10.1007/s10459- 014-9554-0,20,3 (669 – 682), (2014). Crossref
- L. McKenna, M. Boyle, T. Brown, B. Williams, A.Molloy, B. Lewis, L. Molloy, Levels of empathy in undergraduate nursing students, International Journal of Nursing Practice, 10.1111/j.1440 – 172X.2012.02035.x, 18,3 (246 – 251), (2012) Wiley Online Library
- L. Ostman, Y. nasman, K. Eriksson, L. Nystrom, L. Ethos: the heart of ethics and health. Nurs ethics. 2019 Feb.26(1): 26-36. (PubMed: 28343436)
- L. Sasso A. Stievano, M.G. Jurado, G. Rocco (2008) Code of ethics and conduct for European nursing. nursing Ethics,15, 821 – 836
- Lesley Baillie, Sharon Black, Professional Values in Nursing, CRC Press, 2014
- M.M. Rosenkotter, J.A (2010) a code of ethics for nurse educators: revised. Nursing Ethics, 17, 137- 139
- Michal Rassin Nurses' Professional and Personal Values, 2008, <https://doi.org/10.1177/0969733008092870>
- Ordinul Ministerului Educatiei Nationale nr. 3499/ 29.03.2018.

TEACHER-GENDER: EXPERIENCES OF MALE TEACHERS IN THE FOUNDATION PHASE IN SOUTH AFRICAN SCHOOLS

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Abstract

In South African primary schools, the Foundation Phase (Grade R, the year before formal schooling until Grade 3) is dominated by female teachers because few men enrol for a teaching qualification in this phase. There are various reasons why there is a reluctance by males to teach in this phase. These include parental nervousness around men who decide to seek employment in a traditionally female profession, scepticism in males' abilities to teach young children as well as their female counterparts, the perception that men cannot handle the responsibility of taking care of young children and the perception that men who choose to teach young children are unnatural, homosexuals and deviants. The study was motivated by two factors: firstly, by the researcher's interest in male teachers who teach young learners (because of the scarcity of male teachers in early education); and secondly, by the large number of students who enrolled for the B. Ed Foundation Phase degree at a South African university. The aim of the study was to explore the experiences of male teachers in the Foundation Phase. Data were collected through focus group and face-to-face interviews and were analysed thematically. The participants were nine male teachers who teach in the Foundation Phase. The researcher wanted to obtain narrative portraits and in-depth understanding of the participants' experiences as males in a reality that is female-dominated. The results show that in many schools, male teachers experience gender prejudice and gender stereotyping from both male and female colleagues, and often from parents. For example, some of the male participants asserted that teachers make fun of them by saying that men cannot be 'nannies'. However, some schools were happy to employ male teachers, regardless of the societal misconceptions about male teachers teaching young children. It is recommended that, amongst others male teachers in the Foundation Phase be encouraged and educated about strategies to cope with criticism in order to be resilient.

Keywords: *Foundation phase, male teachers, gender, female-dominated, young children.*

1. Introduction

Men teaching young children is often perceived with scepticism, criticism and discomfort. Research has shown that the lack of male educators in *Early Childhood Education* is greatly influenced by the association of Early Childhood Education with mothering and being 'natural' for woman, while men interested in the field are often perceived as 'unnatural', as sexual predators and as sexual deviants. There is therefore a perception in society that young children should rather be taught by women (Mashiya 2014; Kewuti 2018:1 and Msiza 2016:iv). Because of these barriers, male teachers in the Foundation Phase in South Africa are under-represented. Thus, teaching young children is a predominantly female occupation in South Africa. This also seems to correlate with studies internationally. Kewuti (2018:3) asserts that many international studies show that there is a gender-imbalance in Early Childhood Education. For example, in Germany the proportion of male elementary school teachers is 4%, in Finland it is 10% and in the United States it is 2% (Mashiya 2014). These findings are supported by Drudy (2008), Cushman (2008) and Skelton (2009) as cited in McGrath & Sinclair (2013:2) when they state that 'the perceived need for more male primary school teachers has emerged as an international issue with research and media reporting proportional and absolute decline in the number of male primary school teachers in Australia, England, Ireland, New Zealand, Finland, Canada and the USA'. In Africa the trend is similar. According to Nyoni and Nyoni (2012) African societies do not welcome men to teach young children. In Tanzania, for example, teaching at primary schools is perceived as a low-status job meant for female teachers (Sayed and McDonald 2017). A study conducted in Kenya found that men are still under-represented in Early Childhood Development Education because the society is uneasy and suspicious about men who choose to work with young children (Mukana and Mutsoso 2011).

2. Aim of the research

The primary research question this paper seeks to address is: What are the experiences, positive and negatives, of male teachers in a female-dominated work environment? I will attempt to address this question by answering the following sub-questions:

- Why are male teachers in the Foundation Phase discriminated against?
- What benefits do male teachers offer in the Foundation Phase?

3. Problem statement

Teaching in the Foundation Phase goes far beyond the formal instruction of subjects because teachers are also tasked with supporting learners with behavioural, social, emotional and physical development. Foundation Phase teachers are thus responsible for the all-inclusive education of young learners through their most formative years. This endeavour is complex and challenging for both male and female teachers and needs to be effective in order to ensure learner success (Meier and Machaba 2021:4). Many South African teachers experience formal teaching challenges such as overcrowded classrooms and lack of adequate resources. Male teachers in the Foundation Phase seem to experience another challenge simply because they are male. The notion exists in many societies that a 'soft' female is supposed to handle young children - not the rough male, hence the onslaught on males who dare to cross the divide and invade a 'female domain' in the eyes of patriarchy (Nyoni and Nyoni 2012:183). Furthermore, Sumsion (in Mashiya 2014) claims that male teachers are facing challenges because of their 'otherness' in relation to their female colleagues. There is also the stigma that men are generally associated with child abuse and child molestation. These barriers lead to the problem of the under-representation of male teachers in Early Childhood Education because of gender discrimination and gender stereotyping. Because of these stereotypes many men are hindered from pursuing a career in Early Childhood Education because they are depicted as abnormal and are not seen as 'real men' (Bhana, McGrath, Van Bergen and Moosa 2019). The discrimination men face is in contravention of law. The Employment Equity Act (1998:6(1)) asserts that no person in the workplace should be unfairly discriminated against on grounds such as gender, sex and marital status. Gender equality is also enshrined in the Constitution. In addition, the Employment of Educators Act (76 of 1998:7) emphasizes the values of equality and equity when it comes to the appointment of teachers. Despite the obstacles experienced by male teachers, research suggests that there are benefits of having male teachers in the Foundation Phase, and that the benefits outweigh the disadvantages. McGrath and Sinclair (2013) assert that the call for more male teachers in primary schools has long been associated with the educational needs of boys, the importance of positive male role models in schools and the disproportionate number of male and female teachers in primary schools internationally (cf. Martino 2008; McGrath and Sinclair 2013). Rolfe (as cited by Okeke and Nyanhoto 2021) states that men and women have a different caring style – males promote a more active, physical environment while women foster a nurturing and calm environment, but both caring styles can be beneficial for young children.

4. Theoretical framework

The research employed Eagly's social role theory (SRT), which argues that widely shared gender stereotypes develop from the gender division of labour that characterizes society. The social role theory developed during the 1980s as a gender-related theory in which Eagly used gender roles as a term for the social roles that society designates to men and women. The theory further concedes that regardless of early socialization and upbringing, men can learn behaviours which are associated with the role of caregiver through participating in those social experiences that were once reserved for women (Biddle, in Okeke and Nyanhoto 2021; Okeke and Nyanhoto 2021). Gender roles have an influence in the teaching profession, and the focus of many studies about male teachers in the Foundation Phase is not necessarily based on their ability, skills and competence, but on their gender (Kewuti 2018:16).

5. Research methodology

Data were collected through qualitative phenomenological research. The purpose of phenomenology is to describe and understand the essence of lived experiences of individuals who have experienced a particular phenomenon. Lived experiences of the everyday world, as revealed through interviews or conversations is the main focus of phenomenological research (Van Wyk and Taole 2015:175). The researcher wanted to obtain narrative portraits and in-depth understanding of the participants' experience as males in a reality that is female-dominated. These narrative portraits aided the researcher to understand the thinking and feelings of the participants. Semi-structured focus group

interviews were conducted. The researcher opted for semi-structured interviews because they provide the best of both worlds as far as interviewing is concerned, combining the structure of a range of issues to be covered together with the freedom to ask follow-up and/or probing questions (Thomas 2017:206).

5.1. Selection of participants

A sample can be defined as the participants who are selected from a larger population for the purpose of conducting research (Lumadi 2015:226). The study was conducted in the Motheo District in the Free State. The participants consisted of nine male Foundation Phase teachers from four schools. Because the participants in the study were male educators, purposeful sampling was used to select only schools that have male teachers in the Foundation Phase.

6. Data analysis and findings

Thematic analysis was conducted based on the themes that emerged from the respondents' responses to the questions. The following themes emerged from the data: a) competence of male teachers with regards to formal teaching; b) treatment of male teachers; c) stereotyping impacts on male teachers' working conditions; d) male teachers can be beneficial for young children. The findings reveal that men can perform their teaching duties as well as their female counterparts. The participants generally feel supported by their colleagues, but they do face societal barriers, bias and resistance. They report that many parents feel unsure about having males teaching their young children, especially their daughters. One male educator reported that he is even reluctant to hug his learners because people look at him funny. He continued to report that it is difficult to work under such conditions of scrutiny. One participant stated the following: "My principal and colleagues say there's nothing wrong with my teaching skills, but they still find it awkward that I chose to teach in the Foundation Phase. They are always curious as to why I do not teach older children instead." Another participant reported that some parents asked during a school meeting: "Are you going to teach my daughter?" He responded by saying he is. Generally, the participants agreed that it is unfair for them to be judged and discriminated against because they are male. The majority of them cited that they enjoy working with smaller children, not because of ulterior motives, but because they love children. Some referred to the Constitution and their right to be treated equally. These responses indicate that male Foundation Phase teachers have positive and negative experiences at their respective schools.

Positive experiences of participants and benefits of having male teachers	Negative experiences and challenges
<ul style="list-style-type: none"> a) Compared to their female counterparts, the respondents claim they face the same challenges with regards to formal instruction. Examples include shortage of educational resources, teaching young writing and reading skills, discipline problems and overcrowded classrooms. b) There are colleagues that accept them with open arms and make them feel included. c) The participants all reported that the learners do not find it strange to be taught by males. Learners also do not seem to notice the unequal gender distribution. d) The participants love young children and teaching – that is one of the main reasons they chose to teach younger children. e) Male teachers are perceived as good disciplinarians. Participants also reported that female colleagues feel men can assist better in sport development. f) Many parents see male teachers as good role models and as father figures, especially for children who do not have fathers, or where fathers are absent. g) Colleagues get used to the idea of having males as colleagues, especially in schools where these male teachers have been teaching for long. 	<ul style="list-style-type: none"> a) Some female colleagues make the male teachers feel unwelcome and are antagonistic towards them. b) Male teachers are scared to touch or hug children for fear of being labelled abusers. They are thus not trusted because they are associated with sexual abuse. c) Many parents are uncomfortable with having male teachers teaching their young children. d) They are often asked questions such as: "do you really want to mother and babysit these kids all day?" This stems from the perception that it is unnatural and unusual for men to mother and teach young children. Men's masculinity is questioned because they cannot be 'real men' if they want to teach young children. e) Because male teachers are generally so few in the Foundations Phase, they often experience isolation and loneliness. They will often sit alone in their classes during break because there are no other males to befriend. Or they will be the only male among female teachers. Their working conditions are therefore negatively affected.

7. Recommendations

In South Africa few teachers in the Foundation Phase are male. This is consistent with a global trend that sees men more likely to teach adolescents than young children. In addition, there is little policy imperative that addresses the ‘missing men’ in the early years of schooling. Based on the findings, it is recommended that, for schools and communities to promote positive representation of men in early education, the focus must be on creating gender harmony. Furthermore, society needs to change its stereotypical perception that only females should teach young learners, because children can benefit from male and female teachers. We need to do away with the negative connotation that Foundation Phase teaching is a ‘motherly’ and ‘babysitting’ type of profession, only suited for females. Male teachers should be applauded, encouraged and supported for their willingness to teach in primary schools. They should not be treated with distrust and suspicion because they want to teach young children. Not all men are bad, not all men are perpetrators. Sayed and McDonald (2017) recommend that policy makers need to nurture a culture of teaching as a positive and highly esteemed profession for men and women. Universities and other state departments should provide career advice that will better prepare male pre-service teachers for the challenges and criticism that awaits them. There need to be strategies or policies in place to educate in-service male teachers on how to cope with prejudice so that they can become resilient and not leave the teaching profession because of these negative connotations associated with male teachers. The value of all Foundation Phase teachers must be recognized, regardless of their gender.

8. Conclusion

Teaching is much more than mere formal instruction of subjects. Teachers also have to act in loco parentis (in the place of the parent), meaning that teachers are obliged to take care of the social, emotional, physical and mental needs of the child. A view exists in society that teaching and caring for young children is a woman’s job, that men are harsh, that they are not nurturing enough and that they cannot take care of young children the same way as women. These views contribute to the scarcity and underrepresentation of male teachers in the Foundation Phase. The few men that have chosen teaching as a career often face challenges that female teachers do not face. Despite these challenges, more male students are enrolling for Foundation Phase teaching at Higher Education Institutions, which means more males are going to enter this female-dominated field. Some men enter the teaching profession because they love children and want to make a difference in their lives. By working in roles that are typically viewed as being appropriate for women, men can break down polarized differences that foster gender inequalities. Dialogue and further research are needed to address the shortage of male teachers, the reasons for this shortage, and to explore more reasons pertaining to the value male teachers can add to young children’s lives.

**Early Childhood Education (ECE) in South Africa can be defined as a comprehensive approach to policies and programmes for children from birth to nine years of age with the active participation of parents and caregivers (Department of Education 2001:14).*

References

- Bhana, D., McGrath, K., Van Bergen, P. & Moosa, S. (2019). Why having both male and female teachers is a good idea for schools. Retrieved December 10, 2021. www.power987.co.za/news/why-having-both-male-and-female-teachers-is-a-good-ide-for-schools
- Department of Education. (2001). *White Paper 5 on Early Childhood Education: Meeting the challenges of Early Childhood Education*. Pretoria: African Watermark.
- Kewuti, N. (2018). *Parents’ perceptions about male teachers’ under-representation in the Foundation Phase: A study in the East London education district*. M. Ed Thesis. University of Fort Hare: East London.
- Lumadi, M. (2015). The logic of sampling. In Okeke, C. & Van Wyk, M. (Eds.), *Educational Research: An African approach*. (224-242). Cape Town: Oxford University Press.
- Martino, W. (2008). Male teachers as role models: Addressing issues of masculinity, pedagogy and the
- Mashiya, N. (2014). Becoming a (male) Foundation Phase teacher: A need in South African schools? *South African Journal of Childhood Education, Volume 4(3)*. Retrieved December 10, 2021. www.scielo.org.za/scielo.php?script=sci_arttext&pid=S2223-76822014000300003

- McGrath, K. & Sinclair, M. (2013). More male primary school teachers? Social benefits for boys and girls. *Gender and Education*, Volume 25(5), 531-547. Retrieved December 10, 2021, from: <https://doi.org/10.1080/09540253.2013.796342>.
- Meier, C. & Machaba, M. (2021). Characteristics, roles and competencies of an effective Foundation Phase teacher. Teaching in the Foundation Phase. In Meier, C. & Ndou, N. (Eds.), *Teaching in the Foundation Phase: Contemporary strategies, curriculum development and assessment* (3-20). Pretoria: Van Schaik.
- Mncanca, M. (2021). Male teachers in the Foundation Phase: Is South Africa ready? In Meier, C. & Ndou, N. (Eds.), *Teaching in the Foundation Phase: Contemporary strategies, curriculum development and assessment* (313-322). Pretoria: Van Schaik.
- Msiza, V. (2016). *Masculinity and Foundation Phase teaching: Exploring the identities of male teachers in Mpumalanga schools*. M. Ed Thesis. University of Kwazulu-Natal: KwaZulu-Natal.
- Mukuna, T. & Mutsotso, S. (2011). Gender inequalities in Early Childhood Development Education teaching profession in Kenya. *Educational Research*. Volume 2(13): 1876-1885.
- Nyoni, T. & Nyoni, M. (2012). Gender de-stereotyping in Early Childhood Development or shrewd opportunism? A case of male students at Masvingo teachers' College, Zimbabwe. *International Journal of Education Administration and Policy Studied*. Volume 4(9): 181-187.
- Okeke, C. & Nyanhoto, E. (2021). Recruitment and retention of male educators in preschools: implications for teacher education policy and practices. *South African Journal of Education*, Volume 41 n.2. Retrieved December 10, 2021 from: <http://dx.doi.org/10.15700/saje.v41n2a1910>.
- re-masculinization of schooling. *Curriculum Inquiry*, Volume 38(2): 189-223. Retrieved December 10, 2021, from: <https://doi.org/10.1111/j.1467-873X.2007.00405.x>.
- Republic of South Africa. 1998. *The Employment Equity Act of 1998*. Pretoria: Government Printers.
- Republic of South Africa. 1998. *The Employment of Educators Act 76 of 1998*. Pretoria: Government Printers.
- Sayed, Y. & McDonald, Z. (2017). Motivation to become a Foundation Phase teacher in South Africa. *South African Journal of Childhood Education*. Volume 7(1), a548. Retrieved December 10, 2021, from: [https://doi.org/10.4102/sajce.v7\(1\).548](https://doi.org/10.4102/sajce.v7(1).548).
- Thomas, G. (2017). *How to do your research project: A guide for students (3rd edition)*. London: Sage Publications.
- Van Wyk, M. & Taole, M. (2015). Research design. In Okeke, C. & Van Wyk, M. (Eds.), *Educational Research: An African approach*. (164-185). Cape Town: Oxford University Press.

HERE AND NOW: THE LASTING EFFECTS OF MINDFULNESS ON STUDY-ABROAD PARTICIPANTS

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Abstract

The fields of international education and study abroad are inherently conducive to new experiences and attentiveness to the moment. However, they have not been fully explored as areas of interest for the integration of contemplative practices. We present a case study of a group of 10 respondents, eighteen months after returning to the US from a study-abroad program in France. The scaffolded curriculum of the program centered around mindfulness and the use of the five senses to engage with and learn about the host culture. During the program, students practiced techniques, reflected collectively and metacognitively in writing assignments. More than a year after the study-abroad program, ten of the thirteen students volunteered answers expounding on their connection to mindfulness. Content analysis of their answers indicates that students perceive a positive impact of mindfulness on their personal, professional, and academic lives. Notably, results indicate that students may have experienced an increased awareness of and attentiveness to their surroundings, improved interoception and metacognition, a greater ability to connect with those around them, and an enhanced capacity for recall and memory.

Keywords: *Contemplative pedagogy, mindfulness, study abroad, intercultural communicative competency.*

1. Introduction

Recent scholarship has praised and encouraged the integration of contemplative pedagogy, and the associated practice of mindfulness, in higher education teaching and learning (Barbezat & Bush, 2014; Owen-Smith, 2018). Proponents argue that these approaches facilitate and guide student metacognitive reflection, while providing experiential opportunities. The onset of a global pandemic has illustrated the need for the cultivation of attentiveness, introspection, self-reflection, and empathy towards self and others. Approaching life in the moment, intentionally, and without judgement, may help curb anxiety brought on by environmental stressors.

Mindfulness is a quality of mind and way of being in life, much more than a discipline or a collection of techniques (Brown et al., 2007). It has been defined as “paying attention on purpose in the present moment and non-judgmentally” (Kabat-Zinn, 2012, p.17), and as “the state of being attentive to and aware of what is taking place in the present” (Brown & Ryan, 2003, p. 822). In these definitions, several elements are significant: In order to live mindfully, it is crucial to slow down and to exercise intentionality and patience; it is imperative to be attentive, to have an unobstructed availability to experience and to use our senses to be fully present to those experiences; it is all the more important to have an open mind, and a vulnerable mind, free of preconceived notions—especially those due to self-judgement—in order to be able to fully experience, and enter more intimately into the here and now.

Research demonstrates that stress, rumination and anxiety can decrease, as creativity and attentiveness can increase, in subjects who practice mindfulness regularly (Hölzel et al, 2011; Kabat-Zinn, 1982, 2013). Mindfulness shifts the focus from a self-referential narrative to one that is more open to others. Its practice can improve social cooperation, through more altruistic and empathetic behavior (Condon et al., 2013; Donald et al., 2019; Iwamoto et al., 2020). Proponents argue that living mindfully allows for greater awareness and emotional self-regulation, and can foster transformative learning (Barner & Barner, 2011). They posit that a mindful approach to life and an open mind can promote: (a) non-judgement and self-compassion (Sedighimornani et al., 2019); (b) creative thinking and mental flexibility, as well as decreased distractedness (Berkovich-Ohana et al., 2017; Zeidan et al., 2010), and; (c) memory and learning (Greenberg et al., 2018). Overall, they suggest, living mindfully can increase well-being (Singleton et al., 2014). Given these claims, the potential for employment of mindfulness in higher education is evident. Furthermore, mindfulness demonstrates specific promise as intercultural praxis within study-abroad programs (Bai et al., 2009; Clancy, 2020; Zajonc, 2013).

Though new to the field of international education, contemplative pedagogy has been practiced for many years across higher education disciplines by both professors and academic administrators

(Zajonc, 2013). Barbezat and Bush (2014) propose four goals for the use of contemplative pedagogy in higher education: (a) the building of focus and attention, through centering meditation and exercises that support mental stability; (b) including contemplation and introspection in course content (students discover the material in themselves and thus deepen their understanding of the material); (c) developing compassion, connection to others, and a deepening sense of the moral and spiritual aspect of education; and, (d) inquiry into the nature of their minds, personal meaning, creativity, and insight.

Research on the use of contemplative pedagogy and mindfulness within the context of study abroad is still in a nascent stage (Clancy 2020). While the short-term benefits of a mindful praxis are well established, we seek, in the present study, to explore the existence of persistent effects, 18 months after a one-semester program that emphasized mindfulness as a praxis for intercultural intervention.

2. Case study method

In the fall 2018, 13 students attending a mid-West American university participated in a 15-week study-abroad program in Cannes, France. Mindfulness was incorporated into the curriculum, with the goal of exploring its effects on students' learning. The students participated in a weekly seminar, "Experiencing Contemporary French Culture through the Five Senses (and beyond...)." The seminar, organized and taught by the faculty director (and first author), used the framework of mindfulness and the five senses, as well as the senses of proprioception and interoception, to intentionally comprehend the host culture. A pre-departure orientation (March-May 2018) preceded the program. The abroad component (August-December 2018) included on-site programs and visits organized by the faculty director. In early 2019, students participated in a welcome back dinner and a follow-up group gathering.

2.1. Pre-departure

The pre-departure workshops included 12 hours of experiential activities such as the contemplative techniques of *visio divina* and *audio divina*, a blindfolded activity to hone listening skills, and a yoga class focused on mindfulness. Pre-departure activities, such as a 24-hour period without using a phone, were followed by reflective writing assignments. Themes introduced pre-departure included cultivating awareness, developing a childlike curiosity and surprise/astonishment, transformation of things and people; and the contemplation on interbeing and interdependence.

2.2. Seminar and activities abroad

Activities in-country supported themes introduced pre-departure. The seminar consisted of one three-hour session per week and was organized into three modules: Experience (learning about the Other through the senses); Reflection (learning of Self through the Other); and Action (discerning a sense of purpose, vocation in life). Each class began with a brief meditation, and, during the semester, each student led the group in a specific mindfulness technique. The theoretical framework of the seminar included selections from Jon Kabat-Zinn's *Mindfulness for Beginners*, Thich Nhat-Hahn's *The Miracle of Mindfulness*, Alain DeBotton's *The Art of Travel*, and Brené Brown's *The Gifts of Imperfection*. It also included films such as Isak Dinesen's *Babette's Feast* and Albert Lamorisse's *The Red Balloon*.

The on-site visits were organized in order to engage the senses. For example, to engage sight, students practiced *visio divina* in museums; for hearing, they performed an *audio divina* in a concert; for smell, they visited the Fragrance Museum in Grasse, the world capital of perfume; for taste, they participated in a blind dinner; for touch, they rode horses in the Camargue, and participated in a grape harvest. After each experiential opportunity, students journaled and submitted short reflections.

2.3. Follow-up material and procedures

Eighteen months after returning from the program (July 2020), in the first months of the global pandemic, students from the program were contacted via email and asked to "take 30 minutes or so of [your] time to sit, reflect intentionally, and honestly respond to" five open-ended questions about the program and continuing use of mindfulness: (a) What is the first thing that comes to mind? What was memorable?; (b) Are you still applying what you learned? What? How?; (c) Has it had an impact (positive or negative) on your academic, professional or personal life? How? Please elaborate, providing examples where appropriate.; (d) Do you think it will have an impact in the immediate future/long-term for you? If so, what do you envision?; (e) Is there anything further you would like to share about your experience with mindfulness?

Voluntary responses were collected on an Internet platform (Forms Manager) in order to guarantee the anonymity of the respondents.¹ Ten of the 13 study-abroad participants replied (77%). Institutional Review Board approval was obtained for the treatment of the results.

¹The authors have no reason to suspect that students' responses to the questionnaire, 18 months after the program's completion, would be biased or a product of social desirability. Given that the majority of respondents had graduated, their academic relationship with the institution and study-abroad director had terminated. As such, and with the voluntary and anonymous nature of the questionnaires, we believe that responses are genuine and heartfelt.

3. Results

Submissions were analyzed to identify emergent themes (Patton, 2002). Four were identified: (a) “External awareness,” i.e., the impact of mindfulness on students’ ability to focus and better manage time; (b) “Self-awareness,” i.e., the impact of mindfulness on students’ sense of grounding and self-knowledge; (c) “Connections,” i.e., the impact of mindfulness on students’ connections and relationships to others, whether in the host country or after their return to the USA; (d) “Memory,” i.e., the impact of mindfulness on students’ ability to recall and create memories from experiences abroad.

4. Discussion and conclusion

Notably, the organization of these four themes mirrors the threefold thematic scope of the study-abroad seminar of Experience, Reflection, Action. It also speaks to Barbezat and Bush’s four objectives of contemplative pedagogy. Overall, 18 months after the study-abroad program, students reported a global satisfaction with the seminar content and with the impact it had beyond their time abroad. From the anonymous and voluntary responses to the questionnaires, it is evident that students’ perception is that “when one takes [mindfulness] seriously and wants to live this way it is truly life changing and eye-opening” (S10). Ultimately, students recognized that mindfulness is transformative, personally, academically, and professionally. Below, we share select testimonials from each of the emergent themes.

4.1. External awareness

Students reported that learning about and practicing mindfulness during the abroad program translated into feeling more centered, present to the moment, and more connected to their surroundings. As they shifted their attention to focus intentionally on the lived moment and experience, they mentioned gaining a greater appreciation for the little things: “I am still applying what I learned. When I’m outdoors, I allow myself to connect with nature whenever it feels right. I allow myself to do that no matter if I’m observing something as small as an ant or as large as the sky. When I eat meals, I focus on food alone” (S2); “I’m much better at reminding myself that the only thing I have to care about is the ‘now’, the present moment” (S9); “Instead of just using my sense of sight, I bring in the other four senses” (S10); “It [...] helped me be more curious about other topics than just my major interest” (S10).

The focus on the present translates into an equal commitment to it in the future. Students took the time to be mindful and became acutely aware of the need to spend time with time, and grant time to time, i.e., to be patient with themselves and to take the time to learn and practice mindfulness daily.

4.2. Self-Awareness

Students consistently referred to a sense of grounding, ease and inner peace that came from practicing mindfulness in their lives, namely during challenging times: “My life feels more centered and wholesome. [...] I find that I get much more enjoyment out of everyday things now” (S6); “[Study abroad made] me the person I am today. More mindful, more calm and more peaceful” (S7); “Mindfulness continues to be a part of my life as I develop skills to manage stress and achieve balance in my life” (S1); “...when it come[s] to mindfulness I try to apply those things in new places or when I want to feel at peace. I still meditate in the morning and journal following the meditation” (S5); “This mindset has really been helpful in stopping patterns of rumination and catastrophizing in my life” (S9); “The person who went to France is not the same person who returned” (S4); “the level of independence I achieved inspires me to this very day [to] push outside of my comfort zone” (S3); “[Mindfulness] taught me to chase what I want rather than what is expected of me [...] I am more comfortable on my own because I don’t get caught up in my thoughts. I focus on the moments I am in” (S5).

In addition to feelings of grounding, ease and peace, students indicate a more centered mind, a heightened self-awareness, greater emotional self-regulation, and increased self-confidence, thus corroborating results from scientific studies showing mindfulness’s benefits in mental and emotional health and well-being.

4.3. Connection

The study-abroad experience, complemented by the weekly seminar, allowed students to learn about and experience the host culture in a very personal way. The focus on mindfulness engendered a greater attention to the moment and to the surroundings, avoiding preconceived notions, which in turn may have heightened students’ intercultural communicative competency: “Immersing myself in the culture provides you with a perspective that you cannot gain through reading a textbook. The inclusion of mindfulness increased awareness of cultural experiences as well” (S1); “mindfulness has reminded me to hone in on details and interact with others with as little judgment as possible, especially in cross-cultural

and intergenerational interactions” (S2); “With mindfulness, I will be able to foster deeper relationships with people and connections with everything” (S2); “I especially used mindfulness in my interactions with immigrants I taught English to at a non-profit last summer” (S2); “I learned to [...] see things from different perspectives. By doing this, I became more aware and more open minded to everything around me” (S8); “I practice active listening with others. I journal more than I used to and value connecting with myself in addition to the world [...]. I still like to do a few of the meditations we practiced, such as the loving-kindness meditation²” (S2); “Patience, appreciation, and respect are what I've learned and continue to learn from mindfulness” (S7); “Mindfulness has helped me in relationships” (S10).

Students perceived mindfulness as being impactful in their relationships with others around them, personally and professionally.

4.4. Memory

Students’ responses also referred to how mindfulness became a conduit for memory. Given the nature, course objectives and learning goals of the seminar, it would be expected that students refer to the use of the five senses when asked about what they remember from their time abroad. However, beyond the recognition of the five senses as key elements during the fall 2018, students expanded on this concept to expose how the attention given to their senses allowed for the creation of memories and of more meaningful recollections of the time spent in France. An awareness of the senses produced photographic moments, allowing students to recall a holistic experience of the moment more easily: “... the blind dinner [...] was a unique and amazing experience. Most of my memories of Cannes are predominantly sight-related, so the blind dinner stands out as a memory that was more about how I felt” (S6); “...particularly memorable is the blindfolded dinner experience. I had never isolated and experienced taste like that in my life. I'm forever grateful for that experience” (S2); “Having to focus on all of our five senses, I became much more cognizant of the phenomena going on around me” (S3); “The raisin activity,³ floating in the water (taking in what all five senses were experiencing), visiting the market with a different intention each week, the madeleine and tea etc. Honestly when I think of France 2018 so many locations come to mind but not in the sense that I visited x amount of places, but I genuinely remember more of the journey to get there and what emotions I felt during the experience” (S10).

The strategy of focusing on process, rather than outcome, became an intentional common practice for some upon their return, and aided in creating memories: “when I'm in an area that I want to remember, I take a moment to experience it with all five senses” (S7); “Looking back at adventures I had during my senior year (my final swim meet, eating food in my apartment, moving out of my apartment) I remember more than what the scene looked like. I remember how the swim cap felt on my head, how accidentally overly-seasoned my chicken was for dinner and how it made me felt to move out of such a room I lived for nine months in. I truly think living mindfully helps one appreciate the little things and acknowledge how much detail we once missed in our everyday living experience” (S10).

The intentional scaffolding and organization of the study-abroad seminar and associated experiences provided students with tools to continue using—even after the completion of the course and the study abroad program. The reinforcement of contemplative practices throughout the semester and the encouragement of student agency allowed students to not only remember the tools, but consciously decide to continue using them beyond their time in France. Student 10 insists, “I will forever and always incorporate mindfulness into my everyday life long term. Whether that means when I'm eating, when I'm working with patients, or when I get the chance to travel again. If I feel it slipping and need a mindfulness refresher I will take out the *Gifts of Imperfection* [Brené Brown] book or Thich Nhat Hanh or even a raisin. HAHA.”

We are cognizant that our sample size is small and aim to conduct similar studies with future study-abroad groups, in order to corroborate trends observed in this study. However, we can conclude from this study that the integration of mindfulness and learning in a study-abroad setting may help with the students’ grounding and attentiveness, self-awareness, intercultural communicative competence, and memory. A mindful approach has a lasting impact on students, who report its influence in the spheres of academic, personal, and professional lives, nearly a year and a half after returning to the United States. In line with recent literature on integration of contemplative perspectives within teaching and learning, we encourage and recommend to other international educators the integration of a mindful framework in their curricula. Irrespective of program length or program location, we see tremendous potential for the incorporation of contemplative pedagogy and mindfulness in study-abroad programs, as a vehicle to promote the maturation of young adults.

²The use of the loving-kindness meditation, specifically, is indicative of students’ engagement with the people around them, be it acquaintances or longtime friends or family.

³The raisin meditation involved using each of the five senses to experience a raisin. The sense of taste was the last one explored, after taking a small bite of the dried fruit.

References

- Barbezat, D. P., & Bush, M. (2014). *Contemplative practices in higher education: Powerful methods to transform teaching and learning*. Jossey-Bass.
- Barner, R., & Barner, C. (2011). Mindfulness, openness to experience, and transformational learning. In C. Hoare (Ed.), *The Oxford handbook of reciprocal adult development and learning* (pp. 347–362). Oxford University Press.
- Berkovich-Ohana, A., Glicksohn, J., Ben-Soussan, T., & Goldstein, A. (2017). Creativity is enhanced by long-term mindfulness training and is negatively correlated with trait default-mode-related low-gamma inter-hemispheric connectivity. *Mindfulness*, 8(3), 717–727. <https://doi.org/10.1007/s12671-016-0649-y>
- Brown, K., & Ryan, R. (2003). The benefits of being present: Mindfulness and its role in psychological well-being. *Journal of Personality and Social Psychology*, 84, 822–848. <https://doi.org/10.1037/0022-3514.84.4.822>
- Brown, K., Ryan, R., & Creswell, J. (2007). Mindfulness: Theoretical foundations and evidence for its salutary effects. *Psychological Inquiry*, 18 (4), 211–237. <https://doi.org/10.1080/10478400701598298>
- Clancy, K. (2020). Towards a relational lens: Contemplative pedagogy and study abroad [Doctoral dissertation, University of Minnesota]. University of Minnesota Digital Conservancy. <https://hdl.handle.net/11299/215132>.
- Condon, P., Desbordes, G., Miller, W., & DeSteno, D. (2013). Meditation increases compassionate responses to suffering. *Psychological Science*, 24 (10), 2125–2127. <https://doi.org/10.1177/0956797613485603>
- Donald, J., Sahdra, B., Van Zanden, B., Duineveld, J., Atkins, P., Marshall, S., & Ciarrochi, J. (2019). Does your mindfulness benefit others? A systematic review and meta-analysis of the link between mindfulness and prosocial behaviour. *British Journal of Psychology*, 110(1), 101–123. <https://doi.org/10.1111/bjop.12338>
- Greenberg, J., Romero, V.L., Elkin-Frankston, S., Bezdeck, M., Schumacher, E., & Lazar, S. (2019). Reduced interference in working memory following mindfulness training is associated with increases in hippocampal volume. *Brain Imaging and Behavior*, 13, 366–376. <https://doi.org/10.1007/s11682-018-9858-4>
- Hölzel, B. K., Lazar, S., Gard, T., Schuman-Olivier, Z., Vago, D. R., & Ott, U. (2011). How does mindfulness meditation work? Proposing mechanisms of action from a conceptual and neural perspective. *Perspectives on Psychological Science*, 6, 537–559. <https://doi.org/10.1177/1745691611419671>
- Iwamoto, S.K., Alexander, M., Torres, M., Irwin, M., Christakis, N., & Nishi, A. (2020). Mindfulness meditation activates altruism. *Scientific Reports*, 10, 6511. <https://doi.org/10.1038/s41598-020-62652-1>
- Kabat-Zinn, J. (1982). An outpatient program in behavioral medicine for chronic pain patients based on the practice of mindfulness meditation: Theoretical considerations and preliminary results. *General Hospital Psychiatry*, 4(1), 33–47. [https://doi.org/10.1016/0163-8343\(82\)90026-3](https://doi.org/10.1016/0163-8343(82)90026-3)
- Kabat-Zinn, J. (2009). *Full catastrophe living: Using the wisdom of your body and mind to face stress, pain, and illness*. Bantam Dell.
- Kabat-Zinn, J. (2012). *Mindfulness for beginners: Reclaiming the present moment—and your life*. Sounds True.
- Owen-Smith, P. (2018). *The contemplative mind in the scholarship of teaching and learning*. Indiana University Press.
- Patton, M. Q. (2002). *Qualitative research and evaluation methods* (3rd ed.). SAGE.
- Sedighimornani, N., Rimes, K., & Verplanken, B. (2019). Exploring the relationships between mindfulness, self-compassion, and shame. *SAGE Open*, 9(3). <https://doi.org/10.1177/2158244019866294>
- Zajonc, A. (2013). Contemplative pedagogy: A quiet revolution in higher education. *New Directions for Teaching and Learning*, 113, 83–94.
- Zeidan, F., Johnson, S. K., Diamond, B. J., David, Z. & Goolkasian, P. (2010). Mindfulness meditation improves cognition: Evidence of brief mental training. *Consciousness and Cognition*, 19, 597–605, <https://doi.org/10.1016/j.concog.2010.03.014>.

I'M NOT A ROBOT - REPORT ON THE IMPLEMENTATION OF AI IN EARLY CHILDHOOD EDUCATION

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Abstract

Artificial intelligence (AI) technology is creating a new reality in daily life with e.g., smart home functions. This in turn has a major impact on both the socialisation processes of children and communication behaviour in family. The increasing technology-driven saturation of our everyday routines with AI is a crucial challenge for educational institutions. However, looking at AI in pedagogical work in kindergartens from a scientific perspective, the topic still has some research gaps. Only a few articles, describe efficient education concepts aiming at fostering AI literacy (cf. Chen et al., 2020; Kandlhofer et al., 2017).

In Early Childhood Education (ECE) practice, however, there are many reservations about technology, digital media, and AI in particular (Mertala, 2017). Nevertheless, it is imperative that pedagogically trained professionals understand in depth the implications that arise from the interaction between humans and AI. Within the framework of the project, which is focused on pedagogical practice, educators are encouraged to deal with the topic of AI on the one hand and to test concrete implementation possibilities with didactic materials, so-called toolboxes, on the other. In this way, the use of AI can become a key competence both in pedagogical professional training and in the educational biography of children.

Consequently, the aim of *I'm not a robot*-project is to design transferable and practical modules within the further training of educational professionals to enable an active, creative, and conscious use of AI-based technologies throughout Europe. Furthermore, the goal is to develop and test innovative didactic methods regarding AI teaching and learning materials. The EduSpace Lernwerkstatt -a working unit of the Free University of Bolzano- will conduct the mixed-method study in close cooperation with the project partners, who will all carry out development and testing independently and with country-specific characteristics. The ultimate aim is to develop training programmes for educators that will enable them to integrate current technological developments into their everyday work in a meaningful way.

Keywords: *Artificial intelligence, kindergarten, method boxes, training programmes for educators, EU project.*

1. Introduction

Artificial intelligence (AI) plays a central role in our daily lives. For example, robots are on the move under the kitchen table after breakfast to collect the crumbs from the floor or trim the lawn in the front garden. Voice recognition software searches for contact data in the address book of the mobile device to make a call to the supervisor or mother-in-law. In some households, refrigerators order favourite products from the supermarket, and the driving assistant helps with parking or keeps a safe distance from the vehicle in front at the highway. AI skills are highly appreciated in economic fields and are strongly promoted as well in education policies in most of the industrialised countries.

However, the increasing impact of AI-assistants into everyday life is a new challenge for educational institutions. To avoid mystification or misinterpretation in the pedagogical work, interaction between humans and AI-assistants in everyday life as well as the basic of AI should firstly be understood by educators. To date, pedagogical approaches to teach basic knowledge adapted to ECE, independent of specific programming languages or tools are hardly to be found in literature. Currently existing studies mostly focus on promoting the application of artificial intelligence technology in preschool education (Jiang, 2020). Others are stressing the potential impact on teaching and learning (Nieding et al., 2020; Tuomi, 2018).

The *I'm not a robot*-project responds to a Europe-wide education and training deficit and offers field-tested concepts and modules for basic application skills in dealing with AI for both educational professionals and children aged 3 to 5 years. The aim is to develop both a demand-oriented methodology for a pedagogically designed application of AI-based technologies in kindergartens.

2. Designing practice-oriented teaching and learning tools

Firstly, to determine the specific situation as well as the existing needs in German, Danish, Lithuanian and Italian kindergartens regarding the topic of artificial intelligence, a questionnaire is developed and applied. This allows the educators' attitudes and reservations about digital media to be surveyed and can be taken into account in the further course of the project. Secondly, from the central results options and potentials for the design of so-called tool boxes are derived. In addition, indications of appropriate content are identified for the further training concept of the pedagogical staff. The training and strengthening of the medi-pedagogical competences of educators is the central goal of the project and thus ties in with the current discussions on the professionalisation of pedagogical professionals in the course of digitalisation (Stadler-Altmann, 2021).

The Free University of Bolzano is chiefly responsible for the development of the tool boxes. Due to the well-equipped environment of the EduSpace learning workshop, the experienced researchers of the Faculty of Educational Sciences find ideally suited prerequisites for both the scientific support in the conception of the boxes and their practice-oriented testing (Schumacher, 2020; Stadler-Altmann et al., 2020). The development and proving of the tool boxes take place in close cooperation with the international project partners and in consideration of the national-specific particularities.

The tool boxes refer to the European Framework for the Digital Competence of Educators (Redecker, 2017) and incorporate the described competency frameworks for responsible, self-determined participation in the digital society. Material and didactic notes inside are accounted for daily use in kindergarten practice. For this purpose, routine play and learning activities of kindergarten children could get deliberately pick up. Additionally, it is illustrated in which fields the resources that are already available in the kindergarten can be linked to the topic of AI. Thus, the underlying activities of the children correspond to the level of development and the developmental tasks of the kindergarten age

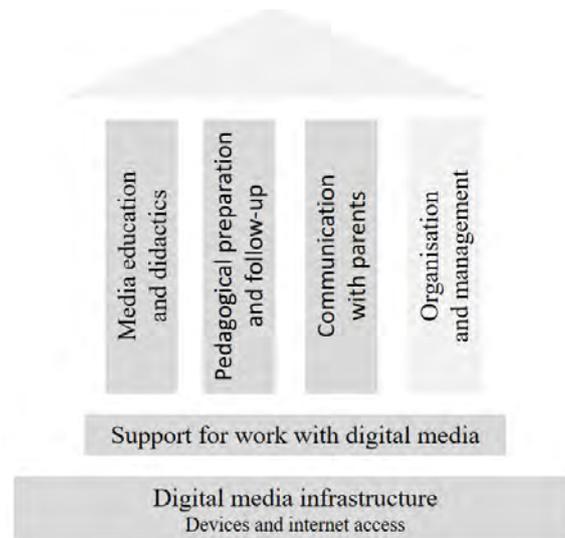
All subjects could be developed without much effort, using toys and already existing equipment in the sense of reinterpretation or upcycling. The tool boxes are fruitful in an overall context; thus, the learners get a widespread insight of the AI topic by working through all stages. Nonetheless, the boxes can also be taken independently of each other to highlight individual aspects of understanding and operating with AI. The set provides the opportunity, to apply to the AI topic with little or no prior knowledge of the subject, on the one hand, and to go deeper into the subject of AI with advanced knowledge and each box, on the other hand.

One basic tool box is specifically addressed at pedagogical professionals who are interested in the question of what AI mean in kindergarten and how ease children's access to the topic. In this box, the pedagogical challenges of using digital media in kindergartens are also addressed and embedded in the current state of the educational science discussion. This clarifies the central approaches of ECE in the context of digital media and makes them comprehensible for educators. Included are mainly elements for everyday kindergarten life itself, but also ideas for the home and suggestions for communication with parents.

3. Methods of exploring the media-related environment in kindergartens

The mode and extent of children's media behaviors are strongly hooked on socialisation factors (Hurrelmann & Andresen, 2012, p. 181). This includes both the way children relate to media consumption in their families and the way they get in touch with media in educational institutions. Research on media-related skills in the age group of 6 and older can be conducted using standard qualitative social science methods, whereas knowledge about the younger age group is obtained either through elaborate observation procedures or through surveys and observations of parents or educational professionals. Since the target group in the *I'm not a robot* project is teachers in kindergarten, we address them by means of a questionnaire.

Figure 1. Levels of digitisation of day care facilities for children.



Note. From "Digitalisierung in Kindertageseinrichtungen," by H. Knauf, 2019, p. 5 (<https://doi.org/10.25656/01:17999>). Creative Commons by Helen Knauf. Lizenz: CC BY SA 4.0.

Of central interest to survey the current state are environmental preconditions, personal media competencies, and beliefs towards AI (see fig. 1). The area of organisation and management was not included since commonly inserted nation- or municipality-specific programmes cannot be changed by the institution itself or by the agency. For all areas, questions were asked about the current handling in the facilities, as well as about personal ideals and perceived obstacles. The questionnaire was already confirmed in 2019 within another study (Knauf, 2019, 2020) and was only adapted linguistically for this context.

The expected results will indicate to what extent the pedagogical staff considers their working environment to be functional and consider themselves competent enough to operate professionally with the topic of digital media in general and AI in particular.

4. Discussing approaches integrating AI in ECE

According to the MoFam study (see Wagner et al., 2016), professionals appreciate further education and training that is oriented towards their real working conditions. Furthermore, they are keen on giving a trial to AI or digital devices themselves to gain deeper insight. Materials with comprehensible recommendations are welcome to give confidence in argumentation while counselling parents. This in turn, generates a benefit for families themselves, e.g., as a relief in dialogues with their children.

The following example illustrates the implementation of the AI topic into the daily work with the children in kindergartens (see table 1).

Table 1. Example for the implementation of the AI topic at kindergarten.

Topic	Target group	
Let's play robots!	Educational professionals	Children
Objectives	differentiate terminology (AI, robots, algorithms, programming, coding, ...) Pick up and address various ideas of AI	social skills: leading and following, taking responsibility, developing trust Cognitive competences: planning and implementing sequences Linguistic and communicative competences (programming, understanding symbols) Body-space perception (what is a step, how much is 45° rotation)
Methods	Role-play: moving the robot from a starting point to a destination (touching head = forward, touching left shoulder = turn left, etc.)	
Material	Playing fields: colourful rubber mats, tile floor, command or symbol cards	

The content and orientation of the tool boxes is also based on the children's needs and curiosity about robots. The children's questions in the field of AI are chosen as the starting point for the development of the tool boxes in order to put the children's perspective in the focus of the considerations (Borowski et al., 2016). The structure of the tool boxes already demonstrates that the pedagogical work in the kindergarten is at the center.

5. Conclusion

The range of possibilities for using digital media is not only very wide in professional life, but also in the family or in educational institutions. Following Prentzas (2013), the children's motivation in taking part in learning and social activities and remain interested in the technological resource even in long term interaction is documented well. A survey of professionals in day-care centres conducted by Knauff (2019) shows a great open-mindedness towards the use of digital media. According to the majority of the surveyed working with the computer is comfortable since it facilitates activities of organisational duty.

Generally, a reflected awareness of one's own media competences is a basis to jointly clarify which tasks and goals should be set to promote interaction with digital media and AI. The activity of "playing" in

the children's activities on the computer are too short-sighted. It would be necessary to discuss with each other whether and in what context computer games are a meaningful activity in a day care centre.

So here it would be necessary to define clear objectives and propose didactic arrangements, as mentioned in the example (see tab. 1). Based on this, it can also be determined more precisely which additional competences should be strengthened on the part of the pedagogue.

References

- Borowski, C., Diethelm, I., & Wilken, H. (2016). What children ask about computers, the internet, robots, mobiles, games etc. In J. Vahrenhold & E. Barendsen (Eds.), *WiPSCE '16: Proceedings of the 11th Workshop in Primary and Secondary Computing Education* (pp. 72–75). Association for Computing Machinery. <https://doi.org/10.1145/2978249.2978259>
- Chen, X., Xie, H., Zou, D., & Hwang, G.-J. (2020). Application and theory gaps during the rise of Artificial Intelligence in Education. *Computers and Education: Artificial Intelligence, 1*, 1–20. <https://doi.org/10.1016/j.caeai.2020.100002>
- Redecker, C. (2017). *European Framework for the Digital Competence of Educators. DigCompEdu* (EUR 28775 EN). Publications Office of the European Union. doi:10.2760/178382
- Hurrelmann, K., & Andresen, S. (2012). World Vision Kinderstudie 2010. *GESIS Datenarchiv, Köln. ZA5061 Datenfile Version 1.0.0*. <https://doi.org/10.4232/1.11403>
- Jiang, N. (2020). Research of Application of Artificial Intelligence in Preschool Education. *Journal of Physics: Conference Series, 1607*(1). <http://dx.doi.org/10.1088/1742-6596/1607/1/012119>
- Kandlhofer, M., Steinbauer, G., Hirschmugl-Gaisch, S., & Huber, P. (2017). KI ab dem Kindergarten. *OCG Journal, 42*(1).
- Knauf, H. (2019). *Digitalisierung in Kindertageseinrichtungen. Ergebnisse einer Fragebogenerhebung zum aktuellen Stand der Nutzung digitaler Medien* (Bielefeld working paper; 3). <https://doi.org/10.25656/01:17999>
- Knauf, H. (2020). Documentation Strategies: Pedagogical Documentation from the Perspective of Early Childhood Teachers in New Zealand and Germany. *Early Childhood Education Journal, 48*(1), 11–19. <https://doi.org/10.1007/s10643-019-00979-9>
- Mertala, P. (2017). Wag the dog - The nature and foundations of preschool educators' positive ICT pedagogical beliefs. *Computers in Human Behavior, 69*, 197–206. <http://dx.doi.org/10.1016/j.chb.2016.12.037>
- Nieding, I., & Klaudy, E. K. (2020). Digitalisierung in der frühen Bildung. Der Umgang mit digitalen Medien im Spannungsfeld zwischen Schutzraum und Schlüsselkompetenz. In A. Wilmers, C. Anda, C. Keller, & M. Rittberger (Eds.), *Bildung im digitalen Wandel. Die Bedeutung für das pädagogische Personal und für die Aus- und Fortbildung* (pp. 31–56). Waxmann.
- Prentzas, J. (2013). Artificial Intelligence Methods in Early Childhood Education. In X.-S. Yang (Ed.), *Artificial Intelligence, Evolutionary Computation and Metaheuristics* (pp. 169–199). Springer. https://doi.org/10.1007/978-3-642-29694-9_8

- Schumacher, S. (2020). Paideas x Box - Von Antinomien des Gebunden-Seins in augmentiert und nichtdigital-medienkonstituierten Lernwelten. In A. Beinsteiner, L. Blasch, T. Hug, P. Missomelius, & M. Rizzolli (Eds.), *Augmentierte und virtuelle Wirklichkeiten* (pp. 221–236). Innsbruck University Press.
- Stadler-Altmann, U. (2021). Digitale Lehrerbildung – den Wandel erforschen. *Lehrerbildung auf dem Prüfstand*, 14(1), 7–10.
- Stadler-Altmann, U., Schumacher, S., Emili, E. A., & Dalla Torre, E. (Eds.). (2020). *Spielen, Lernen, Arbeiten. Kooperation und Kollaboration in Hochschullernwerkstätten. Facetten der Kooperatin und Kollaboration*. Klinkhardt.
- Tuomi, I. (2018). *The Impact of Artificial Intelligence on Learning, Teaching, and Education* (M. Cabrera, R. Vuorikari, & Y. Punie, Eds., EUR 29442 EN). Publications Office of the European Union. JRC113226
- Wagner, U., Eggert, S., & Schubert, G. (2016). *MoFam – Mobile Medien in der Familie*. JFF - Institut für Medienpädagogik in Forschung und Praxis.

CHALLENGES IN TEACHING PROGRAMMING

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Abstract

Teaching is a profession that helps learners to gain new knowledge and insight. Therefore, a teacher needs to choose what to teach the students and how to approach them in an engaging and understandable way. In teaching programming, choosing the content and engaging students can be a challenge because the term programming is used in a variety of ways and contexts, which in turn demands different competencies. This paper uses the Didactical Triangle to discuss some challenges that arise when teaching programming on content, teacher, and student level. Some challenges arise from the structure of programming (syntax, interfaces, approaches, experience, and qualifications), while others are developed from the individual context of the learning situation (role of the teacher, students' motivation, expectations). While programming in computer science is relatively well described in the subject literature, programming in other professions is not well defined. Teaching computer programming in different courses can cause different challenges. Some situations of learning programming might be difficult for computer science students, while other situations might cause challenges for «non-data» students. This paper will present teachers' experiences combined with the theoretical view of challenges that arise when teaching programming in different study programs.

Keywords: *Programming skills, digital competencies, 21st-century skills, didactics in IT education, introduction to programming.*

1. Introduction

“Why is programming hard?” asked Guzdial in his paper (2003, p.1). He is not the only researcher that asked this question, but as he stated himself, “It may be that “What makes programming hard?” is not the most fruitful question to ask” (p.21). There are challenges in introducing programming, some are similar to challenges in teaching in general or teaching technological courses, but some are unique to programming education.

Hartree (1950) stated that there are two stages to organize a calculation for an automatic digital calculating machine. He distinguished them as programming and coding, where the first term consisted of structures of breaking down and dividing the calculations in “a sequence of elementary operations which the machine can carry out” (p.248), and the second term described writhing instructions in a way that the machine would execute. These stages were separate at the beginning of the computer era. Today many people overuse the term programming or use it as a synonym for coding, or “[p]erhaps we don't know yet what programming really is or what it could be” (Guzdial, 2003, p. 21). Blackwell stated that since there are different views of programming, then “when people say they are programming, we should not question whether this activity is genuine programming, but instead analyse their experiences in order to understand the general nature of programming activity” (2002, p. 208).

This paper will present theoretical perspectives on the challenges that the authors experience in teaching programming. The aim of this paper is to analyse and structure the challenges that arise in teaching programming using the Didactical Triangle.

2. Challenges in practice

There are general challenges in teaching and specific challenges when teaching programming (Blackwell, 2002; Guzdial, 2003). For example, presenting information clearly and interestingly, motivating the students, keeping a preferred speed, assessing students, giving students feedback, and many more. To understand the challenges in teaching programming, one must understand the didactics of

programming. For the purpose of this paper, the Didactical Triangle (Kansanen & Meri, 1999) was used. The model emphasizes communication between a teacher, a student, and content, with special attention to the context of a learned situation that affects the teacher and the student.

2.1. Content

2.1.1. Different approaches. Programming has a set of rules and structures that a program needs to follow. However, there are still many options on how to plan and build a program. One approach is to look at procedural programming. When the programmer gets several new features and writes a program, the student can use the procedural method to enrich the code from what they have previously learned. This approach builds student knowledge step by step, always returning to the presented facts, even if that might share a narrow perspective on the new topic (Berglund & Lister, 2010). Another approach is to look at the most significant advantages (and differences) of the new topic, present the ideas first, and then go slowly back to recap how the new topic fits with the rest. (Berglund & Lister, 2010).

2.1.2. Specialized content to the subject. The content in teaching programming will vary according to the course it is presented in. For example, in the Norwegian school curriculum introduced by Kunnskapsløftet (LK20), the concept of computational thinking is used to connect algorithms to systematic problem solving and support «thinking like a computer» (Wing 2006). This approach is also understood as a way of experimenting, tinkering with technology (Csizmadia et al., 2015). Computational thinking is both seen as a means to uncover a problem field, as well as necessary when specific sub-problems are to be solved. In teacher education and in schools, building and programming small robots have been introduced to facilitate encounters between computational thinking and the connection between the physical properties of robots and the behaviour that is implemented virtually in code. When students build and code their own robots, they open up for discussions about how automatons become influential on an individual level and affect us at the societal level. This approach may not be as relevant in teaching programming to students in technical subjects, but in teacher education, it is very relevant to address the pupils' way of computational thinking and learning (Fojcik et al., 2020).

2.1.3. The choice of interfaces. When programming with a text-based interface, users may experience difficulties when it comes to overview and the program's internal structure. This may make it difficult for novice programmers to learn how to program (Blackwell, 2002; Guzdial, 2003). Different interfaces have been developed to address such challenges. Block-based programming languages, like Scratch, make the users able to program by dragging and dropping visual blocks. On the other hand, text programming languages such as Python and JavaScript can be more complex and better suited for advanced tasks.

2.2. Teacher

2.2.1. Experiences with programming. Teachers need to demonstrate interesting cases, show good practices, and instil the joy of programming in students. This can be done by someone who truly knows what he/she is doing, both in the subject's content and in pedagogical approaches. If not, the results might not be comparable to the students. The same goes for professors that have not been involved in software development. Then, the only experience shared with students can be a theoretical one. (Berglund & Lister, 2010).

2.2.2. Updating qualifications. "One of the greatest dangers in teaching is the routine, and habitual repetition of actions often observed in one's teachers or colleagues" (Czerepaniak-Walczak, 2014). This is particularly evident in the teaching of engineering subjects related to computer science. This area is quickly changing all the time. By updating the teacher's qualifications and experience, one might avoid repetitions. At the same time, the industry introduces many new terms and ideas that are more relevant for the students when they apply for jobs after finishing their studies.

2.2.3. Motivating students. In many subjects' students will have very different motivations. As a teacher, one will have to place the programming tasks in contexts where the students see the larger relevance and importance of the specific tasks they are given by the teachers.

2.3. Students

2.3.1. Learning approach. If students have a misconception about how programming works, their first meeting with programming can be confusing. Many students start their learning process with memorization and creating habits they do not fully understand. When the students choose a code sequence that works, they might use it again in a different setting to see if it is still working. This might

create a “reward” for this habit, even if the student does not understand why it works (or does not work). (Ertmer & Newby, 2013). Presents that constant patterns, repetitive actions (not necessary with understanding), signals for positive and negative responses can be desirable and help at the beginning of the course. Students have to learn names and definitions. But the programmer cannot rely only on repetition and memorization. It is necessary to have understanding, problem-solving skills, to talk with others – to divide the problem into smaller parts, where the parts can be worked on separately. Such an algorithmic approach may also make it more feasible to work on a problem in groups.

2.3.2. Student expectations. Students observe the world, use modern tools (mobile phone, PC, smart home/watch, etc.), and often communicate that they would like to have something similar in their studies. Sometimes the students have interesting ideas that could be implemented in the course. In contrast, at times, students want to learn about big ideas like the deeper functionality of social media, the Internet of Things, autonomous systems, etc. Education needs to take into account that many students want to learn as part of a much larger context.

3. Discussion

By using the Didactical Triangle, we can see that teaching is not the achievement of one individual. There is still possible to have a relationship as a mentor-apprentice, but today’s structure often consists of even more elements than the triangle: colleagues, administration, management, library, IT services, assistants, and others. Teachers have to share experiences to help and motivate each other as well as their students. When cooperating, different people with their ideas, backgrounds, point of view can do much more than individuals on their own.

To increase such synergies, collaboration must be organized. One approach is to develop and implement a system/rules that facilitate knowledge sharing and collaboration among teachers, as well as including students. Shared resources may distribute the work and allow individuals to contribute where they are strongest and find their motivation.

Teaching programming has many possibilities and requirements. The use of modern tools often requires particular knowledge and skills. Students who specifically study programming need different theoretical and practical knowledge and skills compared to students of other majors. These students don’t need the same theory and basic knowledge of algorithmics, problem-solving, and will often benefit from perspectives that introduce what programmed computers can do, not so much how the computers are programmed using advanced programming languages.

4. Conclusions

Real-world examples show that there is no “best solution”. There are different expectations in scope (speed, standards, knowledge of technologies, libraries, programming environments) as well as the area (industry, banking, marketing, education) shows that there are very different expectations, and it is impossible to meet them all in all courses. Teachers require a different approach than computer scientists. Their purpose of education and the challenges they meet in their professional lives differ.

A programming course is a challenge for many students. It should be taught by a competent teacher with knowledge of the subject and pedagogy. It’s easy to alienate students and harder to motivate them if there are problems. In programming, almost every element builds on the previous ones. Lack of mastery of the primary material will give rise to deficiencies in subsequent elements as a result.

References

- Berglund, A., & Lister, R. (2010, December). Introductory programming and the didactic triangle. In T. Clear and J. J. Jamer (Eds.), *Twelfth Australasian Computing Education Conference (ACE2010)*, Volume 103, pp. 35–44. Retrieved from https://www.researchgate.net/publication/228848373_Introductory_Programming_and_the_Didactic_Triangle
- Blackwell, A. F. (2002). What is programming? In J. Kuljis, L. Baldwin R. Scobble (Eds.). *14th workshop of the Psychology of Programming Interest Group, Brunel University*, (pp. 204–218). Retrieved from <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.58.1345&rep=rep1&type=pdf>

- Csizmadia, A., Curzon, P., Dorling, M., Humphreys, S., Ng, T., Selby, C., & Woollard, J. (2015). Computational thinking-A guide for teachers. Retrived from https://eprints.soton.ac.uk/424545/1/150818_Computational_Thinking_1_.pdf
- Czerepaniak-Walczak M., (2014). Miedzy teorią a praktyką, Funkcje koncepcji pedagogicznych w pracy nauczycieli i nauczycielek, „Refleksje” nr 6, s. 10–14.
- Ertmer, P. A., & Newby, T. J. (2013). Behaviorism, cognitivism, constructivism: Comparing critical features from an instructional design perspective. *Performance improvement quarterly*, 26(2), 43–71. <https://doi.org/10.1002/piq.21143>
- Fojcik, M. K., Fojcik, M., Sande, O., Refvik, K. A., Frantsen, T., & Bye, H. (2020, November). A content analysis of SOLO-levels in different computer programming courses in higher education. In *Norsk IKT-konferanse for forskning og utdanning* (No. 4). Retrieved from A content analysis of SOLO-levels in different computer programming courses in higher education | Norsk IKT-konferanse for forskning og utdanning (bibsyst.no)
- Guzdial, M. (2002). *Programming Environments for Novices*. Retrived from novice-envs2.pdf (umich.edu)
- Hartree, D. R. (1950). Automatic Calculating Machines. *The Mathematical Gazette*, 34(310), 241–252. <https://doi.org/10.2307/3611023>
- Kansanen, P., & Meri, M. (1999). The didactic relation in the teaching-studying-learning process. *Didaktik/Fachdidaktik as Science (-s) of the Teaching profession*, 2(1), 107–116. Retrieved from https://www.researchgate.net/publication/313645561_The_didactic_relation_in_the_teaching-studying-learning_process
- LK20 (2020). *Læreplanverket i Kunnskapsløftet*. Utdanningsdirektoratet. Retrieved from <https://www.udir.no/laring-og-trivsel/lareplanverket/>
- Wing, J. M. (2006). Computational thinking. *Communications of the ACM*, 49(3), 33–35. <http://dx.doi.org/10.1145/1118178.1118215>

PRONUNCIATION EVALUATION CRITERIA FOR EFL LEARNERS

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Abstract

Pronunciation is one of the competencies foreign language learners of English are implicitly or explicitly judged for in classroom context as well as real-life communication. At the same time, both teachers and learners express concerns concerning this competence, as relatively little attention is being paid to pronunciation issues. While accuracy was desired in the past, comprehensibility is preferred as the goal of pronunciation instruction in recent years. Mistakes and errors the speakers make vary across the language background of speakers and can be manifested at segmental and suprasegmental levels; however, familiarity with the topic discussed may help overcome many obstacles the foreign language speakers may make. Pronunciation may be judged by human raters as well as automatically by specialized software. The presented study aims to current practices presented in research papers published in the past ten years. The results suggest different criteria applied to pronunciation evaluation.

The paper presents partial research outcomes of the projects KEGA 019TTU-4/2021 Introducing new digital tools into teaching and research within transdisciplinary philological study programmes and 7/TU/2021 Pronunciation mistakes of pre-service teachers of English.

Keywords: *EFL, pronunciation, evaluation, comprehensibility, accuracy.*

1. Introduction

Evaluation in education is defined in the broader context as assessing “merit and worth” (Byram & Hu, 2017, p.234). Evaluation, therefore, considers the evidence provided in the process, which should methodologically justify the individual steps taken in the process of teaching and evaluation. Kizlik (2012, p. 2) suggests evaluation allows interpretation of the collected data within a “situation”, i.e., material and other conditions in which evaluation occurs. This justification is possible due to the multidisciplinary nature of evaluation, as it considers models and approaches from different disciplines. More specifically, educators (e.g., Byram & Hu, 2017, Scanlan, 2012) distinguish between formative assessment, i.e., strengthening the evaluated subject, and summative evaluation, i.e., the result of the subject achieved after delivering a teaching programme.

According to the Common European Framework of Reference for Languages: learning, teaching, assessment; Council of Europe, Companion Volume (CEFR; 2018), a key document shaping language policies in Europe, spoken communication relies on pronunciation, which is one of the competencies a foreign language learner must master to be able to participate in a broader social discourse. As a result, the document focuses on various degrees of comprehensibility and intelligibility according to the proficiency levels foreign learners achieve. Through language, foreign language learners express themselves and adapt to their language community using acoustic forms typical and comprehensible for a particular setting. Therefore, pronunciation is one of the first features of language a communication partner perceives and forms their attitude towards the speaker (Hendriks, van Meurs & Usmany, 2021).

The dominant approaches have shaped the evaluation of non-native pronunciation in foreign language teaching. While audiolingualism emphasizes pronunciation and various forms of its training, in the currently predominant communicative language teaching, learners are expected to achieve good pronunciation by exposure and attention to other layers of language (Murcia, Brinton, & Goodwin, 1996). The most current perspective on pronunciation teaching emphasizes comprehensibility and intelligibility (Levis, 2005; Vančová, 2019). Under the approaches mentioned above, two general goals and the following evaluation criteria for pronunciation are considered. The first is the ability to imitate the native-like pronunciation of non-native learners, which aims for accuracy. Accuracy is evaluated by comparing the model’s and learner’s pronunciation, highlighting the deviations. The degree of proximity of sounds of a native pronunciation and the deviation of a non-native speaker is referred to as an

accentedness and can be judged by human raters or digital tools (Levis, 2007; Pokrivčáková, 2015). The second is the speaker's ability to be understood by listeners judged from the listener's perspective. This type of pronunciation skill is referred to as intelligibility or comprehensibility (Vančová, 2021). While intelligibility refers to the speaker's ability to be understood, the latter refers to the listeners' amount of effort to understand the speaker. Intelligibility and comprehensibility, contrary to accuracy, are predominantly judged by human raters who assess these aspects of non-native speech by transcription or comprehensibility evaluation sheets. Speech sounds are assigned a high or low functional load which hinders or promotes comprehensibility (Munro, 2010). However, judging these pronunciation aspects may be subjective, as human raters' experience with judging pronunciation may affect the results of their evaluation (Isaacs & Thompson, 2013), as well as external factors, e.g., raters' tiredness or background noise (Isaacs & Harding, 2017; Sheppard, Elliott & Baese-Berk, 2017).

Linguistically homogeneous classes can address the same type of mistakes in terms of accuracy. The possible deviations in pronunciation of foreign learners can be typically grouped according to the influence of the mother tongue (Kelly, 2000). These challenges then present the aim of the pronunciation instruction in accuracy. To know the needs their learners should address, teachers identify the typical mistakes their linguistically homogeneous groups make. As far as the pronunciation requirements and proficiency levels are concerned, the goals for each level of foreign language learners are not clearly defined. Thus, many teachers and learners are predominantly guided by course books, which present segmentals and suprasegmentals across all proficiency levels, and the purpose they use the English language (non-professional or expert use, Vančová, 2020, 2021).

2. Design

The presented study follows the qualitative approach, which aims to “understanding behaviors of values, beliefs and assumptions” (Choy, 2014, p. 101). The emphasis is placed on content analysis of recent research studies published in peer-reviewed academic journals and proceedings (since 2012).

3. Objectives

The presented study aims to answer the following questions:

1. *What criteria do the authors apply for pronunciation evaluation?*
2. *In recent research studies dealing with pronunciation improvement, do the researchers use human raters or digital tools for English pronunciation evaluation?*

4. Methods

To answer the research questions, a method of content analysis was selected. The content analysis focused on the data presented in research studies presented in reviewed academic journals or conference proceedings and published since 2012 and available in academic databases. The research studies were searched for in the following databases: *Google Scholar, Eric, Taylor and Francis, Web of Science Core Collection, Wiley Online Library, SAGE and Science Direct* using the keywords “pronunciation, evaluation, English, rubrics, scale”. The search results were then checked for appropriateness (presenting original research data of pronunciation evaluation by human raters or digital tools). After that, ten studies from the following journals and conference proceedings were selected: *Asian EFL Journal Research Articles, Proceedings of the International Symposium on Automatic Detection of Errors in Pronunciation Training June 6 – 8, 2012 KTH, Stockholm, Sweden, Special issue Making Connections: Studies of Language and Literature Education (Special issue in honor of Gert Rijlaarsdam) (2018), Language Teaching Research, Language Learning & Technology, Computer Assisted Language Learning, System and IAFOR Journal of Education.*

5. Results

The selected articles were analyzed for the overall conditions in the evaluation process and the identified criteria for pronunciation evaluation in the context. The overview is presented in Table 1 below:

Table 1. Overview of the analyzed studies.

Study	Participants and raters	Instruction and/or data collection tool	Pronunciation focus
Zahra et al. (2012)	9 EFL learners (speakers) and 12 native-speaking raters	decision tree and speech recognition technology	obvious, minor, no errors (phone and syllable level)
Luo (2014)	55 Taiwanese English majors and two human raters, peer-review	computer-assisted pronunciation training technique	4-point holistic scale (native-like to incomprehensible, segments to sentences)
Fouz-González (2017)	121 Spanish learners of English, 2 non-native judges	Twitter-based instruction	mispronunciation of words (phonemes, lexical stress)
Gluhareva & Prieto (2017)	20 Catalan undergraduates (18-30) and 5 native speakers of American English	recorded speech (beat and non-beat)	overall comprehensibility (rhythm)
Zoghbtor (2017)	50 L1 Arabic learners of English and 18 non-native and native English-speaking raters	Lingua Franca Core features, semi-structured interviews	pronunciation features promoting intelligibility of non-native learners of English
Koet & van den Bergh (2018)	20 Dutch upper-intermediate to advanced learners and 126 listeners	recorded speech samples (non-communicative)	comprehensibility, aesthetic quality, intonation, standardness
Al-Ahdal (2020)	32 Saudi EFL learners	podcasts (TED Talks), in-class discussion	not specified
Fouz-González (2020)	52 Spanish learners of English	English File Pronunciation app	fossilized vowels, alveolar fricatives
Moxon (2021)	105 Thai undergraduate students	SpeechAce	phonetic accuracy
Suzukida & Saito (2022)	40 Japanese learners and native-speaking raters	monologue speaking task, IELTS Pronunciation Scale	segmentals and suprasegmentals, word stress and intonation

The earlier stages of pronunciation evaluation using technology compared human evaluation and technology evaluation. Zahra et al. (2012) compared the evaluation of human and software ratings of pronunciation of ELF speakers of different linguistic backgrounds (Syrian, Dutch, Portugal, Indonesian, Pakistani, Hungarian, Nigerian and Irish). The results were not consistent (false positivity and negativity) due to two possible reasons – low quality of the system or little strictness of human raters. The study was not carried out for educational purposes but system testing. Similarly, Luo (2014) compared the effectivity of the experimental group's computer-assisted pronunciation training (CAPT) with the results achieved by the in-class only trained participants in the control group. Students provided peer feedback by commenting on a discussion board. Pronunciation was evaluated by 4-point rating rubrics, which contrasted native-like and intelligible pronunciation on different levels (phoneme, clusters, words, sentences). The peer-review of multiple raters ensured various mistakes were noted as each reviewer tended to concentrate on other types of mistakes. As a result, this type of peer feedback appeared to be sufficiently reliable. Finally, Moxon (2021) identified a statistically significant correlation between the frequency of practice and pronunciation accuracy in Thai undergraduate learners of English using speech recognition software SpeechAce.

Koet & van den Bergen (2018) used semantic differential to compare evaluation criteria of Dutch and English raters for describing the Dutch learners' pronunciation in English on 7-point scales (positive attributes: pleasant, cultured, beautiful, polished, no accent, standard, melodious, expressive, intelligible, precise, distinguished). In addition, listeners focused on speakers' aesthetic quality, intonation, comprehensibility and standardness. The findings suggest (concerning study limitations) that non-native listeners were unreliable in evaluating the aesthetic quality and intonation; however, the raters appeared to be reliable in judging comprehensibility. Such results, therefore, limit the use of non-native listeners as examiners.

Gluhareva & Prieto (2017) aimed to use gestures to improve the participants' rhythm in speech and thus let native speaking raters evaluate the overall comprehensibility, stress and intonation. The authors also considered that intelligible speech could be accented, which means that this focus of the evaluation is more inclusive than the evaluation of native-like, non-accented speech. In addition, the

samples were presented to raters in pairs (with and without the beat) to increase the raters' sensitivity during evaluation.

Regarding accuracy, Zoghbor (2017) used Jenkins' Lingua Franca Core features promoting the intelligibility of non-native learners of English as the basis for pronunciation training. The native as well as non-native speakers of English judged the performances and indicated all instances of unintelligible utterance. Similarly, Fouz-González (2020) concentrated on the production and perception of English vowels /æ, ɑ:, ʌ, ə/ and alveolar consonants /s, z/ B2 Spanish learners of English need to address due to their fossilization. Therefore, the study was designed around specific segments rather than the overall intelligibility. The participants needed to carry out the spontaneous, controlled, and imitative task to assess their progress after two weeks of daily use of the English File app for 20 minutes. Suzukida and Saito (2022) concentrated on identifying segmental and suprasegmental pronunciation features with high and low functional load in the pronunciation proficiency of Japanese learners of English across different proficiency levels. The participants were evaluated by expert native-speaking raters on a 9-point IELTS rating scale.

As far as social media in pronunciation training are concerned, they appear to be a source of authentic material for pronunciation improvement. In Al-Ahdal's study (2020), the teacher was a mediator and a human corrector of learners' errors in free speeches of students who improved their pronunciation by listening to podcasts. Similarly, Fouz-González (2017) used non-native pronunciation experts to evaluate the pronunciation of commonly mispronounced words after using Twitter.

6. Discussion and conclusions

All selected studies were conducted on adult learners of English; however, their proficiency levels varied.

Concerning the first research question, various specific pronunciation aspects were evaluated. For instance, e.g. Moxon (2021) used automatic speech recognition software Speechace for sounds, Fouz-Gonzalez in 2017 focused on the pronunciation of particular words and, in 2020, on the accuracy of advanced learners' fossilized sounds. Zoghbor (2018) focused on LFC features, and implicitly a similar approach was taken by Al-Ahdal (2020), who corrected learners' pronunciation in discussions on TED Talks. Gluhareva and Prieto (2017) improved speakers' rhythm and comprehensibility.

However, Koet & van den Bergen (2018) used a more holistic approach and analyzed the positive and negative attributes of pronunciation and standardness. Similarly, Suzukida and Saito (2022) evaluated pronunciation features with high and low functional loads for overall comprehensibility.

In terms of actual rating scales and rubrics, the studies tended to be vague, except Suzukida and Saito (2022) used the IELTS Pronunciation Scale and Luo (2014) used a 4-point scale for segmental and suprasegmental levels. The best score was achieved for native-like accuracy, while the lowest was given for incomprehensibility, combining both principles.

Regarding the second research question, the following observations were made. Human and digital tools are used for evaluation – while human raters appear to be efficient in evaluating intelligibility or more complex aspects of pronunciation (e.g., intonation) by various methods (buzzing method, Zoghbar 2017; semantic differential Koet & van den Bergen, 2018), digital tools concentrate on accuracy.

The question of raters' expertise was raised by Koet & van den Bergen (2018), who did not find significant differences between expert and inexperienced listeners; however, they acknowledge that native speakers tend to be more positive in evaluation than in evaluation of non-native speakers. Fouz-Gonzalez (2017 and 2020) used pronunciation experts to evaluate speakers' accuracy, and Gluhareva and Prieto (2017) asked native speakers to evaluate rhythm and comprehensibility. Teachers were excluded from rating by Zoghbor (2018, p. 5) because "English teachers often have exceptionally low thresholds of intelligibility". On the contrary, Luo (2014) used peer evaluation to benefit both learners and peer raters.

As the study presents, the approaches to pronunciation evaluation in pronunciation classrooms are diverse, and peer or expert evaluation can be helpful in the variety.

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References

- Al-Ahdal, A. (2020). Overcoming pronunciation hurdles in EFL settings: An evaluation of podcasts as a learning tool at Qassim University Saudi Arabia. *Asian EFL Journal Research Articles*, 27.
- Byram, M. & Hu, A. (2017). *Routledge encyclopedia of language teaching and learning*. London and New York, Routledge.
- Celce-Murcia, M., Brinton, D., & Goodwin, J. (1996). *Teaching pronunciation*. Cambridge University, Cambridge.
- Choy, L. T. (2014). The strengths and weaknesses of research methodology: Comparison and complimentary between qualitative and quantitative approaches. *IOSR journal of humanities and social science*, 19(4), 99-104.
- Council of Europe. (2018). *Common European Framework of Reference for Languages: Learning, Teaching, Assessment. Companion Volume with New Descriptors*. Strasbourg: Council of Europe.
- Fouz-González, J. (2017). Pronunciation instruction through Twitter: the case of commonly mispronounced words. *Computer Assisted Language Learning*, 30(7), 631-663.
- Fouz-González, J. (2020). Using apps for pronunciation training: An empirical evaluation of the English File Pronunciation app. *Language Learning & Technology*, 24(1), 62-85.
- Gluhareva, D., & Prieto, P. (2017). Training with rhythmic beat gestures benefits L2 pronunciation in discourse-demanding situations. *Language Teaching Research*, 21(5), 609-631.
- Hendriks, B., van Meurs, F., & Usmany, N. (2021). The effects of lecturers' non-native accent strength in English on intelligibility and attitudinal evaluations by native and non-native English students. *Language Teaching Research*, 1362168820983145.
- Isaacs, T. & Harding, L. (2017). Research Timeline. Pronunciation assessment. *Language Teaching*, 50, 347-366
- Isaacs, T., & Thomson, R. I. (2013). Rater experience, rating scale length, and judgments of L2 pronunciation: Revisiting research conventions. *Language Assessment Quarterly*, 10(2), 135-159.
- Kelly, G. (2006). *How To Teach Pronunciation (With Cd)*. Pearson Education India.
- Kizlik, B. (2012). Measurement, assessment, and evaluation in education. Retrieved October, 10, 2015.
- Koet, T., & van den Bergh, H. U. U. B. (2018). Pride and prejudice? Judging non-native pronunciation of English. *L1 Educational Studies in Language and Literature*, (Edited by L. Araujo, N. Elf, R. Funke, T. Janssen, J. van Rij, M. Schrijvers, & SK Tse).
- Levis, J. (2007). Computer technology in teaching and researching pronunciation. *Annual review of applied linguistics*, 27, 184-202.
- Levis, J. M. (2005). Changing contexts and shifting paradigms in pronunciation teaching. *TESOL quarterly*, 39(3), 369-377.
- Luo, B. (2016). Evaluating a computer-assisted pronunciation training (CAPT) technique for efficient classroom instruction. *Computer assisted language learning*, 29(3), 451-476.
- Moxon, S. (2021). Exploring the Effects of Automated Pronunciation Evaluation on L2 Students in Thailand. *IAFOR Journal of Education*, 9(3), 41-56.
- Munro, M. J. (2010, September). Intelligibility: Buzzword or buzzworthy. In *Proceedings of the 2nd Pronunciation in Second Language Learning and Teaching conference* (pp. 7-16).
- Pokrivčáková, S. (2015). 2.2 CALL and teaching pronunciation. *CALL and Foreign Language Education: e-textbook for foreign language teachers*. Pokrivčáková, S. et al. (Eds.). Nitra: Constantine the Philosopher University.
- Scanlan, C. L. (2012). *Assessment, Evaluation, Testing and Grading*. Available online.
- Sheppard, B. E., Elliott, N. C. & Baese-Berk, M. M. (2017). Comprehensibility and intelligibility of international student speech: Comparing perceptions of university EAP instructors and content faculty. *Journal of English for Academic Purposes*. 26, 42-51.
- Suzukida, Y., & Saito, K. (2022). What is second language pronunciation proficiency? An empirical study. *System*, 106, 102754.
- Vančová, H. (2019). Current issues in pronunciation teaching to non-native learners of English. *Journal of Language and Cultural Education*, 7(2), 140-155.
- Vančová, H. (2020). *Pronunciation Practices in EFL Teaching and Learning*. Hradec Králové: University of Hradec Králové, Gaudeamus Publishing House.
- Vančová, H. (2021). *Teaching English pronunciation using technology*. Nürnberg: Kirsch Verlag.
- Zahra, A., Cabral, J. P., Kane, M., & Carson-Berndsen, J. (2012). Automatic classification of pronunciation errors using decision trees and speech recognition technology. *Proceedings of IS ADEPT, Stockholm*, 65-69.
- Zoghbor, W. S. (2018). Teaching English pronunciation to multi-dialect first language learners: The revival of the Lingua Franca Core (LFC). *System*, 78, 1-14.

EVALUATION OF PRE-PANDEMIC AND PANDEMIC EDUCATION FROM THE PERSPECTIVE OF A UNIVERSITY INSTITUTE STUDENTS

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Abstract

The circumstances of the COVID-19 pandemic have brought a turbulent change to all levels of education around the world. Even in these cases, however, it is necessary to maintain accountability, i.e. the responsibility of educational institutions for both consequences and quantity and quality of their services. For this purpose, various evaluation processes are implemented across universities to identify and ensure the quality of teaching and learning. In this context, the paper deals with the first results of a comparison of higher education in both pre-pandemic and pandemic period, causing the closure of all types of schools and a complete, forced transfer to a distant, untested forms of education. In both monitored periods, the same research tool was used, namely an online evaluation questionnaire, in which the respondents had the opportunity to express their opinions on the lectures and seminars studied, on the conditions of teaching and learning, on the approach of the teacher, and on the overall assessment of the course. The target group were students of bachelor study programmes of a university institute in the Czech Republic. This study provides evidence that, although the pandemic struck without warning and very fast, the university institute concerned was able to cope with the necessary reforms in the organization of education, and from the students' point of view, while maintaining the quality of teaching provided. Even, the complete distance teaching and learning at the time of the pandemic was on average rated better than the pre-pandemic.

Keywords: *Evaluation, higher education, distance learning, quality of education, students' satisfaction.*

1. Introduction

The circumstances of the COVID-19 pandemic have brought a turbulent change to all levels of education around the world. At universities, students, tutors, and lecturers had to adapt to use a number of different online communication platforms to ensure a continuous learning process. In addition to information and communication technologies, or the Internet elements such as online gaming worlds and artificial intelligence, come to the forefront, requiring new literacies (Volery & Lord, 2000; Gallardo-Echenique et al., 2015; Tuan, 2015; Ramírez-Hurtado et al., 2021). The important thing is then that with a pandemic, the digital competence has become a key concept in discussions on the kind of skills and understanding learners' needs in the contemporary society (Calvani et al., 2008; Ferrari, 2012; Gallardo-Echenique et al., 2015). Even in these cases, however, it is necessary to maintain accountability, i.e. the responsibility of educational institutions for both consequences and quantity and quality of their services. For this purpose, various evaluation processes are implemented across universities to identify and ensure the quality of teaching and learning.

Concerning online distance teaching and learning during COVID-19 pandemic, the opinions differ worldwide. There are a large number of studies finding positive effects for student learning in the online or hybrid format compared to the traditional face-to-face format. Some of the authors observed that distance and online education is at least as effective, if not better, than traditional education (e.g. House et al., 2007; Tuan, 2015; Chakraborty et al., 2020; Aziz Ansari et al., 2021).

Conversely, there are a number of research findings pointing that online learning is generally less effective than the conventional face-to-face format. Compared to the number of studies that found positive or neutral significant effects for student learning results in the online format, the number of studies that found mixed or negative significant effects is much smaller, however (e.g. Hebebei et al., 2020; Asgari et al., 2021; Ramírez-Hurtado et al., 2021). The most prevailing expertise is that there are

many more studies that found zero (neutral) findings for the effects of online learning (El Firdoussi et al., 2020; Al-Kumaim et al., 2021).

In response to what needed to be addressed urgently, the COVID-19 crisis has presented an opportunity for the development of effective learning solutions and universities anchored to the traditional face-to-face teaching model have striven to adopt strategies to ensure the service quality of their online teaching to satisfy the students (Ramírez-Hurtado et al., 2021). The same was true for the educational institution concerned, namely for the Institute of Education and Communication of the Czech University of Life Sciences Prague. Many activities had to be alternated in order to continue with the least possible negative impact on the aims of the university. Specifically, the institute switched to completely distance teaching in March 2020, and the schedule of the academic year was changed, which made it possible to change the dates of state final examinations and the conditions of the admission procedure. Internal and external training was organized for academic staff focused on distance teaching, including technology platforms used for this purpose. The training also covered the verification of distance learning outcomes. All the educational activities for students have also moved to the online environment. The MS Teams platform was chosen as the main platform for distance learning. Experts from the application sphere were involved online in lectures and seminars. Thanks to all these measures, there was no significant increase in study failure.

The author is long involved in the issues of educational evaluation, such as e.g. the following research (Němejc & Smékalová, 2016; Smékalová & Němejc, 2019; Němejc et al., 2020). In this context, the paper deals with the first results of a comparison of education at a selected educational institution of the university in both pre-pandemic and pandemic periods, in the latter case causing the closure of all types of schools and a complete, forced transfer to a distant, unverified forms of education. The data found are the first insight into the issues examined which will be further monitored and investigated by the author. The results will show how the students of a university institute subjectively evaluate the concept of the courses, their opinions on learning conditions, and on the performance of the teachers in the pre-pandemic and pandemic periods of education.

2. Methodology

The research sample was obtained by a deliberate selection based on the already established innovated rules of evaluation processes of the university. Specifically, the data set was then represented by an evaluation survey in the form of anonymous online evaluation questionnaires of the respondents, i.e. first, second and third year students of the bachelor's study programmes of the Institute of Education and Communication of the Czech University of Life Sciences Prague.

The subject of the empirical survey was the opinions and satisfaction of students with: (a) the concept of the courses, (b) the conditions of attending lectures and seminars, and (c) the view of students on the performance of their academics. The expressions were selected on a numerical scale from 1 to 4, with 1 representing the minimum rating and 4 the maximum rating, and there was an "I don't want to comment" option.

Two periods, pre-pandemic and pandemic ones, were monitored and compared. The pre-pandemic period included the classic concept of contact teaching at the university, the pandemic period meant a complete transition of teaching to fully distance synchronous online education outside the university. The evaluated data were based on the evaluation survey for each course, not on the number of respondents, as each respondent was required to express their opinions on each course of their study plan of the semester. The evaluation questionnaires are regularly distributed online in the university system from the end of the semester to the examination period to obtain relevant data.

Specifically, the evaluation of the courses was based on the following semesters, with the following representation of opinions:

- summer 2018/2019 (pre-pandemic period) with 935 expressions of students' opinions;
- winter 2019/2020 (pre-pandemic period) with 2235 expressions of students' opinions;
- summer 2019/2020 (pandemic closure of schools) with 1587 expressions of students' opinions;
- winter 2020/2021 (pandemic closure of schools) with 1587 expressions of students' opinions;
- summer 2020/2021 (pandemic closure of schools) with 1009 expressions of students' opinions.

Contact teaching was thus presented with 3170 questionnaires, distance teaching during the pandemic was made up of 4183 student statements. The return rate of the questionnaires was 100% due to rules and notifications in the university system, no questionnaire was excluded. The data were analyzed using the average of the values on the scale for each of the areas studied and for each semester concerned. The data were processed and compared.

3. Results and discussion

The empirical survey deals with the first results of the comparison of education in the pre-pandemic and pandemic period from the perspective of students of a university institute with a focus on the concept of studied courses, educational conditions and performance of their academics. The results are presented in Table 1.

Table 1. Opinions of undergraduate students on the concept of studied courses, educational conditions and performance of their academics (mean per item, mean per area, overall assessment).

Scale: 1 = minimum - 4 = maximum; N = "I don't want to comment"	Pre-pandemic period of education		Pandemic period of education			Pre-pandemic period of education	Pandemic period of education
	Summer 2018/19	Winter 2019/20	Summer 2019/20	Winter 2020/21	Summer 2020/21	Total mean	Total mean
	Mean						
Opinions on the course - total	3.52	3.56	3.69	3.67	3.83	3.54	3.73
The content corresponds to the declared goals and topics	3.65	3.68	3.78	3.72	3.88	3.67	3.79
The course is suitably included in connection with the courses completed so far	3.57	3.61	3.71	3.73	3.85	3.59	3.76
The subject was a benefit for me (for acquiring and developing knowledge, skills, etc.)	3.45	3.50	3.64	3.57	3.82	3.48	3.68
The subject is important for my study programme	3.41	3.46	3.62	3.64	3.78	3.44	3.68
Opinions on study conditions - total	3.61	3.68	3.76	3.67	3.87	3.64	3.77
Requirements for the course are clearly communicated at the beginning of the semester	3.69	3.78	3.83	3.71	3.89	3.74	3.81
Teaching is connected with the latest knowledge and practical examples	3.51	3.61	3.73	3.62	3.86	3.56	3.74
Information sources for teaching are available	3.54	3.64	3.73	3.69	3.85	3.59	3.76
Teaching spaces and their equipment meet the needs of this course	3.68	3.69	-	-	-	3.69	-
Opinions of the teacher - total	3.60	3.67	3.75	3.63	3.86	3.64	3.75
The information is presented in a clear and comprehensible manner	3.62	3.69	3.77	3.63	3.88	3.66	3.76
The teacher has the ability to motivate students	3.48	3.57	3.69	3.52	3.82	3.53	3.68
The teacher is willing to help students also outside of class	3.66	3.71	3.79	3.70	3.87	3.69	3.79
The teacher encourages the active involvement of students in teaching	3.65	3.74	3.78	3.69	3.88	3.70	3.78
The total study load is reasonable	3.61	3.64	3.72	3.64	3.84	3.63	3.73
Overall assessment	3.58	3.64	3.73	3.66	3.85	3.61	3.75

In both periods being compared, it is obvious from the results of using an identical research tool, i.e. an anonymous online evaluation questionnaire, that the respondents evaluated the items under investigation favourably. In all cases, the mean values are far above the average of the four-point scale.

In the detailed view of the results, one of the best rated items was the "Opinions on study conditions". Namely, it is an item "Requirements for the course are clearly communicated at the beginning of the semester" with a mean values of 3.83 and 3.89 in the summer semester 2019/20 and summer semester 2020/21, respectively. Both periods concerned belong to the period of education during

the pandemic. On the other hand, the item “The subject is important for my study programme” from the assessed area “Opinions on the course” was among the worst perceived evaluated items. The item reached average values of 3.41 and 3.46 in the summer semester 2018/19 and in the winter semester 2019/20, respectively. However, they still exceeded the values above the mean of the four-point rating scale.

Looking at the detailed mean values according to the areas, the results reveal that the most valued *opinions of students on the course* were the following: “The content corresponds to the declared goals and topics” and “The course is suitably included in the connection with the courses completed so far”. Interestingly, a better mean rating was achieved for education during the pandemic.

Also in the area of “*Opinions on study conditions*”, the students' own experience reveal that the facts “The requirements for the course are clearly communicated at the beginning of the semester” and the “Information sources for teaching are available” were the best evaluated. More favourable values were achieved during the pandemic compared to pre-pandemic period.

In case of the last observed area – “*Opinions of the teacher*” – the students expressed the highest degree of their agreement in the following items: “The teacher is willing to help students also outside of class” and “The teacher encourages the active involvement of students in teaching”. Also in this case, it is possible to underline the fact that the performance of teachers during the pandemic was perceived by students better than in previous periods under standard conditions.

In summary, it can be stated on the basis of the use of the same tool, in the composition of similar subjects and teachers, only in different conditions of contact or distance education, all items in all areas under investigation were perceived better from the perspective of students during distance learning of a pandemic.

Now, it is possible to speculate why the results are as they are – i.e. very favourable from the point of view of the management of the educational institution concerned, despite the fact that the conditions in the pandemic period were very difficult, hard to predict, with the need to adapt very quickly. Such results may have been achieved by teachers' greater effort to deliver perfect performance and to facilitate the study of their students as much as possible, may be by the reality how much more time they were forced to spent in their teaching process. Perhaps, the quality of the education provided could be maintained or even exceeded, because the pandemic has thus opened up certain opportunities for finding and applying new ways, in particular teaching and learning, which differ from established practices. Internal and external trainings focused on distance learning, including technological platforms used for this purpose, were promptly organized for academic staff. The training also included ways to verify results during distance learning. The fact that the creation of overviews and worksheets continued, which made it easier for students to study, may also have had a positive effect. The completion and improvement of various constantly accessible study resources continued, for example videoconferencing and recording, online ICT resources in the MS Teams or the content in the LMS Moodle. Thanks to all these measures, there was no significant increase in academic failure.

In the future, following the presented empirical survey, it certainly deserves a comparison of other periods in current post-pandemic education, in the sense in which the mean values will depend on whether the deficit of students' socialization and students' enthusiasm for transition from home to university environment, realizing educational opportunities and face to face discussions, will be reflected in the fact that students' satisfaction and further results will be even better, or not.

In any case, the university institute can be satisfied with the results achieved based on student subjective evaluation, as it has been shown that the periods of difficult distance learning in completely new conditions have been managed while maintaining the required conditions of quality of education.

4. Conclusions

The resolution of the Government of the Czech Republic of 12 March 2020 in response to the COVID-10 pandemic meant the complete closure of all types of schools for several months. It was necessary to respond promptly to technical unpreparedness and methodological support of educational institutions and participants in education. The pandemic thus forced educators to look for non-traditional solutions and to reconsider existing ways of teaching, including the use of new technologies.

Comparison of results from the pre-pandemic and pandemic period provides evidence based on students' own experience with the concept of the courses, their opinions on learning conditions, and on the performance of their teachers. Although the pandemic struck unpredictably, the university institute was able to cope with the necessary reforms in the organization of education while maintaining the quality of education provided. Even, the complete distance online teaching and learning at the time of the pandemic was on average rated better than the pre-pandemic, specifically in all monitored areas.

It can be stated that according to the results, even in times of the pandemic, the planning and implementation of the educational processes of the university institute worked, both at the curriculum

level and to ensure optimal conditions for completing university courses and everything related to them. However, it will be necessary to monitor and compare the evolution of the situation also in the context appropriate to the current times of post-pandemic education.

References

- Al-Kumaim, N.H., & Alhazmi, A.K., Mohammed, F., Gazem, N.A., Shabbir, M.S., Fazea, Y. (2021). Exploring the Impact of the COVID-19 Pandemic on University Students' Learning Life: An Integrated Conceptual Motivational Model for Sustainable and Healthy Online Learning. *Sustainability*, 13, 2546.
- Asgari, S., & Trajkovic, J., Rahmani, M., Zhang, W., Lo, R.C., Sciortino, A. (2021). An Observational Study of Engineering Online Education during the COVID-19 Pandemic. *PLoS One*, 16(4).
- Aziz Ansari, K., & Farooqi, F., Qadir Khan, S., Alhareky, M., Trinidad, A.C., Abidi, T., Muzahed, M. (2021). Perception on Online Teaching and Learning Among Health Sciences Students in Higher Education Institutions during the COVID-19 Lockdown - Ways to Improve Teaching and Learning in Saudi Colleges and Universities. *F1000Research*, 10, 177.
- Calvani, A., & Cartelli, A., Fini, A., Ranieri, M. (2008). Models and Instruments for Assessing Digital Competence at School. *Journal of E-Learning and Knowledge Society*, 4(3), 183-193.
- Chakraborty, P., & Mittal, P., Gupta, M.S., Yadav, S., Arora, A. (2020). Opinion of Students on Online Education during the COVID-19 Pandemic. *Human Behavior and Emerging Technologies*, 1-9.
- El Firdoussi, S., & Lachgar, M., Kabaili, H., Rochdi, A., Goujdami, D., El Firdoussi, L. (2020). Assessing Distance Learning in Higher Education during the COVID-19 Pandemic. *Education Research International*.
- Ferrari, A. (2012). *Digital Competence in Practice: An Analysis of Frameworks*. Luxembourg: Publications Office of the European Union.
- Gallardo-Echenique, E.E., & Minelli de Oliveira, J., Marqués-Molias, L., Esteve-Mon, F. (2015). Digital Competence in the Knowledge Society. *MERLOT Journal of Online Learning and Teaching*, 11(1), 1-16.
- Hebebcı, M.T., & Bertiz, Y., Alan, S. (2020). Investigation of Views of Students and Teachers on Distance Education Practices during the Coronavirus (COVID-19) Pandemic. *Journal of Technology in Education and Science*, 4(4), 267-282.
- House, L., & Weldon, R.N., Wysocki, A.F. (2007). Student Perceptions of Online Distance Education in Undergraduate Agricultural Economic Programs. *Journal of Agricultural and Applied Economics*, 39, 275-284.
- Němejc, K., & Smékalová, L. (2016). Evaluation of Teaching Competence of University Teachers. In *ICERI2016 Proceedings of the 9th International Conference of Education, Research and Innovation* (7919-7925). Seville: IATED Academy.
- Němejc, K., & Smékalová, L., Tomšíková, K. (2020). The Significance of Evaluation of Teaching Competences of University Teachers for Setting and Ensuring the Quality of Teaching: Results of Long-Term Evaluation Processes. In *INTED2020 Proceedings 14th International Technology, Education and Development Conference* (1551-1557). Valencia: IATED Academy.
- Ramírez-Hurtado, J.M., & Hernández-Díaz, A.G., López-Sánchez, A.D., Pérez-León, V.E. (2021). Measuring Online Teaching Service Quality in Higher Education in the COVID-19 Environment. *International Journal of Environmental Research and Public Health*, 18(5), 2403.
- Smékalová, L., & Němejc, K. (2019). Student Evaluation of Transferable Competences and Requirements for their Studies. In *Proceedings of Education and New Developments 2019, Volume II* (182-186). Porto: World Institute for Advanced Research and Science.
- Tuan, N. (2015). The Effectiveness of Online Learning: Beyond No Significant Difference and Future Horizons. *Journal of Online Learning & Teaching*, 11(2), 303-319.
- Volery, T., & Lord, D. (2000). Critical Success Factors in Online Education. *International Journal of Educational Management*, 14(5), 216-223.

THE IMPACT OF COVID-19 ON COMMUNICATION PRACTICES IN THE ENGINEERING WORKPLACE: A STUDENT-DRIVEN SURVEY AND AN EXPLORATION OF POTENTIAL CURRICULAR RAMIFICATIONS

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Abstract

In 2012, the Faculty of Industrial Engineering Technology of Leuven University, Campus Diepenbeek, initiated a student-driven action research project to optimize the communications curriculum and tether it to trends and evolutions in the engineering workplace. The methodological pivot of the action research cycle is a questionnaire that students send out to professional engineers on a yearly basis. To date, the questionnaire has been completed by over 2000 engineers. The survey polls the importance and salient features of contemporaneous communication practices for engineers, on the basis of which the curriculum is continuously refined and optimized to match workplace expectations. The existence of this historical dataset allowed for an accurate measurement of the impact of COVID-19 on communication practices in the field of engineering. The perhaps unsurprising, but nevertheless striking rise in online meeting and collaboration practices in the engineering workplace prompts urgent curricular questions with potentially far-reaching ramifications, as the communications curriculum rests, as yet, on a bedrock of traditional, face-to-face interaction. With urgent 21st century concerns surrounding mobility and climate change, screen-to-screen interactions might well evolve into the “new normal” for business communication. This presentation discusses the findings of the questionnaire on the impact of COVID-19 on engineering communication practices and follows through with a preliminary exploration of the ramifications of these findings on the future communications curriculum for engineers.

Keywords: *Engineering education, COVID-19, communication, action research, curriculum.*

1. Introduction

It is a truism to state that the COVID-19, and particularly the lockdowns that were set in place in the attempt to mitigate the ensuing health crisis, had a strong impact on the professional domain. As educators, for instance, we were suddenly forced to move our classes from brick-and-mortar to virtual learning environments and we found ourselves, in many cases, engaged in what soon came to be known as “Emergency Remote Teaching” (ERT) (Hodges, Moore, Lockee, Trust, Bond, 2020). It was the experience of many that ERT affected the teaching and learning experience quite fundamentally. Apart from the obvious technological challenges, we also found ourselves facing a communicative situation with parameters quite different from traditional face-to-face educational settings. The lack of physical proximity made a clear difference, as I am sure all of us can attest to, even if pinpointing what this difference actually consists of is much less self-evident.

Obviously, also in business and the industry the COVID-19 lockdowns heavily affected communication practices: in many cases, meetings between teams, partners and clients necessarily shifted to virtual environments. Even apart from the COVID-19 context, it seems fair to assume that virtual meetings (VM) are to become – to the extent they were not already - a staple instrument in business communication, due to their obvious advantages in terms of cost, expedience, ecological footprint and practicality (Lindeblad, Voytenko, Mont, Arnfalk, 2016). This observation prompts a clear question for educators: if we strive to prepare students for the workplace as well as possible, then should we not account for these changes in communication curricula and reserve curricular space for designated learning outcomes related to VM? This paper aims to provide a preliminary exploration of this question for the field of Industrial Engineering education.

At the Faculty of Industrial Engineering Technology of Leuven University, Campus Diepenbeek, we have been employing - for almost a decade now - a particular student-driven action-research approach to the communication curriculum in order to ensure that it remains firmly tethered to current practices and trends in the industrial engineering workplace (Lievens, 2012). The methodological pivot of the action research cycle is a questionnaire sent out to professional engineers by students every year. The survey polls the importance and salient features of contemporaneous communication practices for engineers, on the basis of which the curriculum is continuously refined and optimized to match workplace expectations. Besides curricular optimization, the dataset serves several other purposes. Most importantly, it raises awareness for industrial engineering students (and even for faculty), who typically do not identify communication as a core competency for their field of study, that communication is, in fact, a crucial competency for an industrial engineer and that it deserves the claim it makes on increasingly precious curricular space. At the same time, the action research project provides an interesting case for academic writing, as students write a research paper on the project as part of their learning trajectory in academic communication.¹

In 2015, a question was added to the questionnaire to assess the importance of VM in business communication. As a result, the survey results allow for an analysis of the extent to which COVID-19 effectively impacted on the perceived importance of VM in business communication among engineers. This paper presents the survey results and follows through with a preliminary exploration of the ramifications of these findings on the future communication curriculum for engineers.

2. Method

The questionnaire was built - and is shared - using Google Forms, and it consists of ten multiple choice questions regarding communication practices in the engineering workplace (e.g. the importance of several foreign languages, of several types of written and spoken communication, perceived difficulties, extra courses followed...). Respondents also indicate age, gender, size of the company, type of engineering job (managerial, commercial, technical or otherwise) and their sector of employment. The questionnaire is sent out on a yearly basis, typically during the month of October, by second bachelor students to engineers in their wider circle of acquaintance. The last available results date from October 2021. In this paper, the results from 2015, which is when the question regarding VM was added to the questionnaire, up to 2021 are taken into consideration. In this period, 2176 engineers completed the survey.

The students are assigned to analyze the survey results and write an academic paper reporting on their findings as part of the second bachelor course “Statistics +”. The main part of this nomer refers to the classes in statistics that the students receive, and which they also apply onto the survey dataset, while the “+” refers to the classes in academic writing. All students are expected to provide an answer to the overall research question - which is, of course, whether communication skills are in fact important for engineers - while also adding an extra research question that befits their own particular interests (e.g. Which foreign languages are most important for Flemish industrial engineers working in the construction sector?). In addition to the quantitative research that the questionnaire enables, students are also expected to undertake qualitative research efforts, such as interviewing engineers, to arrive at deeper insights that the quantitative research in itself cannot provide.

3. Results

Before moving onto the findings that are central to this paper, this section briefly offers some general results that may be of interest to any practitioner in the field of engineering communication. Figures 1 and 2 are those that students typically produce in order to answer the overall research question (“Are communication skills important for engineers in the workplace?”). Figure 1 shows the percentage of time professional engineers spend on communication on a daily basis, while figure 2 shows the respondents’ perceived importance of communication skills for their career trajectory on a 5-point Likert scale, ranging from 1 (“irrelevant”) to 5 (“all-defining”).

¹The author wishes to credit the second bachelor students Lore Gielkens, Ruben Goddé, Brecht Kaczmarczyk, Jonas Sikorksi, Franne Vandervoort, Gert Weckx, who wrote an inspiring paper investigating what is the topic of this paper as well, i.e. a the importance of virtual meetings in the pre- and post-COVID-19 era.

Figure 1. Time spent on communication.

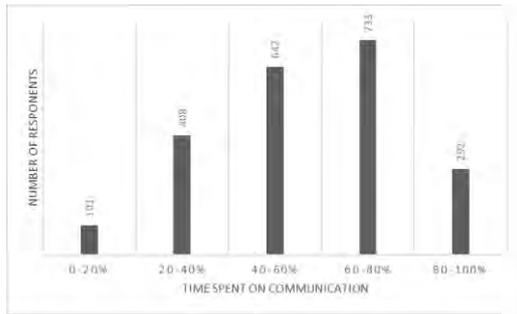
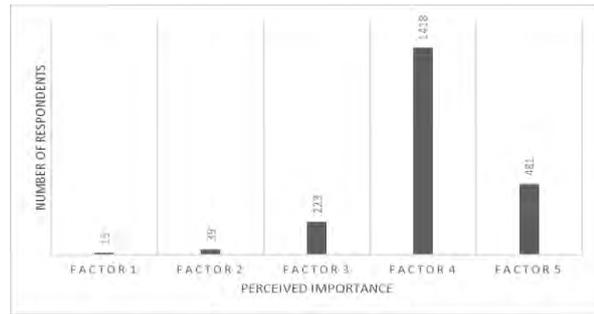


Figure 2. Perceived importance of communication skills.



The findings displayed by Figures 1 and 2 serve to make the point quite definitively - for the reader as well as for the students writing the paper - that communication should in fact be a crucial part of any industrial engineering curriculum.

Now we zoom in onto the particular research question that is central to this paper: what is the perceived importance of VM for professional engineers in the period 2015-2021? Figure 3 shows the full results on the basis the 5-point Likert scale that was presented to the respondents, while Figure 4 simplifies the same results by disregarding the neutral option (“moderately important”) and by summing the two directional answers (“very important” and “important” on the one hand and “somewhat important” and “not important” on the other hand).

Figure 3. Perceived importance of virtual meetings (on 5-point scale).

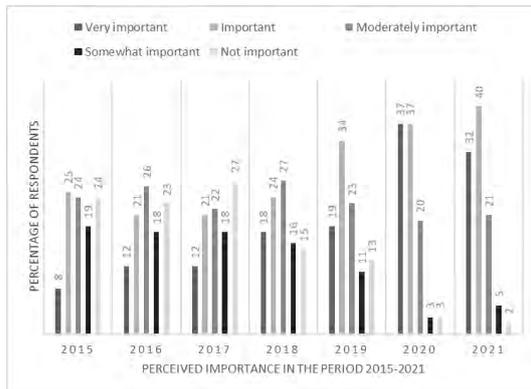
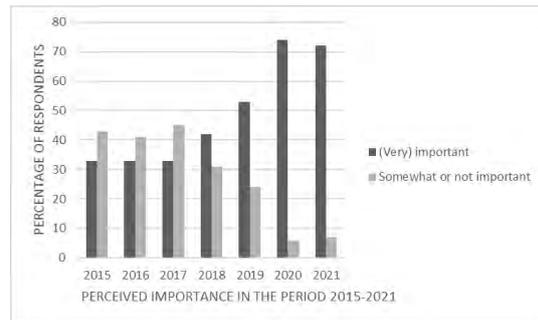


Figure 4. Perceived importance of virtual meetings (simplified version).



These figures indicate that already prior to COVID19 a clear increase in the perceived importance of VM can be observed. While in the period 2015-2017 the perceived importance remains stable with around one third of respondents with a directionally positive answer (see Fig. 4), a clear uptrend commences in 2018, intensifying into 2019 to take the perceived importance above 50%. Taking into account that the questionnaire was sent out in October 2019, which precedes the COVID19 lockdowns by roughly half a year, we can safely state that the rise of VM is not exclusively due to the pandemic. At the same time, the largest shift in perceived importance did take place in the course of 2020, adding roughly another quarter of respondents. This observation suggests that even if COVID19 was not the primordial cause of the rise of the perceived importance of VM, it seems to have further propelled an already accelerating trend.

One might wonder whether the rise of VM in business communication has an impact on face-to-face communication. Interestingly, the questionnaire also happens to contain a question that aims to assess the perceived importance of face-to-face communication (Fig. 5). Figure 6 compares the summation of the directionally positive assessments of the perceived importance of face-to-face communication compared to virtual meetings.

Figure 5. Perceived importance of face-to-face communication.

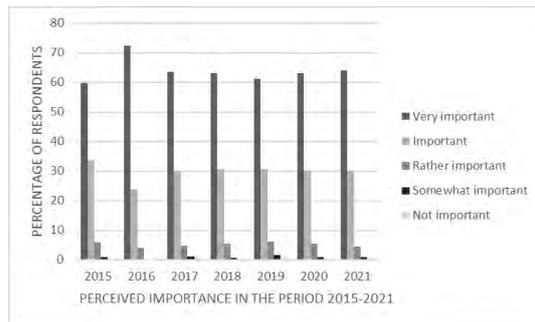


Figure 6. Perceived importance of face-to-face communication and virtual meetings.

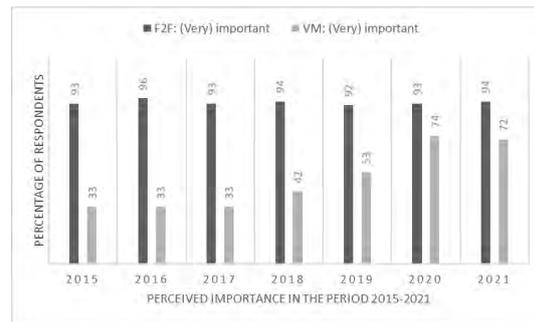


Figure 5 does not provide any indication that the perceived importance of face-to-face communication somehow suffered from the rise of VM in business communication. The importance of face-to-face communication remains constantly high in the observed period, with less than 10% of respondents opting for a neutral or directionally negative answer. Figure 6 demonstrates that even though VM has more than doubled in perceived importance over the last seven years, it can still not compete with the perceived importance of face-to-face communication, which has consistently scored above 90%. VM is definitely on the rise, but it is, one may conjecture, considered a useful additional option for business communication more so than a replacement of face-to-face communication.

4. Discussion

Next to several learning outcomes in written communication, the current communication curriculum at the Faculty of Industrial Engineering Technology at Campus Diepenbeek (University of Leuven) focuses on oral communication objectives (such as presenting, having team meetings, negotiating,...) in – as yet – exclusively face-to-face settings. The survey results shown above, however, beg the question whether the curriculum should not also include oral communication in virtual settings to keep up with changing workplace habits. With urgent 21st century concerns surrounding mobility and climate change, screen-to-screen interactions are not likely to diminish in importance, even if they are equally unlikely to replace face-to-face interactions. Crucial to the argument in favor of devoting curricular attention to VM is the assumption that virtual interactions are, at least to a certain extent, effectively different from face-to-face interactions: if, as the (in)famous Mehrabian's rule goes, up to 55 % of the impact of communication is determined by body language (Mehrabian, Morton, 1967), then VM, with an inherently more limited bandwidth to transmit non-verbal cues, will likely require strategies specific to this particular communicative setting.

The question then becomes: what are we to teach within the curriculum as it comes to VM? This paper does not seek to provide a definitive answer by any means, only to explore summarily some possible levels of interpretation of the curricular needs. A first, superficial level is related to the technological challenges that VM presents. It seems justifiable, however, to assume that technologically savvy users, which industrial engineers may be expected to be, have no particular need for support on this level. A second and probably more appropriate level, then, is related to strategies to cope with – and or even compensate for – the lack of physical proximity and the relative absence of social cues in the more “lean” type of communication that is VM. On this level, the curriculum could address issues such as online etiquette, protocol, techniques for self-presentation or even strategies for building shared mental models of effective communication. Research suggests, interestingly, that VM teams who implemented dialogue theory to build such a shared common ground performed as well as face-to-face teams that did not (Guo, D'Ambra, Zhang, 2009). A third, more abstract level pertains to the broader communicative context and the appropriateness of VMs within that context. To which communicative purposes, for which type and size of audience and in which organizational context, is VM a medium of choice, and for which it is not? As the data shared above indicate, face-to-face communication is unlikely to be replaced by VM entirely, even if the latter has clear, practical benefits. For certain communicative goals, face-to-face communication is destined to remain the preferred option. The literature indicates that for complex social interactions that rely heavily on interactivity, reciprocity and creativity (negotiations, workshops, seminars, brainstorm sessions, start-up meetings...) physical meetings are considered more suitable. For short, routine, follow-up or informational purposes, on the other hand, VM is perceived to be more effective (Guo et al.,

2009; Ivancevich, Konopaske, Defrank, 2012; Lindeblad et al., 2016)². Arguably, then, an important goal of the curriculum should be to have the learner reflect on the parameters involved in the choice for a particular communication medium.

A final reflection relates to *how* these curricular goals, once they have been clearly defined, could be achieved. At Campus Diepenbeek, our didactic approach hinges onto the notion of task-based learning: learning outcomes with regards to communication are maximally integrated within engineering projects that create a realistic, meaningful and rich context for the communicative goals that are to be achieved. It is our experience that students are more motivated to engage in communication activities when some form of actual task completion beyond the communicative activity itself is at stake. The challenge then becomes to devise didactic set-ups in which VM is integrated in such a way as to make “real-life” sense to the learners. As it turns out, the current curriculum already provides opportunities to this end, for instance in bachelor’s thesis projects where student teams develop technological solutions for real-life clients, often in cooperation with one of the university’s research groups. Such multi-stakeholder projects provide an excellent opportunity for having students reflect on the suitability of VM for the meeting’s purposes and circumstances, and if indeed VM is the option of choice, for having students prepare and execute the meeting in such a way that they maximally compensate for the limitations inherent in the medium.

References

- Gielkens, L., Goddé, R., Kaczmarczyk, B., Sikorksi, J., Vandervoort, F., Weckx, G. (2021). Zijn communicatieve vaardigheden belangrijk voor een ingenieur, en hoeveel van die communicatie verloopt digitaal? Unpublished student paper, KU Leuven, Faculty of Industrial Engineering Technology, Campus Diepenbeek.
- Guo, Z., D’Ambra, J., Zhang, H. (2009). Improving the effectiveness of virtual teams: a comparison of videoconferencing and face-to-face communication in China. *IEEE Trans. Prof Commun.* 52 (1), 1-16.
- Hodges, C., Moore, S., Lockee, B., Trust, T., and Bond, A. (27 March 2020). The Difference between Emergency Remote Teaching and Online Learning. Retrieved 14 April 2022 from <https://er.educause.edu/articles/2020/3/the-difference-between-emergency-remote-teaching-and-online-learning>
- Ivancevich, J.M., Konopaske, R., Defrank, R.S. (2012). Business travel stress: a model, propositions and managerial implications. *Work Stress Int. J. Work Health Organ.* 17 (2), 138e157.
- Lievens, J. (2012). Debunking the ‘Nerd’ Myth. Doing Action Research with First-year Engineering Students in the Academic Writing Class. *Journal of Academic Writing*, 2, 1, 74-84.
- Lindeblad, P.A., Voytenko, Y., Mont O., Arnfalk, P. (2016). Organisational effects of virtual meetings. *Journal of Cleaer Production*, 123, 113-124.
- Mehrabian, A., Morton, W. (1967). Decoding of inconsistent communications. *Journal of personality and social psychology*, 6, 1, 109-114.

²In the paper by Gielkens et al., the students refer to an interview with an industrial engineer with a position in sales, who states that, in his experience, for sales talks – which are also, of course, are interactionally and psychologically very complex – face-to-face communication is vastly preferable.

HOW TO BECOME POLITICAL? BASIC CONCEPTS FOR EXPLORING EARLY CHILDHOOD UNDERSTANDING OF POLITICS

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Abstract

In the interdisciplinary project *PoJoMeC*, we investigate children's understanding of politics at preschool and primary school age. The interdisciplinary research approach is based on the perspectives of political didactics, literature and media didactics, and journalism. Initially, we will use qualitative approaches to find out how children's political awareness is shown. Our research methods focus on the one hand on the children's explicit knowledge, but on the other hand already on concepts of rule-governed action. The different degrees of abstraction of these concepts are based on a modification of the ecological model of human development according to Uri Bronfenbrenner (1979).

The paper reconstructs the argumentative process of developing an acceptable interdisciplinary concept of politics for our joint research. Considering political didactics, literature and media studies, and philosophy, a research framework is presented that does not start with terms and concepts but considers more fundamental forms of social perception.

Keywords: *Political thinking, political literacy, early education, early education research, global citizenship education.*

1. The pedagogical question

Climate change, peace, sustainable development, and inclusive participation of different groups in our society are only some of the tasks politics has to deal with today and tomorrow. In this context, “politics” is understood as human action to establish and generally enforce binding regulations and decisions within and between human beings (Patzelt, 2013). Creating an awareness of what this responsibility means and what role each individual should play in it is a central educational goal. Therefore, political or civic education must begin at an early age (Goll, 2021) because political attitudes, beliefs, and stereotypes also develop in early childhood and are difficult to change throughout life (Weißeno, 2022).

Media plays a central role in the transmission and further development of a worldview and thus securing democracy (Marci-Boehncke, Rath, Delere, & Höfer, 2022). Language is just as important as images, films, and other forms of communication. The world, and thus potentially every citizen, is internationally connected. Global citizenship education in the digital age depends on knowledge of the initial conditions of political thought (Dudley & Gitelson, 2002).

Formally, these questions seem answerable in terms of developmental psychology (Wegemer & Vandell, 2020). Substantively, understanding what constitutes political consciousness as a condition of political education, especially in early childhood, seems to be a desideratum. Knowledge about what children understand about politics and whether or what political competencies they bring to elementary school and develop by the time they move on to secondary school is still scarce. Empirical research seems particularly difficult in this age group because the topic is considered very abstract. Given the children's rudimentary writing and reading skills, studying larger cohorts is impossible (van Deth, Abendschön, Rathke, & Vollmer, 2007). Due to the young age, political participation seems to be hardly perceived here yet. In contrast, older school-age is already well researched (e.g., Hunter & Rack 2016; Rowe 2005; Flanagan 2014).

From the perspectives of three different domains, political didactics, literature and media didactics, and journalism, we aim to investigate early childhood understandings of “the political” in the interdisciplinary research project *PoJoMeC* (Goll, 2022), funded by the *Federal Agency for Civic*

Education/bpb in Germany. The heterogeneities of the research, the target group, the disciplinary questions, and the wide-ranging object field suggest a multi-method approach. In addition, we already wanted to take precautions not to fall victim to a blinkered attitude to our research. Therefore, our first concern was developing a viable concept of politics for research with pre-school and primary school-age children. This concept must do several things: it must be broad enough to cover different phenomena, abstract enough to keep disciplinary research interconnectable as a common basis, and finally, anthropologically conceptualized to adequately meet our subjects and their social perceptions even before all political partisanship.

2. Basic conceptual assumptions

Philosophically, the question of “the political” can be understood from an anthropological concept that, at least in the western world, goes back to Aristotle's definition of what a human being is. He defines man as a “political animal” (πολιτικὸν ζῷον, *Pol.* 1.1253a), a being that lives in community. By adopting this definition in Thomas Aquinas, this definition was carried over into the Christian West and continues to affect today. The human practice of organizing into communities varies historically and regionally and, concretely, like all human practices, is not determined by “the living,” an instinct, or a particular form of perception. Instead, Aristotle traces “the practical life” back to “the rational part of the human being” (λόγον ἔχοντος, *Nic. Eth.* 1098a). Therefore, *zoon politikon* and *zoon logon echon* are the classical definitions of what a human is, understood as a being that organizes itself socially with other human beings, drawing on a more fundamental competence, *logos*, which means not only reason but also language and mind. Reason opens up to the human being the possibility of independently developing and implementing the regularity that determines their practical life.

We follow this line of tradition, although not in the metaphysical sense as it was thought of in antiquity, but understood in modern terms as the functionality of human beings to recognize, develop and independently form rules. The regularity of the *logos* is the basis of the rule-governed action of human beings in general. All systematizations of human practices have in common that the fundamental adoption of rules is bound to language. Accordingly, the ability to develop language means nothing else than recognizing, imitating, and shaping rules. Reciprocal, cooperative interactions, empathy capacity, the resulting shared intentionality, and the development of a language are the prerequisites for human communality (Röska-Hardy, 2011; Duncker, 2011; Tomasello & Carpenter, 2007). This connection also represents for us the essential conceptual skill of human beings. Philosophically, moreover, we thus take up the so-called “private language argument” (Wittgenstein, 1958, § 243), according to which no one can learn a language without public use of rules. Nobody, according to Wittgenstein, can follow a rule only once and only alone. Rule acquisition, like language acquisition, is always public and thus social. From this perspective, human beings must be understood as “InterSubjects” (Thyen, 2006) i.e., as beings for whom the rule acquisition of language is paradigmatic of rule-ness and thus always socially bound towards sociality. This view is supported by anthropological research (e.g., Tomasello & Carpenter, 2007) and political didactics (e.g., Goll, 2021). From a social perspective, the first rule of communicative action can be understood as the linguistic “turn-taking” by which human infants share their emotional states with others (Tomasello & Carpenter, 2007, p. 124).

Similarly, this tie-back to a rule (which taps grammar and especially semantics from pragmatics) can also be reconstructed as human beings' ability to access the world via symbols reflexively. Cassirer brought this essential ability, determined by Aristotle as *logon echon*, into the modern form of the human being as “*animal symbolicum*” (Cassirer, 1944, p. 26) – a definition that must be understood “functionally” (ibid., p. 68) rather than pre-modernly substantively. This definition simultaneously provides an important ontogenetic link to a phylogenetic metaprocess that Krotz has called *mediatization* since the beginning of the century. He showed that human beings have always used new medial techniques in their cultural evolution to change their communicative practice. Thus, mediatization theory offers itself as a “conceptual frame” (Krotz, 2007) to reconstruct the political process of societal change (Krotz, 2009). The rules of individual communication were actively changed under the impact of new communication possibilities. Thus, not only has social communication changed, but societal change has always taken place at the same time. This media-sociological perspective is philosophically compatible with the anthropological thesis of the animal symbolicum. Mediatization is a medial practice, the first manifestation of which is natural language. Although this practice is historically modified in each case, it is functionally based on a “mediality” (Rath, 2019), which enables humans a symbolic appropriation of the world characterized by rule acquisition and rule competence. Language acquisition is the beginning of individual mediatization as rule acquisition and thus the basis of political consciousness.

3. “The political”

From the perspective of this philosophical-conceptual background, it is necessary to show what we mean by “becoming political.” What is “the political” of which we hope to find already a consciousness in children? However, the phrase “the political,” taken for granted in German and Romance languages, is challenging to translate into English (Valentine 2016, pp. 505-506) “The political” cannot be integrated into the common political science triad of politics, policy, and polity (e.g., Kaid & Holtz-Bacha, 2008). These dimensions of the concrete political reality of a society can be captured and inquired about in terms of political knowledge. By “the political,” on the other hand, we mean an awareness of the essential rule-based organization of the human community that precedes acquired political knowledge as well as common political literacy (Cassel & Lo, 1997) or its curricular transmission (e.g., Perveen & Awan, 2017). This awareness is not tied to a concrete social or political system. This awareness neither presupposes a knowledge of a concrete polity nor an orientation for which policy which politics (have to) be organized and designed. Nor is the social frame of reference for it necessarily at the level of a concrete polity. With “social frame of reference” we refer to the different social systems that human beings open up for themselves in their development. These frames of reference expand in the context of ontogeny.

Bronfenbrenner (1979) has differentiated five such systems, beginning with the *microsystem* directly surrounding the child, through the *mesosystem*, *exosystem*, *macrosystem*, and *chronosystem*. The macro- and exosystem include, among other things, the state political organization and the related ideological attitudes and beliefs that determine a policy. The mesosystem provides the institutional bridge between the micro- and macrosystems and determines the institutional framework of the microsystem and its actors. The microsystem is the closest social framework directly beyond the individual, such as the family with parents, early educational institutions such as kindergarten and school, and later peers. According to Bronfenbrenner, these concentrically conceived systems provide the material, each of varying complexity, to develop a child's political consciousness. However, in this theory, the politically relevant aspects, the increasing social integration of the child into existing social structures and their regularity, remain strictly separated according to systems. Although these systems are thought to be permeable, they always seem differentiated. Vélez-Agosto, Soto-Crespo, Vizcarrondo-Opppenheimer, Vega-Molina, & García Coll (2017), following the revisions Bronfenbrenner himself made to his theory, were able to construct a less delineating model of human development. In their concept of a spirally expanding social space of the child, culture in its various manifestations has a comprehensive function in the expanding structure of social relations. Language and communication are the central practices of culture - the mastery of linguistic rules provides the model for human rule consciousness in the first place.

These rules become sovereignly usable and thus functional as a communication medium only when they have become explicitly conscious. As already mentioned, consciousness does not only mean knowledge but a conscious, explicit, and therefore in principle also linguistically formulable orientation towards rules experienced within the systems. In this context, not only the rules themselves as rules come into play, but always also and inevitably the actors who define, represent, sanction, and, if necessary, relativize or abolish these rules. This also includes different media distribution levels for rules. Beyond the microsystem, journalism plays a central role in raising civic awareness of problems and negotiating and communicating rules.

In our opinion, it should be emphasized again in this context that a child with political awareness can adopt a reflexive position. This means that rules have been recognized for the child's validity. The child experiences its behavior as oriented by these rules, and it can also explicitly align its actions with the rules or consciously break them. Political awareness thus presupposes receptive civic literacy, namely the ability to recognize such political rule communications in everyday life (Detjen, Massing, Richter, & Weißeno, 2012). Thus, these rules of social practice differ from other regularities that children also learn throughout their lives. Such non-communicative social regularities include limiting or behavior-opening rules such as locked or open doors, technical and functional necessities such as rehearsed operations of switches or technical interfaces, or practical irritations such as confrontation with incomprehensible but regularly perceived languages or linguistic rule-breaking.

4. Political consciousness

“The Political” - as already the basic anthropological terms - is to be understood functionally. It is a notion of social regulation that has a normative effect as a model of social order (Heidemeier & Lange, 2010) already in the microsystem. It thus preempts the formation of specific political knowledge (Weißeno, Götzmann, & Weißeno, 2016) or even concrete “political competence” (Weißeno, 2012), which is measurable as an outcome of knowledge, skills, and behaviors.

Similarly, political consciousness is manifested in the concrete active addressing of rule-specific requirements to all social group members. At this point, the reference to journalism also becomes clear. In the specialist definitions of journalism, it is precisely this community-creating function that is emphasized. Journalism “establishes publicity by observing society, making this observation available to a mass audience via periodic media, and thereby constructing a shared reality” (Meier, 2018, p. 13, own translation). As a level of discourse between politics and society, professional journalism in modern democratic societies offers the possibility to negotiate cooperation needs and reach broad social circles quickly (Habermas, 1991).

The disciplinary perspectives of our project thus take a look at different relevant phenomena of “the political.” Rule consciousness is primarily ascertainable as practice-based, and that is, concrete lifeworld experience in dialogue. Political knowledge can be recorded using various quantitative methods, but these must consider that most of the target group cannot read or can only read very poorly. Therefore, action-oriented, media-practical settings also capture rule awareness in forms of expression other than language media.

5. Methodological considerations

Dialogically, the rule is in the foreground. As already stated above, the rule is not a solipsistic phenomenon. No one can follow a rule alone and only once - but above all, no one can design, enforce and follow a social rule alone. Therefore, rules are observed behavioral controls whose social dimension constitutes the core of political consciousness. Only when the concrete observation of rule-following has led to a rule-following model can we speak of an explicit consciousness of rule-following. Again, language acquisition can serve as a blueprint of rule consciousness. The ability to use linguistic expressions reactively as appropriate to the situation is not yet a sign of explicit rule consciousness. Therefore, we try to evoke statements about rules, their validity, their legitimation, and their sanction through media and linguistic impulses. Visuals in the setting of simplified concept maps as a conversation starter in early education (Tkotzyk & Marci-Boehncke, 2022) come into play, and the classical method of questioning or encouragement narrate oneself.

The interdisciplinary structure of the project allows us to capture at least some of Bronfenbrenner's systems of social integration as described above. Onwuegbuzie, Collins, & Frels (2013) clarify that quantitative, qualitative, and mixed methods research may very well focus on multiple systems or levels of Bronfenbrenner's concept. We are curious to see how our results can be linked beyond the social context and what conclusions we can draw from these results to strengthen institutionalized political and democracy education already in early education.

References

- Bronfenbrenner, U. (1979): *The Ecology of Human Development: Experiments by Nature and Design*. Cambridge, MA: Harvard University Press.
- Cassel C. A., & Lo, C. C. (1997). Theories of Political Literacy. *Political Behavior*, 19(4), 317-335.
- Cassirer, E. (1944): *An Essay on Man: An Introduction to a Philosophy of Human Culture*. New Haven, London: Yale University Press.
- Detjen, J., Massing, P., Richter, D., & Weißeno, G. (2021): *Politikkompetenz – ein Modell*. Wiesbaden: Springer VS.
- Dudley, R. L., & Gitelson, A. R. (2002). Political Literacy, Civic Education, and Civic Engagement: A Return to Political Socialization? *Applied Developmental Science*, 6(4), 175-182.
- Duncker, H.-R. (2011). Die Entwicklung der Menschen zu Sprach- und Kulturwesen. In L. Hoffmann, K. Leimbrinck & U. Quasthoff (Eds.), *Die Matrix der menschlichen Entwicklung* (pp. 15-58). Berlin, Boston: De Gruyter.
- Flanagan, C. (2013). *Teenage Citizens: The Political Theories of the Young*. Cambridge, MA: Harvard University Press.
- Goll, T. (2021). “Die Grenzen meiner Sprache bedeuten die Grenzen meiner Welt” – sprachliche Herausforderungen für politisches Lernen im Sachunterricht. In U. Franz, H. Giest, M. Haltenberger, A. Hartinger, J. Kantreiter & K. Michalik (Eds.), *Sache und Sprache* (pp. 40-47). Bad Heilbrunn: Klinkhardt.
- Goll, T. (2022). Political Literacy von Kindern – Befunde, Implikationen, Herausforderungen. In A. Becher, E. Blumberg, T. Goll, K. Michalik & C. Tenberge (Eds.), *Sachunterricht in der Informationsgesellschaft* (pp. 131-138). Bad Heilbrunn: Klinkhardt.

- Habermas, J. (1991). *The Structural Transformation of the Public Sphere: An Inquiry into a Category of Bourgeois Society*. Cambridge, MA: MIT press.
- Heidemeyer, S., & Lange, D. (2010). Wie sich Schülerinnen und Schüler Demokratie vorstellen. Zur didaktischen Rekonstruktion von Politikbewusstsein. In D. Lange & G. Himmelmann (Eds.), *Demokratiedidaktik* (221-240). Wiesbaden: Springer VS.
- Hunter, P., & Rack, J. (2016). Advancing young citizens' political literacy through social-sciences curricula. *Research Information for Teachers*, 3, 23-28.
- Kaid, L. L., & Holtz-Bacha, C. (2008). Politics, policy, polity. In L. L. Kaid & C. Holtz-Bacha, (Eds.), *Encyclopedia of Political Communication* (Vol. 1, p. 621). Thousand Oaks, CA: Sage Publications.
- Krotz, F. (2007). The meta-process of "mediatization" as a conceptual frame. *Global Media and Communication*, 3(3), 256-260.
- Krotz, F. (2009). Mediatization: A Concept with Which to Grasp Media and Societal Change. In K. Lundby (Ed.), *Mediatization. Concept, Changes, Consequences* (pp. 21-40). New York: Lang.
- Marci-Boehncke, G., Rath, M., Delere, M., & Höfer, H. (2022): Medien – Demokratie – Bildung: Normative Vermittlungsprozesse und Diversität in mediatisierten Gesellschaften. In G. Marci-Boehncke, M. Rath, M. Delere & H. Höfer (Eds.), *Medien – Demokratie – Bildung: Normative Vermittlungsprozesse und Diversität in mediatisierten Gesellschaften* (pp. 1-10). Wiesbaden: Springer VS.
- Meier, K. (2018): *Journalistik* (4th ed.). Konstanz, München: UTB.
- Onwuegbuzie, A. & Collins, K. M. T., & Frels, R. (2013). Foreword: Using Bronfenbrenner's ecological systems theory to frame quantitative, qualitative, and mixed research. *International Journal of Multiple Research Approaches*, 7, 2-8.
- Patzelt, W. J. (2013). *Einführung in die Politikwissenschaft: Grundriß des Faches und studiumbegleitende Orientierung* (7th ed.). Bern: Rothe.
- Perveen M., & Awan, A. S. (2017). Analysis of Curriculum about Political Literacy as a Dimension of Citizenship Education. *Bulletin of Education and Research*, 39(1), 187-202.
- Rath, M. (2019). Ethics of the Mediatized World. In T. Eberwein, M. Karmasin, F. Krotz & M. Rath (Eds.), *Responsibility and Resistance. Ethics in Mediatized Worlds* (pp. 53-68). Wiesbaden: Springer VS.
- Röska-Hardy, L. (2011). Der Erwerb der Theory of Mind-Fähigkeit – Entwicklung, Interaktion und Sprache. In L. Hoffmann, K. Leimbrinck & U. Quasthoff (Eds.), *Die Matrix der menschlichen Entwicklung* (pp. 96-142). Berlin, Boston: De Gruyter.
- Rowe, D. (2005). The Development of Political Thinking In School Students: An English Perspective. *International Journal of Citizenship and Teacher Education* 1(1), 97-110.
- Thyen, A. (2006): *Moral and Anthropologie. Untersuchungen zur Lebensform "Moral"*. Weilerswist: Velbrück Wissenschaft.
- Tkotzyk, R., & Marci-Boehncke, G. (2022). Research with young children: Do picture concept maps work as interview tool in early childhood research? *Proceedings of INTED 2022*, 7258-7267. doi:10.21125/inted.2022.1836
- Tomasello, M., & Carpenter, M. (2007). Shared Intentionality. *Development Science*, 10(1), 121-125.
- Valentine, J. (2006). The Political. *Theory, Culture & Society*, 23(2-3), 505-511.
- van Deth, J. W., Abendschön, S., Rathke, J., & Vollmer, M. (2007). *Kinder und Politik. Politische Einstellungen von jungen Kindern im ersten Grundschuljahr*. Wiesbaden: Springer VS.
- Vélez-Agosto, N. M., Soto-Crespo, J. G., Vizcarrondo-Oppenheimer, M., Vega-Molina, S., & García Coll, C. (2017). Bronfenbrenner's bioecological theory revision: Moving culture from the macro into the micro. *Perspectives on Psychological Science*, 12(5), 900-910.
- Wegemer, C. M., & Vandell, D. L. (2020). Parenting, temperament, and attachment security as antecedents of political orientation: Longitudinal evidence from early childhood to age 26. *Developmental Psychology*, 56, 1360-1371.
- Weißeno, G. (2012). Dimensionen der Politikkompetenz. In G. Weißeno & H. Buchstein (Eds.), *Politisch Handeln: Modelle, Möglichkeiten, Kompetenzen* (S. 156-177). Bonn: Bundeszentrale für politische Bildung.
- Weißeno, G. (2022). Beliefs im Politikunterricht. In G. Weisseno & B. Ziegler (Eds.), *Handbuch Geschichts- und Politikdidaktik* (pp. 1-16). Wiesbaden: Springer VS.
- Weißeno, G., Götzmann, A., & Weißeno, S. (2016). Politisches Wissen und fachspezifisches Selbstkonzept von Grundsch ler/-innen. *Transfer Forschung – Schule*, 2, 162-172.
- Wittgenstein, L. (1958). *Philosophical Investigations*. Translated by G. E. M. Anscombe. Oxford: Basil Blackwell.

DELIVERING INNOVATIVE, ONLINE TEFL COURSES TO FOSTER PROFESSIONAL DEVELOPMENT AND POSITIVELY IMPACT ENGLISH LEARNERS

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Abstract

This paper reports on findings from a U.S. federally-funded research project involving American universities that created online courses to develop Jordanian K-12 English teachers' instructional strategies and communication skills who are employed in disadvantaged or vulnerable rural and urban schools. The four innovative, online courses address Jordanian English teachers' desire to motivate learners (Al-efeshat & Baniabdelrahman, 2020), develop students' critical reading skills (Bataneh & Al-Shbatat, 2018), reduce students' reading anxiety (Al-Shboul et al., 2013), and foster metacognitive reading strategies (Alsarayreh, 2020) among other challenges. Studies have found that increasing mobile technologies to students and teachers and integrating basic technology in public and refugee schools would profoundly impact the scope of learning and instruction (UNESCO, 2018; UNHRC, 2018). Further, research on teacher quality shows that weaknesses in teachers' pedagogical content knowledge (PCK) and classroom practice undermine effective student learning and achievement (Phetla & Newman, 2020; Pontefract and Hardman 2005). Continuing professional development and PCK positively impact schools and embodies the ability to evaluate students thinking, plan appropriate learning opportunities, and modify, combine, and use instructional materials to develop conceptual understanding (Darling-Hammond et al., 1999). Teachers' professional development through teachers' collaboration has been reported to be effective for the improvement of schools' performance and students' learning outcomes in all curriculum subjects. Research repeatedly demonstrates that continuing professional development makes a difference to teachers' pedagogic knowledge and skill which is reflected in enhanced student learning outcomes (AL-Wreikat & Bin Abdullah, 2010; Mahmoud, 2015). This project seeks to narrow these gaps and positively impact learning outcomes and student competencies through the innovative online and in-person PDP with Jordanian teachers of English. Using gathered qualitative and quantitative data, we identify the program's impact on TEFL teachers' integrated service learning projects and culturally relevant pedagogies to positively affected students' learning, advanced teachers' knowledge of research-based instructional strategies, and addressed other challenges identified by the teachers. We will also share the process for selecting teachers to participate in the program and collaborations we developed with international stakeholders.

Keywords: TEFL, distance education, learners, innovation, service learning.

1. Introduction

This paper reports on findings from a U.S. federally-funded program, *English Education for All* (EEFA), involving two American universities delivering online courses, seminars and workshops, and an exchange program to Jordanian K-12 English teachers who are employed in disadvantaged and/or under-represented rural and urban schools. The program's four online courses – two Teaching English as a Foreign Language (TEFL) certification courses and two courses that incorporated service learning projects as high-impact strategies to teach English – sought to address Jordanian English teachers' desire to motivate learners (Al-efeshat & Baniabdelrahman, 2020; Malkawi, N.A.M. (2020).), develop students' critical reading skills (Bataneh & Al-Shbatat, 2018), reduce students' reading anxiety (Al-Shboul et al., 2013), increase English vocabulary (Alhabahba et al., 2016; Al-Jarra. & Al-Ahmad, 2013; Obeidat, & Abu-Melhim, 2008), and foster metacognitive reading strategies (Alsarayreh, 2020; Aljoudi, 2019), among other instructional and learning strategies.

Research on teacher quality shows that weaknesses in teachers' pedagogical content knowledge (PCK) and classroom practice undermine effective student learning and achievement (Phetla & Newman, 2020; Pontefract & Hardman 2005). Studies have found that increasing mobile technologies to students and teachers and integrating basic technology in public and refugee schools would profoundly impact the scope of learning and instruction in public school classroom (Aljaraideh, 2014; UNESCO, 2018; UNHRC, 2018). Research-based instructional strategies are sought by teachers to address pedagogical shortcomings.

2. Methods

A criteria was used to select forty Jordanian English teachers for the EEFA program.¹ Many of the participants teach Jordanians as well as immigrants and refugees in classrooms lacking resources and access to technology. In the online courses (utilizing the LMS *Brightspace* (D2L)), Jordanian teachers participated in weekly asynchronous discussion boards to advance their reading and writing skills. Answering prompts based on weekly readings and videos, a participant's discussion posted was often more than three paragraphs and sometimes included a cited source. Course instructors evaluated the participants' posts and assessed summative projects and essays using rubrics.

The following concepts were embedded in each course: differentiation, English language standards, global competence, social emotional learning, and the United Nation's Sustainable Development Goals. Through readings, podcasts, discussions, graphic organizers, and developing and answering questions, the English teachers explored strategies and techniques to differentiate the content, process, product of instruction in mixed-ability classes based on students' readiness, interests, and learning preferences. For the service-learning component, participating English teachers identified a community issue, integrated four stages of a unit plan map, and developed a sample plan. They created a step-by-step plan for a service-learning project using best practices (i.e., the IPARD process) developed by the National Youth Leadership Council (NYLC). The participants indicated that they previously did not have a large amount of knowledge or experience with service-learning as an instructional strategy and learned other pedagogical approaches from the online courses to integrate in their English classroom.

During the online courses, weekly synchronous conversation classes were scheduled as an opportunity for the Jordanian English teachers to cultivate their speaking and listening skills through interactions with classmates discussing questions related to the weekly course content. Conducted using Zoom during the spring courses, participants prepared questions to lead a small group discussion in one of the breakout rooms, attended by other teachers and a course instructor or program administrator. Discussion leaders received feedback from their peers and course instructor or administrator based on their leadership and communication skills facilitating the discussion. Participating English teachers and course instructors faced few technological challenges delivering or accessing the materials and course content, with the exception of Zoom connection difficulties for some participants. Course instructors and administrators maintained continual communication with the program participants through the course website, WhatsApp, a closed Facebook page for the participating teachers and administrators, and weekly one-hour synchronous conversation class.

The EEFA program followed the model of continuing professional development and PCK which positively impacts schools and embodies the ability to evaluate students thinking, plan appropriate learning opportunities, and modify, combine, and use instructional materials to develop conceptual understanding (Darling-Hammond et al. 1999). Teachers' professional development through teachers' collaboration has been reported to be effective for the improvement of schools' performance and students' learning outcomes in all curriculum subjects. Research repeatedly demonstrates that continuing professional development makes a difference to teachers' pedagogic knowledge and skill which is reflected in enhanced student learning outcomes (AL-Wreikat & Bin Abdullah, 2010; Mahmoud, 2015).

In addition to the four, 8-week courses delivered in fall 2021 and spring 2022, an in-person Summer Institute was delivered after the online courses on the University of Jordan campus that involved three-days of workshops, seminars, and presentations facilitated by the EEFA course instructors, program administrators, and participating teachers in the program. The EEFA program also integrated a train-the-trainer model in which fifteen teachers selected from the forty would participate in a two-week exchange on two U.S. campuses involving K-12 school visits, workshops and seminars on train-the-trainer model,

¹(i) level of English language proficiency and ability (intermediate or advanced): 1- Trouble Communicating; 2- With Some Hesitation; 3- No trouble communicating (see rubric), (ii) level of commitment to participate in the program, (iii) access to technology to participate in online classes each week in fall 2021 and spring 2022, (iv) location of vulnerable school (consider the three geographical governorates in Jordan: North region, central region, and south region), (v) gender of participants, (vi) did not possess a terminal degree or were a doctoral candidate, (vii) years teaching English: consideration was placed on novice (1-3 years) over veteran educator, (viii) possess English teaching degree, and (viii) experience teaching in primary or secondary school, located in urban or rural setting.

and excursions to cultural and historical sites to advance their English and teaching skills. The trained fifteen teachers would then train other teachers in their school and surrounding communities in fall 2022 and spring 2023.

3. Findings

Participating teachers claimed the EEFA program increased their confidence writing and speaking English as well as informed their instructional strategies to actively engage students learning English and integrate activities to motivate students through service learning projects and communicative-based, student-centered activities.

- I've learned a lot about methods, approaches, and strategies about how language should be learned and taught. Class management, using technology, using games, and assessment were great topics to study and examine. Reading and reflecting on my teaching practices helped me a lot to grow as a teacher (male, second year).
- I have learned new innovative strategies to develop my teaching abilities as well as my students learning abilities too. Now, I can utilize technology effectively in my classroom, manage classroom using positive behavior management strategies, adapting materials according to the age group and implementing the PPP [presentation, practice and production] in my week's lesson plan focusing more on the four skills in English language, besides incorporating games and activities that highly increase my students' learning competencies. I have learned the best ways to assess and handled multilevel classes using several types of assessments and rubrics, giving positive feedback (female, fifth year teaching).
- The program aided me in the development of my language skills. It has exposed me to a variety of innovative teaching strategies that have had a big impact on my students' educational levels (female, fourth year teaching).
- I learned how to use technology effectively to transform your ESL classroom also I learned about Benefits of Technology Integration in English Education. I learned the purpose and value of a PPP lesson plan and the value of teaching critical thinking skills in the EFL classroom... I learned (t)he most important strategies for handling multilevel classes and some strategies for increasing interaction and encouraging quiet students to speak in class more frequently (female, sixth year).

Through interviews, surveys, end-of-course written assignments, and written feedback on teacher-led discussions, participants claimed the courses increased their confidence writing and speaking English, and stated that they integrated in their teaching some of the instructional strategies such as differentiation, a PPP (presentation, practice and production) lesson, and service learning to motivate and actively engage students to speak and write in English. One participant stated that this program provided her a unique opportunity because she had not communicated with native speakers of English.

4. Discussions

Results from the EEFA program provide insights for other international projects that seek to foster educators' oral and written English communication skills as well as cultivate their pedagogical knowledge to positively impact learning outcomes through professional development courses, seminars and workshops, and cultural exchange program. Findings from this research address the efficacy of online, distance learning (asynchronous and synchronous) and report on challenges Jordanian educators confront teaching English in disadvantaged and/or under-represented rural and urban schools. Jordanian teachers consistently participated regularly during the online courses as they grappled with new concepts and shared insights and reflections during the synchronous conversation classes. While the development of the online courses were modeled on existing TEFL and teaching courses, there was an identifiable need to consider aligning the online courses with the Jordanian teachers' curriculum, textbook, and learning outcomes from the Ministry of Education as well as connect with sustainable development goals 3, 4, 5, 8, and 9 (Abu shaqra, 2021). In future programs, detailed rubrics would be identified for scoring the twelve constructed categories when selecting English teachers who would participate in a two-week train-the-trainer program in the U.S.

References

- Abu shaqra, R. K. Y (2021). The role of Jordanian school principals in achieving the fourth goal of the sustainable development goals. *Cypriot Journal of Educational Science*, 16(1), 167-186.
- Al-efeshat, H., & Baniabdelrahman, A. (2020). The EFL teachers' and students' attitudes towards the use of songs in learning English. *International Online Journal of Education and Teaching (IOJET)*, 7(3), 844-858.
- Alhabahba, M.M., Pandian, A., & Mahfoodh, O.H.I. (2016) English language education in Jordan: Some recent trends and challenges. *Cogent Education*, 3(1).
- Aljaraideh, Y. F. (2014). Barriers of using educational games in Jordanian public schools. *Education*, 134(3), 298-304.
- Al-Jarrah, R.S. & Al-Ahmad, S. (2013). Writing instruction in Jordan: Past, present, and future trends. *System: An International Journal of Educational Technology and Applied Linguistics*, 41(1), 84-94.
- Aljoudi, A. (2019). Assessment for Learning: Conceptualisation and Implementation among High School Teachers in Saudi Arabia. *American Journal of Educational Research*, 7(10), 713-724.
- Alsarayreh, R. (2020). Using blended learning during COVID-19: The perceptions of school teachers in Jordan. *Cypriot Journal of Educational Science*, 15(6), 1544-1565.
- Al-Shboul, M. M.; Ahmad, I.S.; Nordin, M.S.; & Rahman, Z.A. (2013). Foreign language reading anxiety in a Jordanian EFL context: A qualitative study. *English Language Teaching*, 6(6), 38-58.
- AL-Wreikat, Y.A.A.S. & M Bin Abdullah, M.K.K. (2010). An evaluation of Jordanian EFL teachers' in-service training courses teaching techniques effectiveness. *English Language Teaching*, 3(4), 18-27.
- Bataineh, R. F., and Al-Shbatat, M. I. (2018). Is questioning a catalyst for critical reading among Jordanian EFL learners? *Cypriot Journal of Educational Science*, 14(3), 384-400. <https://doi.org/10.18844/cjes.v14i3.3485>.
- Darling-Hammond, L., Wise, A. E., and Klein, S. P. (1999). *A license to teach: Raising standards for teaching*. San Francisco, CA: Jossey-Bass.
- Mahmoud, M.M.A. (2015). Culture and English language teaching in the Arab world. *Adult Learning*, 26(2), 66-72.
- Malkawi, N.A.M. (2020). Attitudes of secondary school students in Jordan toward contemporary educational concepts. *Journal of Education and Learning*, 9(1), 229-236.
- Obeidat, N.K., & Abu-Melhim, A-R. (2008). Common Practice in Teaching English Listening Skills at Elementary Schools in Jordan. *International Forum of Teaching and Studies*, 4(2), 33-39.
- Phetla, D., and Newman, W. (2020). Effectiveness of teacher professional development programmes: Literature review. *Journal of Entrepreneurship Education*, 23(2), 1-9.
- Pontefract, C., and Hardman, F. (2005). The discourse of classroom interaction in Kenyan primary schools. *Comparative Education*, 41(1), 87-106, DOI: 10.1080/03050060500073264.
- UNESCO (2018). *A lifeline to learning: Leveraging technology to support education for refugees*. Retrieved March 18, 2022, from <https://unesdoc.unesco.org/ark:/48223/pf0000261278>.
- UNHRC (2018) *Turn the Tide: Refugee Education in Crisis*. Retrieved March 18, 2022, from <https://www.unhcr.org/en-us/publications/brochures/5b852f8e4/turn-tide-refugee-education-crisis.html>

MENTORING STUDENT TEACHERS FOR SELF-DIRECTED PROFESSIONAL LEARNING THROUGH THE USE OF E-PORTFOLIOS DURING TEACHING PRACTICE

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Abstract

Teaching Practice is a critical phase of teacher education that provides opportunities for student teachers to reflect on the development of their teaching philosophies and put them into action. Self-directed learning pertains to a process where these students take responsibility for their own learning by setting outcomes, choosing material or human resources, selecting appropriate learning strategies, and evaluating their learning. E-portfolios as learning tools can be utilized to facilitate the development of skills for self-directed learning. Good quality mentoring in schools contributes to the development of critical professional skills of student teachers and ensures the best quality learning experiences for pupils. This paper is arranged as an ideas paper that seeks to explore the intersections between mentoring, self-directed professional learning of student teachers and the use of e-portfolios during teaching practice. The most common trends on these topics will be described and intersections identified, thereby exploring how self-directed learning could be supported by the use of e-portfolios and good quality mentoring. Findings showed that e-portfolios are practical tools for self-directed, reflective and collaborative professional learning. Further findings show that formal mentoring programs are essential to meet student teachers professional learning needs. These findings will encourage mentor teachers to optimally use e-portfolios to enhance student teachers self-directed professional learning.

Keywords: Mentoring, self-directed professional learning, e-portfolios.

1. Introduction

Towle and Cottrel (1996) describe self-directed learning as a process in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes, that is, they take responsibility for, and control of, their own learning. The concept of self-directed learning according to Morris (2019) grew out of popular scholarly works published in North America during the 1960s. The concept is grounded in humanistic philosophy, pragmatic philosophy and constructivist epistemology, which together represent a process of learning that is individual, purposeful and developmental.

2. Professional learning

A general description of professional learning is any type of work-related educational experience that a person may acquire to improve his/her performance on the job. It also refers to updating or building up job-related competencies that enable individuals to function effectively in their chosen profession (Bakhshi, 2019). Professional learning should also include occasions for teachers to reflect critically on their practice and to fashion new knowledge and beliefs about content, pedagogy, and learners (Shurr, Hirth, Jasper, McCollow, & Heroux, 2014). In professional learning, teaching is viewed as a craft that includes a broad range of skills and mindsets that must be adapted to teachers' unique classroom and school contexts (Brennan, 2021). Professional learning therefore positions the teacher as an active, professional learner. Professional learning, according to Brennan (2021) views knowledge through a constructivist lens. Constructivists assert that knowledge is constructed by learners, and as learners bring their unique sets of prior knowledge and experiences to their learning, there is no single true way of interpreting the world (Charalambos, 2000). Professional learning, therefore, exemplifies a constructivist worldview, as teachers

are engaged in creating knowledge and new understandings through the learning process. Bakhshi (2019) argues that professional learning may take a variety of forms: formal, informal or variations of both. Formal professional learning on one hand may include face-to-face training, distance learning and mentoring. These types of professional learning are structured, top down and usually guided by an instructor. On the other hand, informal professional learning such as reading scientific publications, watching documentaries, conversation among colleagues, independent reading and research, or using professional learning websites is seen as open-ended, flexible and self-directed. While professional learning models honour individual teachers' needs and strengths as individual learners, they must also be grounded in a clear mission, vision, and set of values for the school and district so that teachers' learning ultimately serves to support student learning and growth (Brennan, 2021).

3. Self-directed professional learning

According to Shurr, Hirth, Jasper, McCollow, and Heroux, (2014) professional learning is self-directed when the learner, in our case the teacher, takes the lead role in facilitating his/her own professional growth and also that self-directed professional learning (SDPL) includes such components as planning what is to be learned, practicing the skills in everyday settings, self-monitoring and assessment to track skill development, and lifelong learning. In self-directed professional learning teachers provide the momentum and direction of professional learning through their use of self-management, monitoring, and motivation (Garrison, 1997). In self-directed professional learning, teachers take control of their learning experiences. It allows teachers to grow in knowledge, skills, and dispositions in areas such as implementing instructional strategies, managing student behaviours, and engaging students in the learning process (Carpenter & Green, 2018). Self-directed professional learning can give teachers the voice and the choice of what to learn, how to learn and when to learn to improve teaching and learning practices and keep up with students' needs and rapidly expanding knowledge (Bakhshi, 2019).

4. Mentoring student teachers

Student teachers are usually supported, supervised and mentored by experienced school-based teachers. Mentoring in education has long been regarded as one of the most important factors that contribute to teacher professional development (Feiman-Nemser, 2001). Mentoring during student teaching has been reported to be an important aspect of teacher training, and mentor teachers significantly influence the development of student teachers (Jaspers, Prins, Meijers & Wubbels, 2019).

5. Functions of mentoring

The Alberta Teachers Association (2003) identifies the following functions of mentoring: *Teaching*: Teaching the protégé the skills that skilled mentors (unconsciously or consciously) practise daily is difficult. Many experienced teachers teach instinctively, which makes it difficult for them to analyze their own teaching. In order to teach the protégé, the mentor must become a reflective practitioner; *Sponsoring*: Sponsoring the protégé is another function of mentoring. The mentor must identify the strengths of the protégé and advise the protégé as to what activities would be most successful. Sponsoring then requires the mentor to support the protégé when he or she attempts the new practice; *Encouraging*: Encouragement is a key mentor function. By helping protégés see the positive side of their teaching practice and building on those reflections, the mentor is supporting and encouraging the growth of the protégé; *Counselling*: Counselling is the fourth function of mentoring. Protégés need sound advice regarding teaching practice, professional conduct and the culture of the school and community; *Befriending*: The fifth function of mentoring is befriending—protégés need someone to whom they can speak freely.

6. Roles of the mentor

The mentor teacher supports the learning process in the field, improves the quality of teaching and eases the confrontation with the reality of the classroom. They primarily offer instructional and emotional support (Becker, Waldis, & Staub, 2019). Instructional support mainly focusses on the development of the professional knowledge and skills needed to succeed in the classroom. Among other things it includes assistance with lesson planning, instruction related feedback and advice, and help with assessment and diagnostic issues (Becker, Waldis, & Staub, 2019). When offering instructional support, the emphasis is on learning activities that support pupils' learning in the classroom. It is expected that instructional support not

only impact (student) teachers' competence (knowledge and skills) but also the quality of instruction and pupils' learning.

Emotional support consists of careful listening, building confidence, encouraging self-esteem, and enhancing self-reliance. The mentor teacher, therefore, helps the student teacher to put difficult experiences into perspective, which helps the student teachers to increase their motivation and job satisfaction. When they receive emotional support, student teachers experience heightened sense of safety and confidence or reduced feelings of isolation and stress (Becker, Waldis, & Staub, 2019).

After an extensive review of literature on the roles of the mentor, Ambrosetti and Dekkers (2010) identify possible mentor roles and outline how the mentor may perform them.

Supporter: Assists in mentee's personal and professional development; inclusion and acceptance of the mentee; outlines expectations; gives honest, critical feedback; provides advice during task performance; provides protection from unpleasant situations; advocates for the mentee.

Role Model: Assists the mentee by example; demonstrates the behaviours of the profession; demonstrates tasks; sets and maintains standards; integrates theory and practice for mentee.

Facilitator: Provides opportunities to perform the task/job; allows mentee to "develop their sense of self"; provides guidelines and offers support.

Assessor: Provides criteria-based grades/marks on mentees performance; and makes informed decision on progress.

Collaborator: Uses a team like approach; provides a safe environment for the mentee; shares and reflects with mentees; gives assistance to mentees; identifies needs with the mentee.

Friend: Acts as a critical friend; provides companionship or camaraderie; encourages the mentee to try new tasks or challenges; provides advice about weaknesses in a constructive manner.

Trainer or Teacher: Provides specific instructions about performing task; teaches basic skills; provides resources; uses explicit teaching to pass on skills and knowledge.

Protector: Looks after the mentee; raises mentees profile with others; shields the mentee from unpleasant situations; defends mentees actions.

Colleague: Treats the mentee as one who is already part of the profession; advocates for the mentee in the organisation.

Evaluator: Appraises the mentees progress; provides feedback; engages in mutual evaluation with mentee and

Communicator: Shares professional knowledge and skills; provides a variety of communication methods; provides feedback on progress to further develop learning.

The multiple roles that can be assumed by a mentor, as shown above suggest that the work of a mentor is complex and multi-faceted.

7. The teaching practice e-portfolio

The increased integration of technology into the teacher preparation curriculum has influenced the rise of the electronic portfolio format (Wray, 2007). These electronic portfolios, or e-portfolios, are regarded by Wray (2007) as being similar in many ways to the paper and pencil format portfolios in that the contents are similar (e.g. lesson plans, student teacher's work samples, assessment tools), and that they are aligned with purpose (e.g. growth and development, standards driven, certification), and also that the artifacts included in the portfolio represent a variety of experiences over time (e.g. fieldwork, coursework, workshops). EPortfolios are different to traditional, paper-based portfolios in that particular uses thereof may include a range of affordances: ePortfolios can be more easily shared, stored and updated; they include a range of multimedia (embedded in text or hyperlinked); they can provide opportunities for reflective practices; they provide a potential for collaborative learning; and they can promote immediate feedback (Pallitt, Strydom & Ivala, 2015).

The Joint Information Systems Committee (JISC) (2008) identifies the following as the major purposes that e-portfolios might serve across a lifetime of learning: Application – providing evidence in support of an application for a job or for admission to further study; Transition – providing a richer and more immediate picture of learners' achievements and needs as they progress to a new environment, and supporting them through the process of transition; Learning, teaching and assessment – supporting the process of learning through reflection, discussion and formative assessment, and providing evidence for summative assessment; Personal development planning (PDP) and continuing professional development (CPD) – supporting and evidencing the pursuit and achievement of personal or professional competences. Teacher education programmes in many parts of the world make use of electronic portfolios, or e-portfolios. While both paper-based and e-portfolios are defined by a common concern for the importance of reflective commentary within a collection of teachers' work, the latter makes available opportunities to

present materials using digital media, such as audio recordings, graphics, hypermedia programs, database, spreadsheet, video, and word processing software (Trent, & Shroff, 2013).

Teaching practicum is a multidimensional activity involving student teachers, mentor teachers, university supervisors, school administrators, and learners. It entails many different considerations such as lesson plans, observation reports, visits of mentors, visits of supervisors etc. There are several advantages for using ePortfolios in teacher education programmes. These advantages are enhanced lifelong learning, reflective teaching skills, increased pedagogical and technical content knowledge, values, beliefs, and positive attitudes, amongst others (van Wyk, 2017). E-portfolios are used in teacher education programmes as empowerment tools and also as reflection tools. Lim, Lee, & Jia, (2016) argue that pre-service teachers are the ones that benefit the most from the use of e-portfolios as their reflective competencies are being developed. Reflection is a key aspect of a teacher's professional development and an important means for student teachers by which to integrate theory and practice. It remains a crucial part of the repertoire of a good teacher, and student teachers can develop this skill by consistently reflecting on their teaching practice sessions before, during and after they plan, develop and present evidence for the ePortfolio (van Wyk, 2017). Teacher educators have been using reflective practices (i.e. reflection) to help student/pre-service teachers to think about what happened, why it happened, and what they could have done to improve their teaching (Zhu, 2011). Reflection is further seen as the crucial component of teaching portfolios, transforming them from mere containers of information into powerful means of learning and assessment. Van Wyk (2017) argues that when compiling evidence in their e-portfolios, student teachers first reflect and then make informed decisions about what they want to include as quality evidence in their e-portfolios.

E-portfolios have the potential of building the capacity of pre-service teacher students for reflection, the challenges faced by various stakeholders and suggestions of how these challenges may be addressed. It then aims to provide a holistic approach for the sustainable use of e-portfolios in pre-service teacher education programmes (Lim, Lee, & Jia, 2016).

8. Conclusion

Findings from the analysis of literature and trends in mentoring, self-directed professional development and the use of eportfolios provided above reveal that ePortfolios may be used for alternative assessment, enhancing authentic, self-directed professional learning and promoting student self-reflection. Good quality mentoring and the use of e-portfolios are essential processes in the acquisition of self-directed professional learning skills for student teachers

E-portfolios may be used to support self-directed professional development of student teachers as they offer several advantages over traditional paper-and-pencil portfolios. Some of the identified advantages include the ubiquitous portfolio access, the ability to include multimedia and facilitated overviews of personal development.

In their endeavour to implement e-portfolios, institutions need to address issues specific to technology training and support needed by faculty and students, clarifying the portfolio's purpose, and student mentoring and support required during the portfolio development process.

References

- Alberta Teachers' Association. 2003. Mentoring beginning teachers: Program handbook. *Alberta Teachers' Association*.
- Ambrosetti, A., Dekkers, J. 2010. The interconnectedness of the roles of mentors and mentees in pre-service teacher education mentoring relationship. *Australian Journal of Teacher Education*, 35(6), 42-55.
- Bakhshi, A.M. 2019. Teachers' perceptions on self-directed professional learning in Newfoundland and Labrador (Thesis).
- Becker, E.S., Waldis, M., Straub, F.C. 2019. Advancing student teachers' learning in the practicum through content-focused learning: A field experiment. *Teaching and Teacher Education*, 83, 12-26.
- Brennan, A.R. 2021. Reconceptualizing teacher professional development as professional learning: A qualitative case study of a school-supported self-directed professional learning model (Thesis: Miami University).
- Carpenter J.P., Green T.D. 2018. Self-directed Professional Learning and Educator Self-Efficacy: The Case of Voxer. In: Hodges C. (eds) *Self-Efficacy in Instructional Technology Contexts*. Springer, Cham. https://doi.org/10.1007/978-3-319-99858-9_10
- Castanheira, P. 2016. Mentoring for educators' professional learning and development: a meta-synthesis of IJMCE volumes 1-4, *International Journal of Mentoring and Coaching in Education*, 5(4), 334-346

- Charalambos, V. 2000. Constructivism versus objectivism: Implications for interaction, course design, and evaluation in distance education. *International Journal of Educational Telecommunications*, 6(4), 339–362.
- Feiman-Nemser, S. 2001. From preparation to practice: designing a continuum to strengthen and sustain teaching. *Teachers College Record*, 103(6), 1013-1055.
- Garrison, D. R. (1997). Self-directed learning: Toward a comprehensive model. *Adult Education Quarterly*, 48(1), 18-33. <http://dx.doi.org/10.1177/074171369704800103>
- Jaspers, W.M., Prins, F., Meijer, P.C. Wubbels, T.2018. Intervening during student teachers' lessons. *Teaching and Teacher Education*, 75, 327-342.
- JISC (Joint Information Systems Committee) .2008. Effective practice with ePortfolios: Supporting 21st century learning. *Higher Education Funding Council of England*.
- Lim, C.P., Lee, J.C.K. & Jia, N. 2016. E-portfolios in pre-service teacher education: Sustainability and lifelong learning. In *Quality and Change in Teacher Education*, 163-174. Springer, Cham.
- Lorenzo, G. and Ittelson, J., 2005. An overview of e-portfolios. *Educause learning initiative*, 1(1),1-27.
- Morris, T.H. 2019. Self-directed learning: A fundamental competence in a rapidly changing world. *Int Rev Educ*, 65, 633–653 (2019). <https://doi.org/10.1007/s11159-019-09793-2>
- Oner, D., Adadan, E. 2011. Use of web-based portfolios as tools for reflection in preservice teacher education. *Journal of Teacher Education*, 62(5), 477-492.
- Pallitt, N, Strydom, S & Ivala, E. 2015. CILT Position Paper: ePortfolios. *CILT*, University of Cape Town.
- Shurr, J., Hirth, M., Jasper, A., McCollow, M. and Heroux, J. 2014. Another tool in the belt: Self-directed professional learning for teachers of students with moderate and severe disabilities. *Research, Advocacy, and Practice for Complex and Chronic Conditions*, 33(1), pp.17-38.
- Towle, A. & Cottrell, D. 1996. Self-directed learning. *Archives of disease in childhood*. (74). 357-9. [10.1136/adc.74.4.357](https://doi.org/10.1136/adc.74.4.357)
- Trent, J., Shroff, R.H. 2013. Technology, identity, and community: The role of electronic teaching portfolios in becoming a teacher. *Technology, Pedagogy and Education*, 22(1), 3-20.
- Van Wyk, M.M. 2017. An e-portfolio as empowering tool to enhance students' self-directed learning in a teacher education course: A case of South African University. *South African Journal of Higher Education*, 31(3), 274-291.
- Wray, S. 2007. Electronic portfolios in a teacher education program. *E-Learning*, 4(1), 40-51.
- Zhu, X., 2011. Student teachers' reflection during practicum: Plenty on action, few in action. *Reflective Practice*, 12(6), pp. 763-775.

HOW RORY'S STORY CUBES CAN IMPROVE THE ABILITY OF STORYTELLING IN WRITING AND SPEAKING

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Abstract

Using board games in the classroom is an opportunity for experiential learning and teaching. The presentation is an example of how board games can be used in mother tongue teaching. Our previous questionnaire proves that 9–10-year-old children show a positive attitude towards board games, and its use in lessons helps to increase interactions between students. In addition, cooperation within the group was strengthened. We have reflected on this with a new project. Our goal is to examine how the popular board game, Rory's Story Cubes, can develop written and oral communication of 9–10-year-old students. In the first period, essays were written by the members of the experimental group and the control group, in which five previously specified words were used. The quantitative and qualitative indexes of the data were analysed by Mean Length Utterance (MLU) and the Hungarian adaptation of Developmental Sentence Scoring (KFM), and creativity was considered. In the second phase, the members of the experimental group took part in an activity process that lasted 15 weeks and was held twice a week. The games with the Story Cubes were carried out under the supervision of the methodical leader of the experiment and recorded with the video camera. The oral texts were analysed in the same way. In the last period of the process, the participants again wrote an essay. The results show that the consistent use of the given board game is beneficial for the semasiological and syntactic cohesion of the students' oral and written texts. The project's achievements may contribute to the widespread use of Rory's Story Cubes, thereby expanding the methodology of native language teaching.

Keywords: Board games, Rory's Story Cubes, primary school, creativity, cooperation.

1. Introduction

During the pedagogical use of board games, students participate in a complex but at the same time indirect educational process. On the one hand, the primary goal is not the development of a skill, but one of the essential areas of the human psyche, the playfulness, which promotes the improvement of numerous essential areas (Aczél 2015: 2). On the other hand, the educators can fulfil the role of a supporter or even a player, while they are leading the game themselves. The tasks of the educators in this form of activity are to provide board games adapted to the subject matter and the pedagogical goals to be achieved, to explain the rules and to motivate the students. As a result, the after-school care centres or the surrounding atmosphere of the extracurricular activities enable the pedagogical use of board games. In addition, it can be imagined as part of a project, but it does not exclude the appearance of board games in the lesson. The mentioned features together mean that the students can step out of the usual frontal form of activity, in addition, their inner motivation increases noticeably in order to solve problems constructed in the game situation (Jesztl–Lencse, 2018; Zsiray 2020). This form of learning and teaching has a positive effect on many areas, for example it promotes critical thinking, social skills, empathy, tolerance, interpersonal communication and strategic awareness (Mayer–Harris 2010).

2. Methods

The results of our previous questionnaires proved that 99% of 9-10 year old students have positive experiences with board games, and two-thirds of the respondents enjoy playing board games in which communication plays an essential role. In addition, this shows the relevance of the chosen topic, that in the case of the mother tongue lessons, the children have the second greatest need for games. In the next period of previous research, the developmental areas of the core curriculum were compared to the developmental effects of board games we tried. Taking our knowledge into account, a board

game-oriented activity was designed and implemented, the aim of which was to deepen the content of an already familiar fairy tale (Angi Máté: Az emlékfoltozók). The students formed groups and were able to solve tasks at different stations that were connected to various modern board games. Board games selected included, for example, Concept, Dixit and Scrabble. In our experience, board games can be effectively included in native language lessons, and the consistent use of them has a positive effect on cohesion between group members and can increase the number and quality of interactions. The acquired results and observations have motivated us to start a new project. Our current research has been accomplished with the support of the Új Nemzeti Kiválósági Program. It is considered a scholarship program whose goal is to support students interested in scientific careers.

In the board game, Rory's Story Cubes, players can create interesting stories alone or together, in which the motives thrown with the dice are to be linked. We have assumed that regular and guided play with Rory's Story Cubes can promote oral and written communication. In the beginning of the research, an experimental group and a control group of 8-8 people from the fourth grade of the ELTE János Bolyai elementary and high school in Szombathely were created. First, the selected students from both groups wrote an essay using five previously specified words. The definite words had different frequency indexes, and among them there were three nouns, one verb and one adjective. After that, the fifteen-week activity process with the experimental groups started. The project consisted of thirty opportunities held twice a week. The narratives were recorded - both on video and audio - to study the children's communication and attitudes. After all the events, essays were written again. During the research, both oral and written texts were analysed and evaluated in terms of grammatical and semantic complexity. Finally, the performances of the experimental and control groups were compared in many ways.

The opportunities of the activity process are based on the RJR model (*ráhangelődés – jelentésteremtés – reflektálás*), in which three phases are distinguished. In the introduction (*ráhangelődés*) we talked about how to create an interesting and meaningful story, and what to pay attention to when telling it. During the creation of the meaning (*jelentésteremtés*) even the game with the dice happened. In general, the activities consisted of two rounds with two different forms of playing. Most of the time, the students chose a dice and threw it. In case a player had new ideas, then he could start the story. The game lasted until the last dice. In the other forms of playing, the players followed each other in a predetermined order. In the beginning, all players had to throw three dice, later more like two, and start, continue or end the story. We considered it important to use different game forms in parallel because we want to examine how they affect the structure of the stories. The last phase, reflection, is about evaluating the tale. Players could express their feelings and opinions and share positive and negative comments with each other.

The grammatical and syntactic complexity of the texts was determined using Mean Length Utterance (MLU) and the Hungarian adaptation of Developmental Sentence Scoring (KFM). When analysing speech production, a ubiquitous test method is the determination of communication length, that is, how many words are in a message (Crystal 1998). Meaningful words are taken into account while assessing the statement (Deme 1971; Keszler 1983), that is, articles, conjunctions and unjustified repeated words are not counted. In determining the MLU number, the meaningful words are divided by the number of well-formed messages.

We calculated the syntactic complexity of the children's language by calculating the so-called KFM value (Gerebenné – Gósy – Laczkó 1992). The method was developed by Lee and Carter (1971) in the 1970s. The approach examines the structure of the sentences, the level of use of each part of speech, and the presence of the different tenses, interrogative and negative words in the language. Certain parts of speech do not get any points themselves (e.g. *the verb, the noun*), but the pronouns, the number adjectives, the adverbs, the postpositions and conjunctions do. Conjugation and the complements represent their own values in the structures. In the case of determining the KFM value, the count of well-formed messages must be added to the scores of words and grammatical structures, then the sum raised must be divided by the number of messages totalled (Laczkó 2011: 445). et al. 2002).

3. Results – Oral storytelling

3.1. Individual development

At the first opportunity of the activity process, all participants independently created a story using six dice. This measured the level of children's storytelling ability at the beginning. At the end of the process, another measurement was carried out. The results show unmistakable development.

In the early days, students could only focus on connecting motives, so they didn't bother about cohesion. This causes problems several times when there was no living being among the randomly appearing images because they couldn't decide who the main character is. They have not understood that an animal, person or object may be involved in the action even if it is not among the motives being

thrown. After thirty occasions their need for cohesion has increased noticeably. This means that they considered the given motives only as a basis and they added further elements (e.g. *adverbs, attributes*) to the fairy tale. It follows that their narratives became more complex, longer, and more coherent. At first they could not abstract at all from the verbal meaning of the pictures, but today it is not a problem for them.

In the first measurement, the macrostructural units of the narratives could not be separated from each other because the oral texts were too short. At the end of the activity process, the structure (*introduction, main part, conclusion*) can be clearly excluded. The stories often started with typical fairy tale beginnings (e.g. *Egyszer volt, hol nem volt...*) and consisted of one statement. Usually the substantive elements of global cohesion (e.g. *intimation for time and place*) have appeared. At the last measurement, the presentation of the main characters played an important role. They liked to tell both about the appearance and the inner qualities of the characters. During the main part, the children have created a fictional world in which the action has progressed in time and place. The conclusions were the final communications of the tales, and often involved solving a problem and describing the outcome.

The development can be observed in the growth of KFM values and MLU numbers. It was difficult to determine the limits of the statements, when defining them we took the sum of the content and the intonation into account. (Laczkó 2011). The individual stories consisted of 3-4 statements at the first measurement, at the end it increased fourfold on average. At the same time, the number of words per sentence shows an increasing tendency. During the first measurement, the average value of the MLU numbers was 6.41 points. This value has increased to 10.58. The MLU count and the KFM values are related. The higher the MLU number, the higher the KFM value. The average of the KFM values was 21.5 points at the first measurement, then they increased to 43.33 points. As for the grammatical complexity, we can notice significant development. At first, the children mainly supplemented the statements consisting of subject and predicate with object, location or temporal determination at most. In the last measurement numerous attributes (e.g. *a másik törp száz tonnás volt*) and adverbial clauses (e.g. *átváltozott a professzorrá, erőt nyer magának*) can be found. Conjugation became more varied, both subjunctive (e.g. *nem sportolhat*) and imperative (e.g. *adjanak egy kis adatot a vírusról*) can be perceived. Besides the past tense, the future tense (e.g. *meg fogja állítani*) can also be observed.

3.2. Collective development

At the beginning of our research we consciously considered a concept for the activities and it was adapted to the needs of the participants. The first couple of occasions served to get to know the board game. The children could immerse themselves in the experience offered by playing and learn about the possibilities of the game. Then the students gradually had to take many factors into account (e.g. *using several attributes*). Initially, we wanted to encourage the development of connections between themes, so we preferred the three-dice game form. In addition, the game form with a dice was used until the end of the activity process, because the children could better concentrate on the symesiological and grammatical aspects. From the twentieth occasion on, the form of the game with two dice dominated, because we noticed that the connection of the motives no longer caused problems for the students, so we were able to pay more attention to the semantic aspects. On some of the latest occasions we have tried double play.

During the occasions, a growing trend in semantic cohesion can be observed. At the beginning of the process, it often happened that the children continued the story together with thoughts that were not related to the original idea. The improvement in this area is noticeable. The children regularly strive for the preservation of the train of thought they have begun and the convergence of the introduction and conclusion. Although the fitting of random motives in common fairy tales is more complicated than in individual stories, group members can adapt to the ideas of other players more easily and quickly than before. We noticed that hesitation phenomena (e.g. *hát, ugye*) that arise as a result of linguistic planning occurred less frequently. The correct ending of the story causes problems for most of the children, so we gave all participants the opportunity to finish the common fairy tales. During the reflection, they enthusiastically shared how the story should end. We concluded that they are interested in the further fate of their fictional characters. Thanks to the grandly refined style, the stories become more and more exciting, apart from the necessary statements, the students give short descriptions of the place of the message, identify the characters. There used to be no fixed character traits for the characters, so from the two-thirds point of the action process we made the decision that the children should provide the main character with traits at the introductory stage. After that, they could identify with the characters better.

The average of the KFM scores on the first ten occasions was 34.94 points. This value increased to 40.76 points in the next ten occasions, then it increased to 45.85 points in the end. In this case, too, the MLU numbers and KFM values show correlation. The average of the MLU numbers grew from 8.47 to 9.76, then to 10.83. During the shared narratives, they rarely made mistakes in grammar. It follows from their age and the development of their grammatical competence. They created long and complex sentences that were connected with often recurring conjunctions or temporal adverbs. In their communications, the coordinate and subordinate structures combined.

4. Results – Written storytelling

Furthermore, the first and last written essays are compared. On the one hand, the initial and final performances of the experimental group are studied. On the other hand, the differences between the written results of the experimental and control groups are explored. For both essays, participants were required to use five pre-determined words in their texts. The words of the first essay were the next ones: the squirrel, the balloon, the umbrella, dirty, curls (*mókus, léggömb, esernyő, piszkos, csalogat*). In the second essay they would have to fit the following words: the cord, the path, the coin, tricky, suddenly become aware (*madzag, ösvény, pénzérme, csalafinta, rádöbben*). The essays written alone were analysed in a similar way to the oral texts.

4.1. Semantic cohesion

Some of the elements that ensure semantic cohesion can only be explored in the written texts. The following remarks identify the first and last essays. All participants in the research gave a title to the essay that was related to the content, which means that the global cohesion was created in the title and relevance. The macrostructural units were generally judged correctly and there was a substantive relationship between sentences. The introduction consisted of a message, and at the same time the time and place and the naming of the main character were implemented. The main part was mostly made up of 5-10 sentences and was not divided into further paragraphs. Compared to oral narration, story completion was planned more consciously because they had more time to think. The plot was characterised by a linear train of thought, so the continuity of the process was not broken.

In this study, we understand creativity as linguistic creativity, which makes texts more versatile and expressive. In this area, most members of the experimental group have excelled. A significant difference between the groups is that the participants in the experimental group were able to pull the previously given words into the final essay without difficulty. It could be seen several times that the students from the control group often formed word structures consisting of two previously given words (e.g. *csalafinta ösvény*), from which we can conclude that they were trying to build in the words into the text as quickly as possible, and they didn't consider the logical connections in the first place. In addition, the children who regularly played with Rory's Story Cubes formed their stories imaginatively, naming their characters many times (e.g. *Morzsi, Erzsébet*). It never happened in the case of the control group.

4.2. Grammatical cohesion

The linguistic creativity also arose in the syntactical solutions. While the students in the control group wrote thirty quality attributes in the essays, the others embellished the style of the story with fifty-seven quality attributes. The numbers of quantity attributes in their papers were more than twice as many as (14) as in the case of the control group (6). Differences can be observed in the area of conjugation, which show the progress of the experimental group. The use of the past tense subjunctive was found only in their texts (e.g. *akartam volna menni*). Adverbial participle developed late in speech production, although they can be detected in the stories of the experimental group (e.g. *haza felé közeledve*).

In the first essay, the experimental and control groups achieved similar results in terms of average MLU numbers and KFM values. The mean value of the MLU scores of the experimental group was 5.46 points. This value was 5.55 in the control group. Originally, the mean value KFM scores of the experimental group were 2.8 points (20.41 points) higher than the points of the control group (17.61 points). of written essays. The written texts are characterised by shorter sentences, but the units of communication in conversation consist of several complex grammatical structures. From the analysis of the experimental group's final essays, it can be observed that the MLU scores improved by an average of 2 points. The gain of the control group is 0.5 point.

Both groups have developed from the height of the KFM values since the first measurement, but the average value of the experimental group has increased by 2.3 points. In this field, all participants of the experimental group performed better than the first time. Compared to the first measurement, they soon collected an average of 8 more points. These positive changes are the result of regular and consistent use of Rory's Story Cubes. In the first essay, the experimental and control groups achieved similar results in terms of average MLU numbers and KFM values. The mean of the MLU scores of the experimental group was 5.46 points. This value was 5.55 in the control group. Originally, the mean KFM scores of the experimental group were 2.8 points higher (20.41 points) than the points of the control group (17.61 points). of written essays. The written texts are characterised by shorter sentences, but the units of communication in the conversation consist of several complex grammatical structures. From the analysis of the experimental group's final essays, it can be observed that the MLU scores improved by an average of 2 points. The gain of the control group is 0.5 point. From the point of view of the KFM values, both

groups have developed since the first measurement, but the average value of the experimental group has increased by 2.3 points more. In this field, all participants of the experimental group performed better than the first time. Compared to the first measurement, they soon collected an average of 8 more points. These positive changes are the result of regular and consistent use of Rory's Story Cubes.

Table 1. MLU numbers and KFM values average values based on the analysis of the essays from the experimental and control groups.

	Experimental group	Control group		Experimental group	Control group
1. Essay MLU number	5.46	5.55	1. Essay KFM values	20.41	17,61
2. Essay MLU number	7.4	6.03	2. Essay KFM values	29.38	24,19

5. Conclusion

During the process of activity, consisting of thirty opportunities, we experienced positive changes in the semantic and symesiologic area. Overall, it can be said that the oral and written texts of the participants became more complex and structured. The tendencies that emerged verbally early on can also be unmistakably noticed in writing. The MLU and KFM values of the experimental group increased significantly compared to the control group. When telling a story, the students could always use a variety of expressions and enrich the texts with additional attributes and various definitions. The development routes presented in the study show that the systematic use of Rory's Story Cubes in the methodology of native language teaching can be included as a playful method, because they are useful in the development of oral and written communication.

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References

- Aczél, Z. (2015). A társasjáték-pedagógia filozófiája. *Tani-tani Online*. Retrieved 04.20.2022., from: http://www.tani-tani.info/a_tarsasjatek_pedagogia_filozofiaja
- Bárdossy, I., Dudás, M., Pethőné Nagy, Cs., Priskinné Rizner, E. (2002) *A kritikai gondolkodás fejlesztése: Az interaktív és reflektív tanulás lehetőségei. Tanulási segédlet pedagógusok és pedagógusjelöltek számára a saját élményű tanuláshoz*. Pécs: PTE Kiadó.
- Crystal, D. (1998). *A nyelv enciklopédiája*. Budapest: Osiris Kiadó.
- Deme, L. (1971). *Mondatszerkezeti sajátosságok gyakorisági vizsgálata*. Magyar szövegek alapján – Nyelvészeti tanulmányok 15. Budapest: Akadémiai Kiadó.
- Gerebenné Várbiro, K., Gósy, M., Lackó, M. (1992). *Spontán beszéd megnyilvánulások szintaktikai elemzése DSS technika elemzésével*. Budapest: Manuscript.
- Jesztl, J., Lencse, M. (2018) *Társasjáték-pedagógia*. Budapest: Demokratikus Ifjúságért Alapítvány.
- Keszler, B. (1983). Kötetlen beszélgetések mondat- és szövegtani vizsgálata. In Rácz, E. Szathmári, I., *Tanulmányok a mai magyar nyelv szövegtana köréből*. (164–87.) Budapest: Akadémiai Kiadó.
- Laczkó, M. (2011). Óvodások és kisiskolások spontán mondatalkotási folyamatai. *Magyar Nyelvőr* 135(4): 440–458.
- Laczkó, M. (2020). A beszéd jellemzői spontán társalgásban és tanórai megnyilatkozásban. In Ludányi, Zs., Jánk, I., Domonkosi, Á., *A nyelv perspektívája az oktatásban. Válogatás a PeLiKon 2018 oktatásnyelvészeti konferencia előadásából*. (297–310.) Eger: Eszterházy Károly Egyetem Líceum Kiadó.
- Lee, L. L., Canter, S. M. (1971). Developmental sentence scoring: a clinical procedure for estimating syntactic development in children's spontaneous speech. *JSHD* 3663: 315–40.
- Mayer, B., Harris, C. (2010). *Libraries Got Game: Aligned Learning through Modern Board Games*. Chicago: American Library Association.
- Zsiray, B. (2021). *A társasjátékok alkalmazási lehetőségei kiemelten az anyanyelvi nevelés keretein belül*. OTDK dolgozat. Nyíregyháza: Manuscript.

DEVELOP CRITICAL THINKING FROM FREEHAND DRAWING TO DIGITAL PROCESSES

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Abstract

Learning never stops, and neither does teaching. Stimulating critical thinking at the university plays a critical role in shaping a generation of professionals capable of meeting the ever-changing challenges of the modern world. The experience is related to the course of Building Drawing in the first year of Building Engineering at the Politecnico di Torino. The methodological approach adopted explores the potential of the drawing itself as a language of communication for the construction sector. The course becomes a learning path with the students: theoretical notions are provided as the foundation, then tools and methods for representing the survey and the project between tradition and innovation are analysed and evaluated with a critical attitude. Real-world (freehand sketching), digital (CAD vs BIM), augmented and virtual practices are presented to provide a synoptic picture of possibilities that the student may choose to use in subsequent courses and in working life. The recent pandemic has promoted further opportunities to innovate in teaching by adopting tools that stimulate creativity. The teacher becomes an avatar who can interact with students in cyberspace to evaluate and discuss project ideas. Students are continually asked to self-reflect and assess lesson content by identifying key concepts. The final evaluation also involves a discussion of a mind map in which keywords are put in order, reworked, linked to form a personal interpretation of the teaching. Through the introduction of these actions, it has been noticed an increasing involvement of students, both individually and in groups, leading to the achievement of quality results sometimes higher than required.

Keywords: *Critical thinking, mind map, digital drawing, BIM, virtual and augmented reality.*

1. Introduction

Nowadays, the modern world is faced with increasingly complex challenges related to globalisation, climate change, and the resilience of our cities. On the other hand, the growing technological evolution enables broader and more exciting scenarios than ever. These factors are very evident in the construction sector, which in the Industry 4.0 era is going through a period of structural change to keep pace with the speed of the innovation process. The emergence of digitisation, new working methods and collaborative processes required at the European level by the Directive 2014/24/EU (European Parliament, 2014), such as Building Information Modelling (BIM), have demanded from the market not only new skills at a technical level but, above all, a flexible engineering mindset capable of adapting to fast-changing contexts. This scenario has generated a gap between the new industry's demands and the training of young university graduates. In this historical context, more than at any other time, there was a pressing need to introduce a revision of degree courses (Ugliotti & Osello, 2021), not on theoretical content but approach and teaching method. Moreover, distance learning associated with the Covid-19 epidemiological emergency measures has introduced new difficulties that have required additional investment to turn the limitations of the virtual environment into opportunities for the students (Ugliotti et al., 2021). The article addresses the particular case of the course of Building Drawing in the first year of Building Engineering at the Politecnico di Torino as a leading example of innovative and future-proof teaching practice.

2. Method

Now that the necessity to push for innovation in teaching and learning methods has been framed, how to critically and technically explore it? Moreover, which role plays tools and procedures' for digitalization? This section aims to investigate the strategies that lead to consistent innovation in teaching processes and focuses on the broad theoretical reflection of the current strategies in innovating methods. Promoting innovation in terms of process and tool in teaching courses is driven by specific and tailor-made strategies that aspire to profoundly change the methods and scope of the traditional teaching approach. The Building Drawing course tries to embody these strategies and make them feasible by providing an articulated action plan. The operative strategies adopted in the course are grounded on determined teaching principles focused on improving the use of personal mental strategies in elaborating concepts. The elaboration of information in terms of the connection between topics and matters, individual restitution of results, and critical analysis of process and outcome is fundamental in pushing teaching methods beyond traditional and consolidated procedures. The Building Drawing course tries to embody some of the principles expressed by the cognitivist matrix teaching (Maccario, 2015) and associate the theoretical suggestions with an operative strategy. The teaching approach of the course takes the following strategic principles into account: (i) supporting the reworking of knowledge, (ii) experimenting with mental strategies, (iii) employing the use of mental resources, (iii) increasing the self-efficiency level of the students.

2.1. Reworking of knowledge

First of all, innovative teaching methods should lean on supporting the reworking of knowledge (De Vecchi, 1999). The teaching goal is no longer simply to accumulate a set of knowledge, but to structure, to build networks between concepts. To establish a connection between knowledge. What can benefit the development of an articulated network of concepts is addressing a teaching topic by suggesting the employment of several and different technologies to explore from different sides and grade the same object of study. Providing diversified tools and learning strategies can help in pushing students to build critical thinking and cognitive connections. In this context, the Building Drawing course suggests employing several methodologies and techniques in the cross-sectional analysis of a specific building under study. As the students are only in their first year, they are asked to reproduce an author's project to begin to familiarise themselves with the theoretical content and govern the tools. The case study selected is explored comprehensively by students through a gradual learning path of representation techniques which involves the employment of freehand drawing, bidimensional and three-dimensional digital drawing, parametric design, augmented and virtual reality. The aim, therefore, is not to make a vertical focus, but to investigate the potential and limitations of the different instruments. While the use of freehand drawing is well established in the scientific social research as a tool for critical reflection, the adoption of advanced digital tools is still underestimated in terms of methodological approach. The tools, in fact, represent a means to better control not only the design but especially the process. In this sense, it is important to transfer to students the approach with which to interface with the instruments rather than the mere sharing of commands referring to a specific software popular at the time. The use of different but complementary operative solutions helps students in analysing the object in different scales, various perspectives and technical means. The outcome is a deeper learning of the whole object in its characteristics, in the relationships between the parts, in its connection with the surrounding. The students are asked to begin the process of investigating the building, starting with the creation of anthological sketches. The theoretical contents relating to orthogonal and axonometric projections are declined in the following practical exercises, always requested freehand, having as object a specific characterising element of the artefact. Then digital representations made with Autodesk AutoCAD and Autodesk Revit design model authoring software are compared. The employment of augmented reality is required for the purpose of providing additional layers of information during the presentation of the drawings during the examination. These may include images, videos, virtual tours made from the realised models, websites. Figure 1 shows the example of the Mies van der Rohe Barcelona Pavilion case study from the Building Drawing course a.a. 2020/2021. In addition, students experience immersive virtual reality for their project reviews by using Iris ProspectVR as software, HTC Vive and Oculus Rift as hardware. As can be seen from Figure 2, the teacher becomes an avatar who can interact with students in cyberspace to verify the correct construction of elements and their assembly, dimensions, proportions and construction nodes. User perception is amplified and discussion becomes interactive because it is possible to take note of critical points also by means of instruments for taking screenshots, writing comments and highlighting errors inside the model (Ugliotti et al, 2021). Being able to navigate the digital three-dimensional models at the same time from the inside certainly contributed in terms of collaboration and involvement of the students.

Figure 1. Gradual learning path of representation techniques.

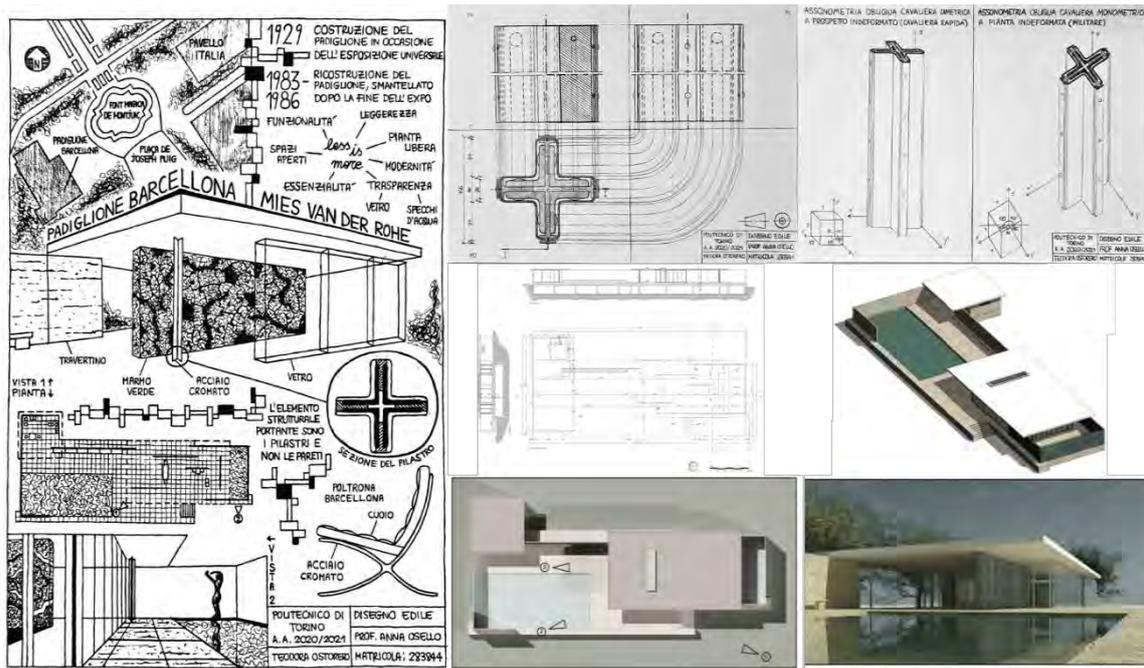


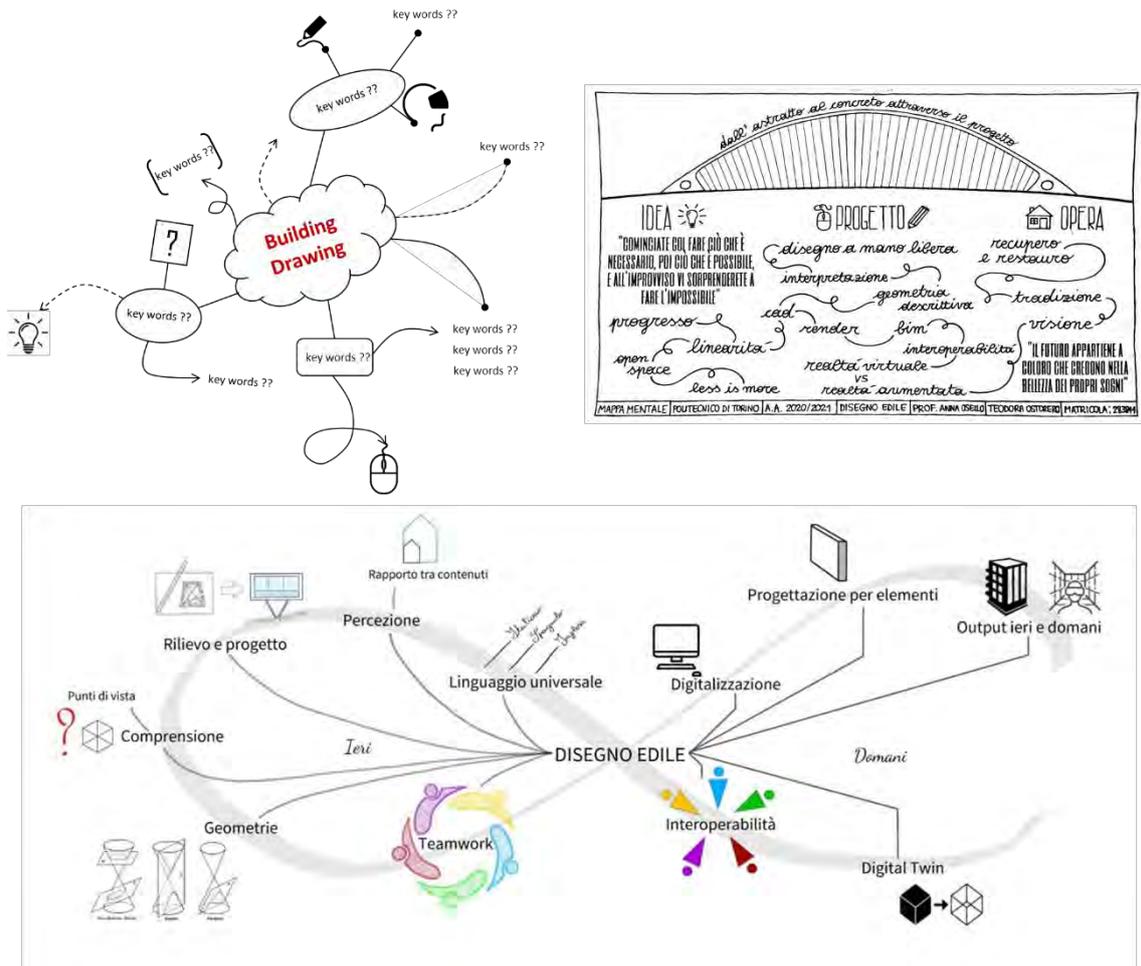
Figure 2. Immersive virtual reality experience for project reviews.



2.2. Experiment with mental strategies

Secondly, teachers should encourage students to experiment with mental strategies to push a step beyond mere knowledge transmission. Knowledge is built through a personal work of re-elaborating concepts through which understanding takes place, and knowledge is established. During the Building Drawing course, students are encouraged to elaborate a personal interpretation of the topics and build mental and graphical connections between subjects. In this framework, an operative strategy could be the definition of a mental map that encloses a keyword for every topic addressed in the course. The student, in this case, has the task of tracing connections between the topics explained and interpreting the contents and the relationships by using a graphical mean. Two examples from the Building Drawing course a.a. 2020/2021 are shown in Figure 3.

Figure 3. Mental maps outcomes.



2.3. Employing the use of mental resources

The teacher not only provides the strategies but also helps students in employing the use of mental resources (Mazzoni, 2001). It is fundamental that an individual is guided to understand that resources must be dedicated during a study activity and, secondly, how many resources must be dedicated and for how long. It is strategic for a student to ask himself how much (cognitive) effort must be used to tackle a task. How to reach this objective? Through a clear organization of the teaching course in terms of topics, objectives, technologies employed, and expected outcome. The task of a teacher is not only to organize the resources but also to help students by employing them at different levels at different times. The Building Drawing course is organized to put different organizational, cognitive and technical resources into action to accompany the subject in its growth as an autonomous individual and student.

2.4. Increasing self-efficacy level of the students

The weaving of the strategies described must lead to the last point of discussion to consider the needed increase in the self-efficacy level of the students. This aspect represents a crucial and fundamental element because it focuses on nourishing the students' cognitive resources in evaluating themselves. It aspires to help students not so much to understand if they have done well or poorly but because they have achieved a specific result. It can positively affect self-efficacy as it helps to evaluate their performance to recognize functional processes and those that are harmful to increase the possibility of self-regulation and the confidence to better face future difficulties. To the advantage of this aspect, the Building Drawing course promotes a calendar organized in weekly steps of validations supported by the teacher, doctoral students, and tutors at different levels and with different and complementary competencies to help students develop practical activities. Students are accompanied in developing their exercises by weekly reporting difficulties and achievements. They are put into proof to have defined a critical and personal reflection on the practical work.

3. Conclusion

The article aimed to illustrate how results in not only the matter intended as the observable learning outcomes but also the strategies used to make them their own. Learning takes place through the organization of knowledge by the subject. A person learns when he can connect the information from outside to his own knowledge to build organized structures. The organization of knowledge leads to the construction of concepts or logical categories that are more and more comprehensive, articulated, and related through logical links. The student must be helped to manage their own learning in an increasingly autonomous way, developing a strategic attitude. The article shows how these theoretical reflections can become practical strategies to make teaching principles feasible. The Building Drawing course is the fieldwork where these teaching and learning objectives are put into action and are experimented into a practical context. The results obtained on the proposed innovative didactic experimentations represent an initial proposal to evaluate the potential of the adopted technologies to support teaching and their impact on students' learning processes based on critical thinking. At the end of the course, students have acquired the competence to critically interpret building form and geometry and the ability to choose the most appropriate representation to achieve a given goal.

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References

- European Parliament, *Directive 2014/24/EU of the European Parliament and of the Council of 26 February 2014 on public procurement and repealing Directive 2004/18/EC*. (2014).
- De Vecchi G., Carmona-Magnaldi N., Della Casa, C. (1999). *Aiutare e costruire le conoscenze*. Firenze: La Nuova Italia.
- Maccario D. (2015). *Le nuove professioni educative*. Roma: Carocci editore.
- Mazzoni G. (2001). *I processi cognitivi nell'apprendimento scolastico*. Roma: Carocci editore.
- Ugliotti, F.M, De Luca, D., Fonsati, A., Del Giudice, M., Osello, A. (2021). Students and teachers turn into avatars for online education. *INTED2021 Proceedings*, pp. 4556-4565.
- Ugliotti F.M., Osello A. (2021). Drawing Rediscovered its Intrinsic Multidisciplinary Resilience. *CONNECTING drawing for weaving relationships. Languages Distances Technologies*, pp. 1228 – 1241.

SURVIVAL MODELS FOR PREDICTING STUDENT DROPOUT AT UNIVERSITY ACROSS TIME

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Abstract

The aim of this study is to develop a tool to recognize major responsible factors of student dropout through time, both in terms of student characteristics and type of degree courses, and to accurately predict the student time to dropout, if any. From a predictive point of view, we aim at developing an early warning system to early predict the status of a student career, identifying the risky timings in terms of dropout, as a supporting tool for early interventions policies. To this end, we follow a Survival Analysis approach, applying time-dependent COX frailty models, in which the target variable is the time to dropout of students within the first three years after the enrolment. Student careers are tracked over time, collecting time-dependent information. Results show that first year information is already powerfully predictive of the time to dropout and that dropout trends differ across degree courses and student profiles.

Keywords: *Student dropout, higher education, survival analysis, frailty COX models, time-dependent covariates.*

1. Introduction

The Italian Higher Education (HE) system measures a high level of dropout, with many students abandoning their studies during the Bachelor (Cannistrà et al., 2021; Pellagatti et al., 2021). Data from the Annual activity report of Eurostat 2020 (EUROSTAT, 2020) show that the educational attainment at the overall tertiary level is very low compared to most of the rest of EU countries. In this study, we analyze data from Politecnico di Milano (PoliMI), focusing on the careers of students enrolled in a Bachelor of Science in Engineering between 2010 and 2017. PoliMI dropout rate in engineering is around 30% and student dropout mainly occurs during the first three years after the enrolment. Since the dropout occurrences are distributed across time and that their drivers and determinants might be potentially heterogeneous, we do not focus only on the dropout event per se, but rather on time to dropout.

Dropout has been broadly studied in the literature (Aljohani, 2016; Contini, 2018; Tinto, 1975), with various sources of data and methodological approaches, mainly focused on the classification of dropout (Aljohani, 2016; Cannistrà et al., 2021; Larrabee Sønderlund et al., 2019; Viberg et al., 2018). In the last decades, some researchers have moved to a survival analysis approach (Kleinbaum & Klein, 2004), taking account and modelling the dropout timing (Ameri et al., 2016), being the student dropout the event of interest.

In this work, we contribute to this literature by proposing a Cox survival model (Cox, 1972) to analyze PoliMi dropout phenomenon. Our aim is twofold: to identify responsible factors of student dropout through time, both in terms of student characteristics and degree courses, and to develop a tool to accurately predict the student time to dropout, as soon as possible. To this end, we rely on time-dependent Cox frailty models (Therneau & Grambsch, 2000). The Cox model allows to investigate the association between the survival time of students and more predictor variables. The inclusion of time-varying covariates allows to inform the model by updating student-level covariates semester by semester, tracking the student career through time. Lastly, being the students enrolled in 16 different degree courses, the inclusion of the frailty allows to investigate and quantify the dropout phenomenon heterogeneity present at the degree courses level, by considering the nested structure of students within degree courses. To the best of our knowledge, this is the first time that time-dependent Cox frailty models are applied to educational data. We further provide a prediction analysis comparing models performance when student career information is added stepwise.

Results show that first year information is already powerfully predictive of the time to dropout and that dropout trends differ across degree courses and student profiles.

2. PoliMi dataset

We consider data coming from careers of bachelor students enrolled in an engineering faculty at PoliMi between 2010 and 2021. We focus on the first three years of their career, excluding from the analysis all dropouts occurred during the first semester¹. Data come from two different sources. The first dataset contains student information at the enrolment (each record refers to a different student and contains his/her personal information). The features we consider from this dataset are the student gender and origins, the age at the enrolment, the PoliMi admission score, the high school grade, the type of previous studies, family income and degree course. The student career duration is indicated by the variable *CareerDuration3y*, which is computed as the difference between the day of the start of the career and the day of the end of the career, using the number of semesters as unit of measure. Students whose career is still active at the end of the third year are censored and their career duration is fixed at 6 semesters. The variable *Status3y* indicates whether the student drop out or not during the follow up time, with a high concentration of dropout events in the early semesters of the student career. The second dataset, instead, collects the student academic exams track semester per semester. In this table each observation describes the student performance during a specific semester (exam session). The variables we consider from this dataset are *CFUP*, indicating student number of credits gained, and *Average*, indicating student weighted average grade during the specific exam session. In the time-dependent framework, the two datasets are merged to include both student personal information and student career progression results, in which the number of gained credits and the weighted average grade are computed progressively through the career, as shown in the table reported in Figure 1. In this table, each observation represents a specific interval of time, corresponding to university semesters. The time interval is defined by the variables *Start* and *End*, while *EventDrop* describes whether the student drops or not during each specific semester. The dataset collects information about 49,501 students, enrolled within 16 engineering degree courses.

Figure 1. Complete sample observations for a random student.

Stud.ID	Gender	Income	CFUPprog	Averageprog	Start	End	EventDrop	Status3y	C.Duration3y
333858	M	High	0	0.0	0.0	1.0	0	L	5.7
333858	M	High	30	23.3	1.0	2.0	0	L	5.7
333858	M	High	60	24.3	2.0	3.0	0	L	5.7
333858	M	High	90	25.2	3.0	4.0	0	L	5.7
333858	M	High	120	25.5	4.0	5.0	0	L	5.7
333858	M	High	160	24.9	5.0	5.7	0	L	5.7

3. Methods

The analysis is composed by three main parts: we start by conducting an explorative univariate analysis in which survival curves of different profiles of students are measured by means of Kaplan-Meier estimator and compared, standing on their gender, age, family income, etc. We then apply Cox models both with time-invariant covariates, measured at the baseline (end of first semester), and with time-varying covariates, measured until the end of student careers. Lastly, we include the frailty in the Cox models to take account of the nested structure of students within degree courses and to model the induced heterogeneity.

We denote by T the nonnegative random variable representing the time to the event, or *survival time*, and by t any specific value of interest for the random variable T . We consider a student as survived at time t if he/she did not experience the event of dropout until time t . The *survival function* $S(t)=P(T>t)$ indicates the probability of an individual to survive longer than a specific time t , while the *hazard function* $h(t)$ gives the instantaneous risk for the event to occur, given that the individual has survived up to time t . The Kaplan-Meier estimator is a nonparametric statistic that estimates $S(t)$ and allows to compare the estimated survival curves of group of students, according to the membership to a specific category. The Cox model estimates the hazard function $h(t)$ for each student as the product of a common baseline hazard function, estimated nonparametrically, and the exponential of a linear predictor composed by student-level covariates. The frailty Cox model includes a degree course-specific multiplicative factor, a Gamma distributed random variable, to the baseline hazard exploiting the heterogeneity at the degree courses level.

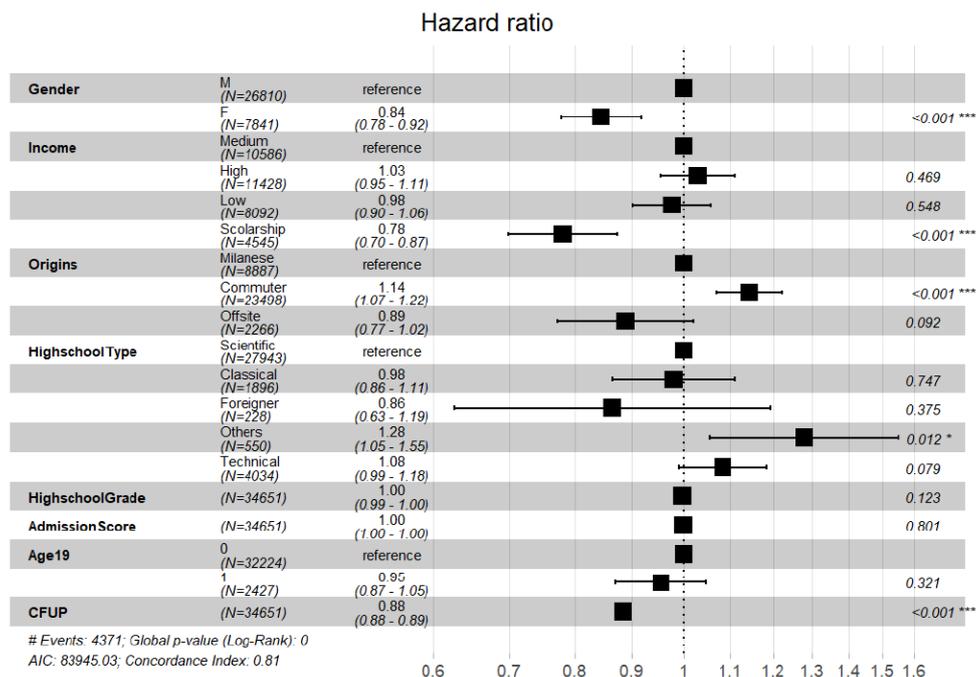
¹During the first semester, and especially during the first two months, we observe a high number of dropouts, mainly given to unpredictable external factors like the acceptance in other universities.

4. Results

Results of the univariate explorative analysis by means of Kaplan-Meier curves show that females have on average a 30% lower risk of dropout than males. Those students belonging to the LS ("legge stabilità") tax group tend to survive longer, encouraged by the low university taxes that they have to pay. Students coming from Milan belong to a higher risk category with respect to commuters or off-site students. Students who come from a Scientific high school have a higher survival probability through time, with respect to other types of previous studies. A significant difference is observed also in the numerical variables regarding the student admission score and the high school grade, with students with a high school grade >75 and a PoliMi admission score >71 being less at risk of dropout than the opposite categories, respectively. Regarding the early academic career results, students who gain at least 10 credits during the first semester are compared to those students who do not. The computed hazard ratio shows that students who do not pass at least 10 credits during the first semester are 7.87 times more at risk of dropout. All the analyzed features have been tested with the log-rank test, that confirms the heterogeneity of the survival probability in the different categories of students.

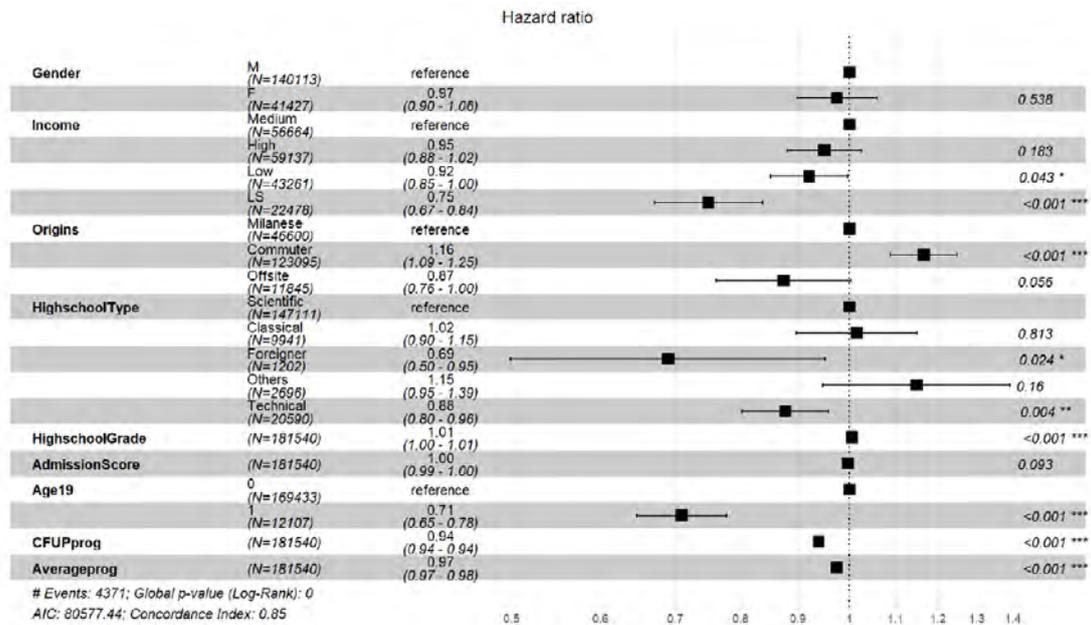
The first Cox Proportional Hazards (PH) model is fitted at the baseline, i.e., with the information at the end of first semester, and considers as predictors the categorical covariates *Gender*, *Income*, *Origins* and *HighschoolType*, the numerical covariates *HighschoolGrade* and *AdmissionScore*, while the variable *AdmissionAge* has been partitioned between those students who enroll until the 19th year of age and the ones who enroll later. Moreover, a variable indicating the number of credits passed during the first semester is added to the model. The response variable is the student career duration on a follow up time of 3 years, and the event of interest is the student dropout during this period. The model has been fitted on a training set containing the 70% of the data, obtaining the results displayed in Figure 2.

Figure 2. Result of the Cox PH model with time-invariant covariates, measured at the end of the first semester.



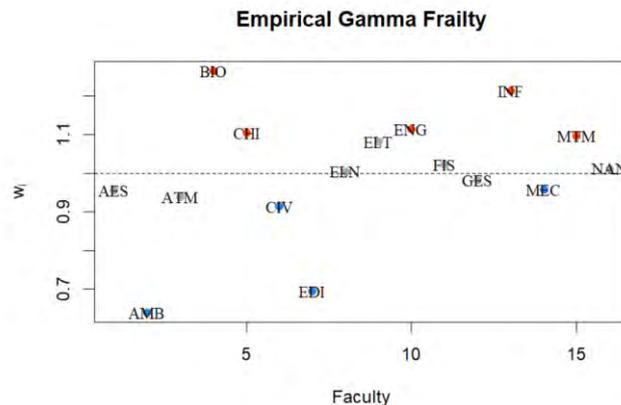
The values of the hazard ratios in Figure 2 confirm the results observed in the univariate analysis, with the most important feature being the variable related to first semester credits. We therefore extend our model to take into consideration the student academic progress through time, by means of the inclusion of time-varying covariates. In the extended Cox model with time-dependent covariates, the progressive weighted average grade and the total number of credits gained by the student across the semesters are introduced as predictors. Results of the model fitted under this new setting, in which each observation represents the student career in a specific semester, are shown in Figure 3. Some differences with respect to the time-invariant Cox model regard student gender, that loses significance in the time-dependent framework, and the admission age, which highlights a lower risk of dropout for those students who started their university career after the 19th years of age. The two time-dependent variables introduced are very significant, with students with lower grade point average and less CFU being more at risk of dropout.

Figure 3. Result of the Cox model with time-dependent covariates, updated semester per semester.



As a last step, we extend the model to include the nested structure of students within the 16 different engineering bachelor courses present at PoliMi. The resulting Frailty Cox model has been fitted both with only time-invariant and time-varying covariates. Results show that the estimated fixed-effects coefficients are similar to the ones shown in Figure 2 and 3, but it is interesting to observe how the estimated Gamma Frailty parameters differ one from another, with the highest risk faculty (BIO) having a risk to dropout that is the double with respect to the degree course with lowest risk (AMB), as showed in Figure 4.

Figure 4. Empirical Gamma frailties estimated in the Cox PH frailty model with time-invariant covariates, measured at the end of the first semester. Degree courses with a frailty higher/lower than 1 increase/decrease the dropout risk with respect to the average.



Finally, we compare the model performances across time from a predictive point of view. To do this, six different models have been implemented. Model 0 is the model computed at the enrolment, with a single observation for each student and no information about the student career result, while Model 5 is the most advised one, with up to six observations for each student and the information on 5 different exams session. The Concordance Indexes of these models, displayed in Figure 5, highlight the improvement of our predictive models when considering more observation for each student. In particular, the biggest improvement is obtained from Model 0 to Model 1, in which we observe that considering student academic results in the first semester leads to an increment in the C-Index from 0.672 to 0.810. A second great enhancement happens from Model 1 to Model 2, when considering the information until the second exams session. As we could expect, by adding information through time, the model accuracy increases, but, in the perspective of developing an *early warning system*, first and second semester information results to be already very informative.

Figure 5. Concordance Index computed on the test set, comparison between the 6 time-dependent Cox models.

Model	Concordance Index
Model 0	0.6720148
Model 1	0.8092473
Model 2	0.8428549
Model 3	0.8489186
Model 4	0.8521593
Model 5	0.8530412

5. Conclusions

This work investigates the potential of Cox regression models for describing the dropout phenomenon across time and predicting student time to dropout. The inclusion of time-varying covariates and of the frailty term constitutes a methodological novelty that allows to track students career over time and to estimate the effect of the degree courses on the student dropout risk. The exams related information is the most determining factor when analyzing the dropout phenomenon, as remarked by the increasing predictive accuracy across time. Nonetheless, a trade-off between model accuracy and the development of an early warning system arises: the model accuracy does not significantly improve after the second semester, suggesting the university to take preventive action on the early career of the student.

References

- Aljohani, O. (2016). A Comprehensive Review of the Major Studies and Theoretical Models of Student Retention in Higher Education. *Higher education studies*, 6(2), 1-18.
- Ameri, S., Fard, M. J., Chinnam, R. B., & Reddy, C. K. (2016, October). Survival analysis based framework for early prediction of student dropouts. *In Proceedings of the 25th ACM international on conference on information and knowledge management* (pp. 903-912).
- Cannistrà, M., Masci, C., Ieva, F., Agasisti, T. & Paganoni, A.M. (2021) Early-predicting dropout of University students: an application of innovative multilevel machine learning and statistical techniques. *Studies in Higher Education*, 1-22.
- Contini, D., Cugnata, F., & Scagni, A. (2018). Social selection in higher education. Enrolment, dropout and timely degree attainment in Italy. *Higher Education*, 75(5), 785-808.
- Cox, D. R. (1972). Regression models and life-tables. *Journal of the Royal Statistical Society: Series B (Methodological)*, 34(2), 187-202.
- EUROSTAT (2020). Annual activity report 2020 https://ec.europa.eu/info/publications/annual-activity-report-2020-eurostat_it
- Larrabee Sønderlund, A., Hughes, E., & Smith, J. (2019). The efficacy of learning analytics interventions in higher education: A systematic review. *British Journal of Educational Technology*, 50(5), 2594-2618.
- Kleinbaum, D. G., & Klein, M. (2004). *Survival analysis*. New York: Springer.
- Pellagatti, M., Masci, C., Ieva, F., & Paganoni, A. M. (2021). Generalized mixed-effects random forest: A flexible approach to predict university student dropout. *Statistical Analysis and Data Mining: The ASA Data Science Journal*, 14(3), 241-257.
- Therneau, T. M., & Grambsch, P. M. (2000). The cox model. In *Modeling survival data: extending the Cox model* (pp. 39-77). Springer, New York, NY.
- Tinto, V. (1975). Dropout from higher education: A theoretical synthesis of recent research. *Review of educational research*, 45(1), 89-125.
- Viberg, O., Hatakka, M., Bälter, O., & Mavroudi, A. (2018). The current landscape of learning analytics in higher education. *Computers in Human Behavior*, 89, 98-110.



POSTERS

TEACHERS' OPINIONS REGARDING THE LEARNING SKILLS OF BRAZILIAN DYSLEXIC SCHOOLCHILDREN

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Abstract

Dyslexia is described as a difficulty in learning to read, which affects 5-12% of students. The aim of this study was to characterize the opinion of teachers of students with dyslexia in a specific questionnaire on learning skills. 74 teachers of Brazilian schoolchildren with an interdisciplinary diagnosis of dyslexia participated, of both genders, aged from 9 years to 10 years and 11 months from the 3rd to the 5th year of Elementary School I. The teachers answered the Learning Skills Questionnaire, composed of six items: 1) attention skills; 2) visual processing skills; 3) auditory processing skills; 4) logical-mathematical reasoning skills; 5) motor skills; 6) behavioral skills. The questionnaire was filled out by teachers, with responses scored on a scale from 0 to 4 points (Likert Scale). Data for this study were collected from March 2019 to March 2020, before the start of the COVID-19 pandemic in Brazil. The results were analyzed statistically indicating that teachers answered "rarely" and "sometimes" for all categories, except for category 6 (behavioral), which most answers were "never". There was also an indication of "I don't know" for all categories, suggesting that teachers' lack of knowledge regarding behaviors aspects of dyslexic's schoolchildren. The results allowed us to conclude that teachers still need of information about how schoolchildren with dyslexia learn to read, since the results "rarely" and "sometimes" were presented in all categories of academic learning.

Keywords: *Dyslexia, learning, education, educational measurement.*

1. Introduction

Dyslexia is described as a difficulty in learning to read and affects 5-12% of schoolchildren (Norton, Beach & Gabrieli, 2015). Research has reported that reading is a complex task, requiring the integration of multiple visual, linguistic, cognitive and attentional processes (Ziegler et al., 2008). Due to this diversity of manifestations, it is necessary to use procedures, such as questionnaires, in order to verify teachers' opinions on the potential academic markers for this population. The inability to read and understand, present in students with dyslexia, is one of the greatest obstacles to learning, leading to serious educational, social and emotional consequences (Fletcher, 2009). This inability among dyslexic students impairs: decoding (letter-sound association); fluency (ability to read words and texts automatically); and comprehension (proficient reader) (American Academy of Pediatrics, 2009). Consequently, the investigation of learning skills from the perspective of their teachers can collaborate in the identification of educational behaviors among dyslexic students, which in turn can help in the design of clinical and educational interventions, as well as guide the elaboration of orientation and training programs for the teachers of these students.

2. Objective

To characterize the opinions of teachers of dyslexic schoolchildren, using a specific questionnaire on learning skills.

3. Method

This study was approved by the Research Ethics Committee (n° 957,998) of the researchers' home institution. A total of 74 teachers of schoolchildren with an interdisciplinary diagnosis of dyslexia participated in this study. The students were of both sexes, aged 9 years to 10 years and 11 months and from the 3rd to 5th year of Elementary School I. The teachers answered the Learning Skills Questionnaire

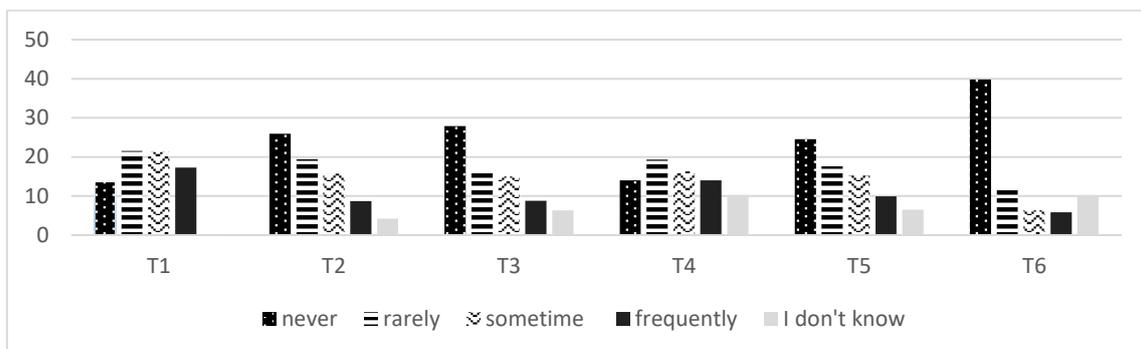
(El Nokali, Bachman & Votruba-Drzal, 2010) (Capellini, Giaconi, & Germano, 2016), comprising six items: 1) attention skills (e.g., difficulty maintaining attention while performing school activities); 2) visual processing skills (e.g., difficulty copying drawings, shapes, and letters from a blackboard or book); 3) auditory processing skills (e.g., speech developmental delay); 4) logical-mathematical reasoning skills (e.g., difficulty in doing mathematical calculations); 5) motor skills (e.g., difficulty in fine or gross motor skills); and 6) behavioral skills (e.g., presence of agitated behavior in the classroom and at home). The questionnaire was completed by the teachers, without influence from the researcher, and the answers were marked on a scale of 0 to 4 points (Likert Scale), according to the possible responses of the instrument, namely “I don’t know”, “never”, “rarely”, “sometimes”, and “frequently”.

Data for this study were collected from March 2019 to March 2020 and therefore prior to onset of the COVID-19 pandemic in Brazil.

4. Results

The results were statistically analyzed using the Statistical Package for Social Sciences, version 22.0. The significance level was set at 5%. Graph 1 indicates the mean of the distribution of the teachers' opinion in relation to each category, with the application of the Chi-Square test, all with statistically significant results (Graph 1).

Graph 1. Distribution of frequencies of teachers' opinions for each category of the Questionnaire. Chi-Square Test ($p < 0.05$).



Graph 1 indicates that teachers responded “rarely” and “sometimes” for all categories, except for category 6 (behavioral), where most responses were “never”. There was also an indication of “I don't know” for all categories, suggesting that the skills present and investigated in the questionnaire are unknown to the teachers as a measure for analysis of their dyslexic students' behavior.

5. Discussion

A study (Dilnot et al., 2017). carried out with parents and teachers indicated that the teachers' responses proved to be a strong predictor for the identification of difficulties in academic performance, since it demonstrated complaints regarding visual, auditory processing, logical-mathematical reasoning had a greater impact than other skills within the educational context. Our findings revealed that auditory and visual processing impairments were related to dyslexic schoolchildren (Snowling et al., 2018) (Carroll, Mundy & Cunningham, 2014). Furthermore, a study (Verhulst, Koot & Van der Ende, 1994) showed that speech, language, auditory and visual processing skills are closely associated with literacy, and dyslexics tend to present deficits in these areas since early childhood education, with a greater impact in the first years of literacy.

6. Conclusion

The results of this study allowed us to conclude that teachers need clarification about the manifestations in the learning of dyslexic students, since the results “rarely” and “sometimes” present in all categories of academic learning were constant. It is important to highlight that these findings suggest a lack of support by Brazilian educational public policies to guide teachers in the identification of difficulties to acquire the skills necessary for learning. Thus, only with specific training and guidance on the characteristics and manifestations of dyslexics in the classroom, will it be possible to guarantee these students an improved quality of educational life.

References

- American Academy of Pediatrics. (2009). Joint statement-learning disabilities, dyslexia, and vision. *Pediatrics*, 124(2):837-44. doi: 10.1542/peds.2009-1445.
- Capellini, S. A., Giaconi, C., & Germano, G. D. (2016). Parents and teachers opinion about learning skills: Comparison between brazilian and italian dyslexic's students. *Dyslexia: Perspectives, Challenges and Treatment Options*, 91-98. NovaPublisher.
- Carroll, J. M., Mundy, I. R., & Cunningham, A. J. (2014). The roles of family history of dyslexia, language, speech production and phonological processing in predicting literacy progress. *Developmental science*, 17(5), 727-742. doi: 10.1111/desc.12153.
- Dilnot, J., Hamilton, L., Maughan, B., & Snowling, M. J. (2017). Child and environmental risk factors predicting readiness for learning in children at high risk of dyslexia. *Development and psychopathology*, 29(1), 235-244. doi: 10.1017/S0954579416000134.
- El Nokali, N. E., Bachman, H. J., & Votruba-Drzal, E. (2010). Parent involvement and children's academic and social development in elementary school. *Child development*, 81(3), 988-1005. doi: 10.1111/j.1467-8624.2010.01447.x.
- Fletcher JM. (2009). Dyslexia: the evolution of a scientific concept- short review. *J Int Neuropsychol Soc*. Jul;15(4):501-8. doi: 10.1017/S1355617709090900.
- Norton ES, Beach SD., & Gabrieli JD. (2015). Neurobiology of dyslexia. *Current opinion in neurobiology*, 30, 73-78. doi: 10.1016/j.conb.2014.09.007.
- Snowling, M. J., Gooch, D., McArthur, G., & Hulme, C. (2018). Language skills, but not frequency discrimination, predict reading skills in children at risk of dyslexia. *Psychological science*, 29(8), 1270-1282. doi: 10.1177/0956797618763090.
- Verhulst, F. C., Koot, H. M., & Van der Ende, J. (1994). Differential predictive value of parents' and teachers' reports of children's problem behaviors: A longitudinal study. *Journal of abnormal child psychology*, 22(5), 531-546. doi: 10.1007/BF02168936.
- Ziegler JC, Castel C, Pech-Georgel C, George F, Alario FX., & Perry C. (2008). Developmental dyslexia and the dual route model of reading: simulating individual differences and subtypes. *Cognition*, Apr;107(1):151-78. doi: 10.1016/j.cognition.2007.09.004.

TEACHERS' UNDERSTANDING OF CRITICAL THINKING DEFINITION

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Abstract

Introduction. The need to develop critical thinking has been growing in the 21st century. It has become a key competence included in the school national programs also in Slovakia. The Slovak teachers' critical thinking conceptualization is analyzed by qualitative study in this research as teachers are those ones responsible for its development in the educational system.

Aim & Method: The study aim was to analyze the Slovak primary and high school teachers' critical thinking conceptualization (N=99, 73% of females, M_{age}=44 years, SD 10.56) and to explore their critical thinking interpretations. Text content analysis is an important part of qualitative research. There are two basic methods – descriptive-interpretative and hermeneutic one, but the best solution is to combine them. The starting point was a basic file reconnaissance by qualitative content analysis to orient in a file, and then to start interpreting the file in the context of hermeneutic approach. The aim was to analyze data from *Critical Thinking Questionnaire* of our provenience on critical thinking conceptualization in 2020.

Results & Discussion: The study results from the qualitative research analysis extracted 2374 words used to describe critical thinking understanding by the research participants. The qualitative frequency content analysis created data matrix decomposition. In the last phase, the synonymous and similar words clusters based on a word stem were formed to create critical thinking categories. The critical thinking “criteria dictionary” was based on frequency hierarchy. The results were compared with standardized critical thinking definitions. The results also proved 55% of respondents used wider or narrow critical thinking definition and 7% of them explained critical thinking completely incorrectly. The study was created as a part of newly established *Slovak Philosophy for Children Center* and of the KEGA 028UMB-4/2021 project.

Keywords: *Critical thinking, qualitative study, teacher.*

1. Introduction

Today it is probably more persistent than ever to think about critical thinking development not only of children, but also of adults. Critical thinking competence stated in the Slovak educational curricular document is considered as an important skill. We do presuppose the concept of critical thinking can have various non-professional interpretations, such as we have noticed in the adolescent's general population. They understand critical thinking very narrowly as a negative criticism aimed at someone – criticizing him/her. They forget that criticism as such can also be understood in the positive sense of good evaluation. On the other hand, if we want to explain the concept of critical thinking, we cannot use words with the same word stem in its definition, for example to criticize. We have analyzed teachers' understanding of critical thinking core conceptualization as a part of our research. They are those ones who facilitate students' critical thinking development. So, we wanted to find out what our research sample of the school teachers understand by critical thinking conceptualization.

In our understanding of critical thinking, we derived from the following definitions. Critical thinking is ...: ... “rational, reflective thinking focused on deciding what to believe and what to do.” (Ennis, in Cam, p. 10); ... criteria-based thinking related to the context (Sasseville, Gagnon, 2011, p. 34 and p. 64); ... independent, individual, information-based, presenting questions and problems, and well-thought-out reasoning is thinking in society. (Klooster, 2000, p. 8-9); ... thinking leading to correct and true conclusions. (Androvičová 2019, p. 113); ... means to evaluate new information, to form judgments, to evaluate the information importance for one's own needs and for real needs of society.” (Petrasová 2019, p. 148); ... "the process by which we evaluate information". (Royal, 2016, p. 8); ... the skill to recognize that an object of interest may be different from what it appears (Barnett, 1997 in Turek 2003); ... is systematic, consistent and objective thinking (Turek 2003, p. 9); ... making reasoned judgments, using criteria to evaluate the quality of anything, ... a consistent way of thinking to judge the validity of something (Beyer, 1995, in Turek 2003, p. 10); ... consistent mental activity aimed at arguments or statements' evaluation and drawing conclusions from them leading to certain opinions and

action (Huitt 1988, in Turek 2003, p. 11); ... intentional effort to understand what is happening via reasoning, evidence evaluating, and careful thinking about the thinking process itself. (Chatfield 2018, p. 6); ... is “the use of those cognitive skills or strategies increasing the likelihood of the desired outcome. It includes cognitive skills, disposition to apply these skills and a great knowledge of the content field (Halpern, Sternberg 2020, p. 8)

Considering these definitions, we form our working *referential definition of critical thinking* as *an ability to know the object of cognition as it is, not as it appears. This presupposes developed cognitive skills. Such a true knowledge of the object should lead to free and responsible decision-making and action.* Based on this definition, we determine the following referential key categories: *knowledge, object, truth, freedom, responsibility, decision-making, action.*

2. Methods

2.1. Research sample

105 teachers of the Slovak primary and high schools took part in the questionnaire survey using the occasional sampling method. We excluded 6 respondents due to incomplete questionnaires. We worked with 99 completed questionnaires of 73 women and 25 men with an average age of 44 years (SD 10.56; min. 24, max. 69) with an average teaching practice of 16 years (SD 10.26, min. 0, max. 41).

2.2. Method and procedure

The author's "*Short Questionnaire About Critical Thinking*" was used to obtain the data distributed online via Google forms platform during the year of 2020. It consisted of 17 items, of which 8 were demographic.

The data were evaluated in two ways.

1 – data from an item *What is critical thinking for you?* – we applied interpretive phenomenological analysis (Smith et al. 2009). We classified the answers into four qualitative groups of critical thinking definition: the definition was correct or incorrect, narrow or broad.

2 – we applied quantitative text content analysis for the data of five items requiring longer response (Ferjenčík, 2000). The starting point was the processing of the so-called frequency dictionary being created by decomposing the respondents' statements (a total of 5751 words) and each word frequency evaluation (a total of 2374). The disadvantages of this approach, mentioned by Hendl (2005, p. 360), were overcome by meaningless lexeme exclusion (such as numbers, conjunctions, prepositions etc., a total of 2255 words) and by lexeme combination with similar word stem on the basis of its meaning. In the next step, we merged the synonyms to create categories. A category dictionary was created rearranged in descending frequency order.

3. Results

The following list shows the occurrence of the 100 most used categories in the analyzed text. The frequency table consists of 2964 occurrences of semantically meaningful words. Bold written categories are closely related to critical thinking definitions. There were 5632 meaningful words from the analyzed text. Each of the listed categories implicitly contains also its derived word types and synonyms (e.g., value, evaluate, full-valued, assess, self-assessment, judge, judgment, verify, meaning, important, relevant, etc.), due to the length of the study, we do not mention them all here. We list the first hundred categories with a frequency from 128 to 9 per a category:

information, value, thinking, opinion, discussion, interest, knowledge, your, student, creation, analysis, man, ability, criticism, problem, teach, search, brainstorming, solution, activity, situation, correctness, possibility, manipulation, deficit, variability, source, method, reading, otherness, verification, work, time, quantity, acquisition, truth, question, reality, acceptance, basis, argumentation, expression, understanding, laziness, consequence, something, comfort, exploration, decision-making, development, formulation, why, fact, hour, attitude, need, independence, present, mainly, experience, society, act, differentiate, reason, theme, text, thing, reflection, goal, evidence, map, answer, resolution, life, presumption gift, generation, Hejny's method, accept, side, world, utilize, conclusion, medium, support, management, follow, connection, role, objectivity, expertise, comparison, practicality, project, study, responsibility, subjection, consequence, EUR, speak.

4. Conclusions

In our list, we have used bold style to indicate terms that are often found in referential critical thinking definitions. We see our research sample combines the nature of critical thinking with information, judgment, evaluation, cognition, creativity, analysis, problem-solving ability, active search

and inquiry, resistance to manipulation, truth, reality, argumentation, understanding, research, consequences, decision-making, formulation, facts, attitudes, needs, experience, society, differentiating, reasoning, reflection, intentionality, classification, assumptions, contexts, objectivity, expertise, comparison, responsibility, and consistency. The referential examples of critical thinking definitions mentioned in the introduction prove the validity of these concepts when we consider critical thinking conceptualization.

We state that the referential key term order in our respondents' dictionary is as follows: *knowledge* (7th position, 90 occurrences), *truth* (36th position, 26 times), *decision-making* (49th position, 18 times), *object* (90th position, 10 times), *responsibility* (96th position, 10 times), *action* (3 times), *freedom* (twice),

A rather surprising finding was the high category rank of "laziness", "comfort", "time", "hour", "Hejny's method". We also expected the desired target value of *freedom* would obtain more than two occurrences. Apparently, this category is represented by its opposite "manipulation" (14th position). Also, the category of *action* is probably represented by the category of *activity* (20th position) and by other active words expressing partial mental processes: *evaluate*, *think*, *discuss*, *create*, *analyze*, *search*, *solve*, etc.

Critical thinking definition qualitative analysis was based on the first item of our questionnaire (*What is critical thinking for you?*) answered by 99 teachers. We distinguished four qualities of the teachers' definition:

38% of respondents provided **a sufficient definition** (e.g., "*Obtaining and verifying information from various sources, rational argumentation, listening to a different opinion, considering the context.*", "*Thinking that can objectively evaluate information.*", "*Facts correct evaluation.*")

critical thinking narrow understanding was formulated by 15% of respondents (e.g., "*Reality analysis based on personal experience, various information sources and one's own opinion formation.*", "*Realistic situation evaluation.*", "*Ability to formulate critical/objective attitude to a topic.*"),

40% stated **critical thinking concept broad understanding** (e.g., "*The own opinion based on the experience.*", "*Creating one's own judgment from reports and information. Being able to think creatively and seek solutions from various perspectives.*", "*Ability to adopt an attitude to information.*"),

7% of our respondents mentioned **a completely inadequate definition** (e.g., "*Thinking in a critical state required by the situation*", "*Searching for the truth.*", "*Expressing own opinion on issue*").

Our findings as being presented, of course, have their methodological limits. In addition to the sample size and its sampling, it is our referential critical thinking definition. We realize that other authors might formulate it differently.

References

- Androvičová, Z. (2019) Načo učiť filozofiu. In Kaliský, J. (ed.) *Kritické myslenie a filozofická reflexia v edukácii*. Banská Bystrica: Belianum.
- Cam, P. (1996). *Zusammen nachdenken. Philosophische Fragestellungen für Kinder und Jugendliche*. Mülheim an der Ruhr: Verlag an der Ruhr.
- Chatfield, T. (2018) *Critical thinking*. London: SAGE.
- Ferjenčík, J. (2000) *Úvod do metodologie psychologického výzkumu*. Praha: Portál.
- Hendl, J. (2005) *Kvalitativní výzkum. Základní metody a aplikace*. Praha: Portál.
- Klooster, D. (2000) Co je kritické myšlení? In *Kritické listy* 1-2/2000. S. 8-9. Retrieved May 9th 2022 from https://kritickemysleni.cz/wp-content/uploads/2020/05/KL01_2_web.pdf
- Petrasová, A. (2019) Ide, ide, odišlo... (Stratégie rozvíjania kritického myslenia) In Kaliský, J. (ed.) *Kritické myslenie a filozofická reflexia v edukácii*. Banská Bystrica: Belianum.
- Philosophy for Children Center in Slovakia*. Retrieved May 9th 2022 from www.p4c.sk
- Royal, B. (2015) *Principy kritického myšlení*. Praha: Ikar.
- Sasseville, M. & Gagnon, M. (2011) *Pozorujeme filozofování s dětmi*. České Budějovice: Teologická fakulta Jihočeské univerzity.
- Smith, J. A. & Flowers, P. & Larkin, M. (2009) *Interpretative Phenomenological Analysis. Theory, Method and Research*. London: SAGE.
- Sternberg, R. J. (ed.) & Halpern, D. F. (Ed.) (2020) *Critical thinking in psychology*. Cambridge: Cambridge University Press.
- Turek, I. (2003) *Kritické myslenie*. Banská Bystrica: Metodicko-pedagogické centrum.
- Vargová, D. (2019) Prečo (a ako) rozvíjať kritické myslenie (nielen) na hodinách etickej výchovy in Kaliský, J. (ed.) *Kritické myslenie a filozofická reflexia v edukácii*. Banská Bystrica: Belianum.

DEVELOPING AN ANTI-OPPRESSIVE PROFESSIONAL VOICE AS A PRE-SERVICE TEACHER

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Abstract

Service-learning is traditionally used as a pedagogical tool in pre-service teacher education programs to connect theory to practice and to provide future teachers with experiences that support school needs and offer early opportunities to engage with children and youth. While the assumption is that pre-service teachers will benefit from service-learning by ultimately becoming more effective educators, the reality is that pre-service teachers often encounter entrenched power structures and deficit models of teaching and learning while participating in traditional service-learning activities. The research presented here examined one college's critical service learning initiative designed to support pre-service teachers as they interrogated existing power structures impacting both teaching and children's learning and lived experiences. The College's rationale for this pedagogical shift was to support pre-service teachers' understanding of equity and social justice and to help them develop an anti-oppressive professional advocacy voice that can be useful when attempting to reduce the systemic barriers they may encounter when working in U.S. schools. The researcher followed 94 pre-service teachers over the course of 10 weeks as they engaged in one of two self-selected critical service-learning projects: (1) Educational policy involvement during a government legislative session (n=51) or (2) Production of podcasts on educational equity issues for the local community (n=43). Survey data and analysis of student reflections were examined. 91% of pre-service teachers indicated that involvement enhanced their ability to implement anti-oppressive practices, and 96% reported that the experience helped them determine who they want to become in a movement for educational and social justice.

Keywords: *Teacher education, service learning, educational policy, equity, social justice.*

1. Introduction and objectives

Service-learning is a common pedagogical practice in pre-service teacher education programs (Resch & Schrittmesser, 2021). While service learning offers pre-service teachers opportunities to engage with children, youth and experienced teachers in community and classrooms settings, some research finds that service learning can reinforce personal biases and negative stereotypes (Kirkland, 2014). Additionally, pre-service teachers report they are often ill-prepared to respond when they encounter entrenched power structures and deficit models of teaching and learning while participating in traditional service-learning assignments. During the past decade a shift towards models of critical service learning has occurred, with pre-service education programs encouraging future teachers to see themselves as agents of change and use service learning to respond to injustices in communities (Bond, 2016; Mitchell, 2008; Tinkler, Tinkler, Reyes, & Elkin, 2019).

While teacher preparation standards require new teachers to have a basic understanding of equitable and inclusive learning (CAEP, 2022, CCSSO, 2022), they do not require teachers to be able to examine systems in order to effect change. In contrast, standards in social work and human services education require that pre-service professionals understand systems of oppression and know how to advocate for equity and social justice with and on behalf of vulnerable and oppressed people (Council for Standards in Human Services Education, 2019; Council on Social Work Education, 2015). These professions have a long history of embedding personal standpoint and systems learning early in the pre-service curriculum, often before students work with vulnerable people in the field (Friedman, Karim, Feiler, Padner & Erich-Gyard, 2020). The scope and sequence of the social work and human services curriculum offers opportunities for pre-service professionals to begin to develop a professional identity and voice along with the skills necessary to navigate the complexities of their future work prior to engaging in field-based learning.

The research presented here describes the work of one U.S. based college that maintains a vision of pre-service learning that “advances knowledge, honors diversity, and promotes social justice” (Woodring Mission and Vision, n.d.). In 2020 the College began to shift away from traditional service learning activities and move towards pre-service teacher’s understanding and development of a professional advocacy voice. This shift was tied to a larger ongoing initiative focused on preparing *community teachers* by connecting the teacher education curriculum with previously disparate college programs – notably human services and nursing. This research examines pre-service teacher’s experiences as they engaged in critical service learning projects within an education equity and social justice course.

2. Methods

Research followed 94 pre-service teachers attending one university in Washington State (USA) over the course of 10 weeks while they worked on self-selected advocacy projects. The first project focused on educational policy and advocacy during a state legislative session. Fifty-one students explored education bills and selected one bill to focus on throughout the legislative session. Pre-service teachers learned how to read educationally relevant bills, reports, and substitute bills, and then follow the bills through the legislative process. They also watched hearings and listened to testimony for and against their bills. While not required, some students offered their own testimony, while others met with their local legislators to discuss implications of various bills for teachers and learners. Students then created an infographic to explain the bill to families and educators. The second group, comprised of 43 pre-service teachers, learned about the importance of podcasts for information sharing and education advocacy and then created podcasts on education equity issues for families, students, educational administrators and/or local community members.

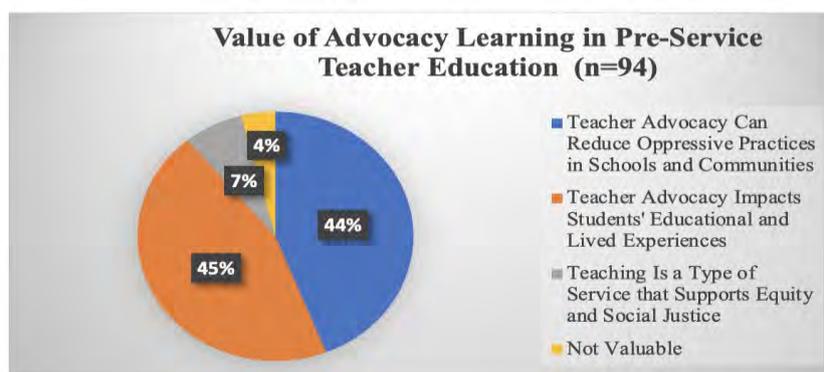
All of the pre-service teachers were in their initial year of a two-year educator preparation program. The projects were embedded in a course focused on examining how culture and social justice impact education, schools, and teaching. At various points during their participation in the project pre-service teachers were asked to provide feedback on their experiences and learning. Survey data, student reflections, and artifacts were collected and analyzed for both the podcast and legislative advocacy projects.

3. Findings

The 43 social justice podcasts were categorized into seven categories that included content on education in relation to racial equity, mental health, LGBTQ+ experiences, poverty, juvenile justice, disability and school policies. The 51 legislative advocacy projects focused on statewide bills under consideration including teacher training on indigenous history, education of children in the foster care system, comprehensive school counseling programs, emergency waivers for high school graduation during the pandemic, and multicultural education in schools.

An analysis of survey data from the 94 participants found that 91% agreed or strongly agreed that their involvement in the professional advocacy project enhanced their ability to implement anti-oppressive practices in schools and communities, and 96% indicated that they agreed or strongly agreed that the experience helped them determine who they want to be in a movement for educational and social justice. Approximately 4% of participants indicated that they found very little or no value in the project. Findings did not differ significantly according to the type of project selected.

Figure 1. Most important learning: themes associated with professional advocacy projects.



Students were asked to share their most significant take-away from the project. Responses were coded and categorized into two primary themes that did not differ according to the type of project selected (Figure 1). According to participants, knowing how to use one's voice and expertise for equity and social justice is foundational to becoming a teacher in order to (1) reduce oppressive practices and (2) positively impact students educational and lived experiences. As one future teacher who participated in legislative advocacy noted, "I will use what I learned to take action in my job because I want to be involved in decisions that help my students in their education." A pre-service teacher who participated in the equity podcast project concluded, "I got so much out of this experience. I was able to open my mind and do new things that I didn't know I could do. I learned a lot about equity and education. I also learned that I have a voice, and I now know how to use my voice."

4. Concluding thoughts

This research points to the value of pre-service teachers acquiring an understanding of the systems, policies, and practices that will impact their teaching and student learning. While much of this work is context specific and not meant to be generalized to other communities, the projects described here offer two viable ways of engaging pre-service teachers in critical service learning that helps them develop skills and offers opportunities to use their professional voices to advocate for laws, policies and practices that contribute to equity and social justice in schools.

Acknowledgements

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References

- Bond, N. (2016). Preservice teacher leaders learn to advocate legislatively through professional organizations. *Journal of Curriculum and Teaching*, 5(2), 25-36.
- Council for Standards in Human Services Education (2019). *CSHSE national standards*. Retrieved May 5, 2022 from, <https://cshse.org/membership-resources/standards/>
- Council for the Accreditation of Educator Preparation (2022). 2022 CAEP Standards. Retrieved May 5, 2022 from, <https://caepnet.org/standards/2022-itp/introduction>
- Council of Chief State School Officers (2022). *InTASC model core teaching standards and learning progressions for teachers 1.0*. Retrieved May 24, 2022 from, <https://ccsso.org/resource-library/intasc-model-core-teaching-standards-and-learning-progressions-teachers-10>
- Council on Social Work Education (2015). *Educational policy and accreditation standards*. Retrieved May 5, 2022, from <https://www.cswe.org/accreditation/standards/2015-epas>
- Derigne, M., Rosenwald, M. & Naranjo, F. (2014). Legislative advocacy and social work education: Models and new strategies. *Journal of Policy Practice*, 13, 316-327.
- Dunst, C., Hamby, D., Howse, R., Wilkie, H., & Annas, K. (2020). Research synthesis of meta-analyses of preservice teacher preparation practices in higher education. *Higher Education Studies*, 10(1), 29-47.
- Friedman, L., Karim, M., Feiler, K., Padner, S. & Erich-Gyard, K. (2020). Political social work: An essential component of the profession. *Journal of Health & Human Services Administration*, 43(4), 359-381.
- Kirkland, D. (2014). "They look scared": Moving from service learning to learning to serve in teacher education – A social justice perspective. *Equity and Excellence in Education*, 47(4), 580-604.
- Mitchell, T. (2008). Traditional vs. critical service learning: Engaging the literature to differentiate two models. *Michigan Journal of Community Service Learning*, 14(2), 50-65.
- Resch, K. & Schrittmesser, I. (2021). Using the service learning approach to bridge the gap between theory and practice in teacher education. *International Journal of Inclusive Education*, DOI: 10.1080/13603116.2021.1882053
- Tinkler, A., Tinkler, B., Reyes, C., Elkin, S., & Warren, K. (2019). Critical service learning: Learning through experience to advance teacher education. *The Journal of Experiential Education*, 42(1), 65-78.
- Woodring College of Education. (n.d.). *Mission and Vision Statement*. Retrieved May 1, 2022, from: <https://wce.wvu.edu/about/mission-and-vision>

ETHICAL OUTCOMES OF ECOLOGICAL VALUES IMPLEMENTATION INTO MORAL EDUCATION ANALYZED BY ANIMAL RESPECT QUESTIONNAIRE (ANIRE-QUE)

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Abstract

The study presents life ethics respect outcomes and egalitarian zoocentrism theory implemented into the author's, diagnostic tool of *Animal Respect Questionnaire (AniRe-Que)*. AniRe-Que is a valid and reliable tool for teacher's action research to assess intervention programs effectiveness aimed at environmental intelligence support and nature protection sensitivity. Subsequently, by means of 504 university students (future teachers of various study fields) as a research sample we focused on estimation of animal respect level (R-score for animals considered as natural beings and the essence of moral reasoning). R-score was analyzed in the context of dominant study field at university, prevailing value education from primary and high school education and worldview. Significant differences were proved for worldview in favor of non-religious respondents, for prevailing value education in favor of secular ethical education and for teacher's training study field in favor of students studying Ethical Education as their future teaching profession. The study discusses the importance of nature protection sensitivity programs implementation into the educational process.

Study was financially supported by KEGA project 028UMB-4/2021.

Keywords: *Nature protection, moral education, man's attitude to animals, ecological values.*

1. Introduction

The ecological crisis discussions are heard from everywhere today. Though, the educational reactions in a pupil's value education need to be considered in the context of its manifestations, cause identification, empathy lack of non-human life or underdeveloped understanding of natural free, wild and non-structured environment. We believe environmental crisis ethics can be interpreted as an evidence that it is impossible to formulate and clarify some basic questions, such as What does it mean to be a human? What is justice? What is value? What kind of a good man, s/he is?, without not taking into consideration the Earth and all Earthlings fate with the knowledge of their environment desolation. We start from the premise that (a) moral conduct is related only to a man, and we defend the position that it is manifested only in relation to beings (which is a broader concept than a man). We claim beings have moral status, either as feeling beings or as subjects of life. This issue opens up a question of man's relationship to animals (as non-human natural beings). We presuppose beings have a moral status and respect declaration requires their natural environment protection.

Slovak moral education at our schools covers significantly nature conservation topic, not only because human environment is in global ecological crisis, but also because ecological (or environmental) education is inherently a value education; revealing values and formulating moral norms with respect to non-human world. Therefore, in our research we focused on possible educational impact of the study field, or value/world orientation on animal respect. Our study provides a sociological survey focusing on the future teacher university students' attitude towards animals, as we believe that the diagnostic tools for assessing attitudes towards nature do not sufficiently reveal the attitudes to animals (compare to Kaliský, Kaliská 2021).

We formulated three research questions. RQ1: *Are there differences in the animal respect from AniRe questionnaire (AniRe-Que) between a group of university students of Ethical Education Teacher's Training study field and groups of other teaching study fields from Matej Bel University in Banská Bystrica, Slovakia?* RQ2: *Is there animal respect difference in relation to prevailing primary and high school value education?* RQ3: *Is there animal respect difference with respect to an individual's declared worldview?*

2. Method

2.1. Research sample

Our research sample based on available and intentional sampling (in order to supplement male respondents) consisted of 504 future teacher university students (62% women, $M_{age}=22.3$; $SD=4.1$) of various study fields from three faculties of Matej Bel University in Banská Bystrica, Slovakia. Data were collected in 2018.

2.2. Method

We used the author's Animal Respect Questionnaire (AniRe-Que). Its creation process, validity, and reliability estimation were described and explained by Kalisky and Kaliska (2020). It consists of 15 items, assessing animal respect level labeled as R-score (R as respect), reaching values from 1 to 5, with 5 representing the highest level. The questionnaire is based on the ecological egalitarian and zoocentrism theory and identifies an individual's respect for animals. The questionnaire covers the various areas of human-animal relation via three attitude dimensions – cognitive, affective and conative.

3. Results

RQ1. The statistical analysis of animal respect differences was focused on the interdisciplinary analysis (3 teaching faculties of MBU: Faculty of Education, of Arts, of Natural Sciences) vs. Ethical Education students. By Post-Hoc LSD test, we proved high significant interdisciplinary differences between students of Ethics and other study fields. The students of Ethical education were the only ones reaching maximum value ($M = 5.00$).

Table 1. Differences in R-score of various future teacher study field students at MBU.

U-score	Min	Max	M	SD	Median	F-test	p	Post-Hoc test p	d
1/ Ethical Education (N=53)	2.13	5.00	3.61	.57	3.53	81.88	.000	1 vs 2 = .416	1 vs 2 = .12
2/ Faculty of Education (N=232)	1.53	4.93	3.54	.59	3.47			1 vs 3 = .005	1 vs 3 = .47
3/ Faculty of Arts (N=120)	1.67	4.87	3.33	.62	3.27			1 vs 4 = .000	1 vs 4 = .63
4/Faculty of Natural Sciences (N=88)	1.40	4.80	3.24	.60	3.20			2 vs 3 = .002	2 vs 3 = .35
								2 vs 4 = .000	2 vs 4 = .50
								3 vs 4 = .273	3 vs 4 = .15

RQ2. We were analyzing the influence of prevailing value class participation at primary and high school. We found out a possible tendency of R-score difference, with low practical effect-size difference, in favor to class-taking of Ethical Education rather than a class of Religious Education.

Table 2. Animal Respect differences according to prevailing value education at primary and high school.

	U-score	Min	Max	M	SD	t-test	p	d
Ethical Education (N=294)		1.67	5.00	3.50	.61	-1.96	.051	.18
Religious Education (N=197)		1.40	4.80	3.39	.59			

RQ3. A statistically significant Animal Respect difference ($p \leq .05$), but with small effect-size, was estimated only in favor of a higher score for atheists vs. Christians. Other differences are statistically insignificant.

Table 3. R-score differences according to a respondent's worldviews.

	Min	Max	M	SD	Median	
1 Christian worldview (N=365)	1.40	4.87	3.40	.59	3.33	F-test=2.43 p=.07 1 vs 2 p=.04 (1 vs 2 d=.23) 1 vs 3 p=.24 1 vs 4 p=.09 2 vs 3 p=.71 2 vs 4 p=.63 3 vs 4 p=.96
2 Atheistic worldview (N=94)	2.33	5.00	3.54	.61	3.53	
3 Agnostic worldview (N=11)	2.67	4.73	3.61	.74	3.47	
4 Other spiritual worldview (N=27)	1.87	4.93	3.60	.76	3.53	

4. Conclusions

Our research data showed a normal distribution and its average R-score was 3.44. In the context of central distribution tendency, we assume that the average animal respect score is in the range of <2.83 - 4.05> as a standard or average animal respect score. If the score drops below 2.83, we consider it as a low level of animal respect, and if the average score rises above 4.05, we consider it as a high level of animal respect.

We found out the Ethical Education students achieved an average R-score, though this score is still significantly higher ($M=3.61$, $p \leq .001^{***}$) than R-score of other study field students. We believe the ecological intelligence as defined by Goleman, (2009), is given more emphasis within the ethical education curriculum, and as we argue environmental education is a value education and therefore it is significantly related with moral development (or ethical education). The Ethical education students in Bachelor university degree must take *Eco-ethics and Ecological Value* courses. There is also an option for them to choose an optional course *Forest as a teaching and learning environment* based on experiential pedagogy. In the Master university degree, the course of *Conversations about Nature* is also offered. This type of pedagogical intervention seems to be meaningful for internalizing the desired and wished for behavior related to nature protection. Environmental education in this extent is not offered within other study fields preparing future teachers.

The animal respect differences related to prevailing value education at primary and high schools (taking classes of ethical or religious education at primary and high schools) were estimated, though not at the expected level ($p=.05$), just with a tendency to support ethical classes participation. White began the discussion on environmental attitudes with respect to biblical message by the study on *The historical roots of our ecological crisis* (1967), which became inspiring firstly for theoretical and then for empirical verifications (e.g., Guth et al. 1995; Hand, Van Liere, 1984; Hartwig 1999). Schultz, Zelezny and Dalrymple (2000) postulated a similar hypothesis to ours (that the worldview is related to the environmental attitude) when they surveyed people whose worldview was more dependent on biblical texts and at the same time they scored higher in the anthropocentric and lower in the ecocentric environmental orientation. Their research was the first international study of White's hypothesis and their conclusion was based on the attitude analysis of 2160 respondents from 14 countries. We do not claim the Christian orientation leads to a lack of interest in environmental problems, only that its interest is rooted in the interconnectedness of environmental problems to a man. Significantly lower scores in AniRe-Que also suggest this possible assumption. Animals are part of nature, they are natural entities and non-Christian worldview of our research sample (atheistic, agnostic, other spiritual worldview) achieved higher R-score level. Due to the participant's number, a significantly higher difference was estimated only in atheistic orientation ($M=3.40$ vs. $M=3.54$, $p=.04$, $d=.23$). However, this issue is more complex and would need to be searched more comprehensively further on.

References

- Goleman, D. (2009). *Ecological Intelligence*. New York: Broadway Books.
- Guth, J. L. & Kellstedt, L. A. & Smidt, C. E. & Green, J. (1995). Faith and the environment: Religious beliefs and attitudes on environmental policy. In *American Journal of Political Science*, 39, S. 364-382.
- Hand, C. & Van Liere, K. (1984). Religion, mastery-over-nature, and environmental concern. In *Social Forces*, 57, p. 265-281.
- Hartwig, B. H. (1999). Christianity and the environment in the American public. In *Journal for the Scientific Study of Religion*, 38, p. 36-44.
- Kaliský, J. & Kaliská, L. (2020). Man's attitude towards nature and animal respect questionnaire (AniRe-Que). In *Studia Ecologiae et Bioethicae* 18 (4): 29-37
- Kaliský, J. & Kaliská, L. (2021). Man's Attitude Towards Animals Within the Context of Gender, Age, Place of Living, Eating Habits, and Worldview in Slovakia. In *Studia Ecologiae et Bioethicae* 18 (4): 29-37
- Schultz, P. & Zelezny, L. & Dalrymple, N. (2000). A Multinational Perspective on the Relation Between Judeo-Christian Religious Beliefs and Attitudes of Environmental Concern. In *Environment and Behavior* 32(4): 576-591. Retrieved May 9th 2021 from <https://doi.org/10.1177/00139160021972676>.
- White, L. (1967). The Historical Roots of Our Ecologic Crisis. In *Science*. Vol. 155, No. 3767 (Mar. 10, 1967), pp. 1203-1207.

SUCCESSFULLY NAVIGATING DIGITAL STORMS IN CROATIAN EDUCATION SYSTEM

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Abstract

2020th was challenging for all teachers in Croatia. Although previously strengthened by the reform of the new Curricula in 2016 and the “School for Life” project in 2018, many have resisted the changes, including the digitalization of teaching. In March 2020th there were no alternatives. In the storm that threatened to stop education at all levels we had to strongly resist defeat and find the strength to fully digitalize teaching. It was no longer enough to have a systematic reform process or legalized curricula, but to make a personal digital transformation. It was imperative to carry out intrinsic reform of one's methodological skills, awaken creativity in teaching approaches and improve competences.

Cooperation and exchange of experiences, as well as investment in improving digital maturity, digital pedagogy, and digital skills, were crucial for strengthening teachers' personal potential. Series of webinars were designed to present new paradigms of teaching in the online environment in cooperation with the community of primary and secondary school mathematics teachers. Four areas in which digital competences of teachers are recognized are: Organization of online classes, Digital literacy, Communication in virtual classroom and External evaluation. E-student and E-teacher with obligatory Student-centered online teaching are key in organizing E-classroom. Subsets of such teaching for students are Project Assignment, Gamification, Flipped Classroom and Self-learning; and for teachers: Evaluation as learning, Formative and Summative evaluation and Individualized approach. Such schematic was upheld in organizing all 16 of webinars, building a foundation for perfecting teachers' necessary skills. Positive effects are visible in the school year 2021/22 not only in online classes but in during face-to-face classes increasing digital maturity in both teachers and students and strengthening collaboration between teachers.

Keywords: *Digital, experiences, competences, teacher, online.*

1. Introduction

Aware of the need of improving education system Ministry of Science and Education of Croatia (MZO) started education reform in 2014. by publishing strategic documents, launching projects aimed at improving the digital competencies of all stakeholders in the education system, developing new curricula for all subjects that have not changed since 2006. high schools. Timeline:

- 2014. Education, Science and Technology Strategy (New Colors of Knowledge, Ministry of Science and Education of Croatia - MZO);
- 2015. – 2018. “e-Schools” pilot project (CARNET) - Establishing a system for development of digitally mature schools;
- 2015/2016. Cjelovita kurikularna reforma - CKR (Comprehensive curricular reform) and publication of new curricula for subjects, subject areas, cross-curricular topics and frameworks;
- 2018/2019 project “School for Life” - the beginning of the experimental implementation of new curricula
- 2018 - 2023 “e-Schools: Developing a system of digitally mature schools” (Phase II)
- 2019 - MZO introducing new curricula in all schools in school year 2019/2020.
- March 2020 - Covid 19, imposing obligatory online teaching for all (video lectures, LMS systems, online student-teacher-parent communication, new organization of learning, adapting teaching forms and methods in an online environment, production of digital educational materials, video lectures (expert working groups and MZO), comprehensive teacher support.
- June 2020 - Senior advisor support to mathematics teachers through 16 webinars
- 2021./2022.- reflection: increased level of digital maturity in the work of teachers and students

2. Objectives

The webinars were created in collaboration of Senior Mathematics Adviser with 16 leaders of county professional councils of mathematics teachers. Together, they each designed and conducted a webinar on two related topics: one from practice (experience of council leaders as a proposal of good practice to other teachers) and the other a recommendation for improvement of online teaching (methodical advice of a senior advisor with a proposal of a suitable available digital tool from the Office 365 package). The aim of these webinars is to support mathematics teachers in the implementation of online teaching and strengthening their competences to improve teaching practice in accordance with the new challenges of online environment. At each webinar, teachers had the opportunity to make a self-reflection of their own work and to get confirmation of whether they found a good way to conduct online teaching or need to make changes for improvement.

3. Webinar topics

Although webinars were intended for mathematics teachers, the topics of each webinar were interdisciplinary and applicable in online teaching in general. The webinars were published on the official portal of professional meetings of the Education and Teacher Training Agency in Croatia as part of the mandatory certified lifelong professional development of teachers. In each of the 16 webinars, in addition to a senior advisor, the lecture was given by the prominent mathematics teachers, whose topic described examples of good practice, experience and recommendations for distance learning. The second topic of the webinar was presented by a senior advisor as a recommendation for the improvement of online teaching: methodological advice and a proposal for a suitable available digital tool, mainly from the Office 365 package (available free of charge to all teachers and students with the support of the MZO), for better achievement of the educational goal in online teaching.

Table 1. Topics and the number of participants with the results of the evaluation and the digital tools presented.

Topic	Date	Number of participants	Participants grade (1-5)	Tools
Formative evaluation / MS Forms (practical experience)	15.06.2020.	178	4.78	MS Forms and Power Automate
External evaluation / Preparations for national exams (practical experience)	16.06.2020.	141	4.81	Selfie
Flipped Classroom / Students Works in Liveworksheets (practical Experiences)	17.06.2020.	161	4.87	Liveworksheets, PowerPoint, Windows 10 Game Bar and YouTube
Distance learning from a principal's perspective / Organization of online teaching	18.06.2020.	140	4.8	Planner Office 365 and Carnet Delta (learning analytics)
Virtual Classroom Communication / Headroom teacher in Remote Classroom	23.06.2020.	136	4.67	Netiquete and media literacy
E-classroom / Distance learning with the Sway app	24.06.2020.	145	4.89	Sway, LMS, One Note and Class Note
Self-learning and lifelong learning / Self-learning in distance learning	25.06.2020.	160	4.84	YouTube and Erasmus+ (lifelong learning)
E-student / Homework in online teaching (practical experiences)	29.06.2020.	162	4.81	Viber, Whatsapp and Kaizala
The other side of the coin / shortcomings of distance learning, E-teacher	30.06.2020.	155	4.89	E-portfolio and SharePoint
The Road to Clear Rules in Distance Learning / Digital Literacy	01.07.2020.	175	4.82	Word, Excel, PowerPoint
Evaluation as learning / Rubrics	02.07.2020.	205	4.86	Rubrics and grading in Teams, Google Classroom and Moodle
Evaluation with the Testmoz tool / Summative evaluation	06.07.2020.	200	4.76	Testmoz, Proctor, Excel, E-dnevnik+
My calendar / Project assignments	07.07.2020.	189	4.86	Geogebra and Word
Distance learning for gifted students / Individualized approach	09.07.2020.	232	4.74	Accessibility in Windows 10 for students with disabilities
Digital Unlocking game / Igrification	14.07.2020.	249	4.81	Games in Moodle, Edmodo, Labyrinth Thinkport, PlayBrighter
Evaluation in Zoom / Online student-centered teaching	15.07.2020.	266	4.85	Zoom, Reflection (MS Forms and Google Forms)

4. Conclusions

Collaboration in online teaching was conducted through school professional councils of mathematics teachers, regional professional councils of teachers and at professional gatherings and trainings at all levels from regional to national. It turned out that collegial support was the most important help in accepting the challenges of online teaching and solving the difficulties they encountered during its implementation. By sharing educational materials, ideas and experiences, the collaboration between teachers working at the same level of education but also at the entire vertical of the education system has been continuously strengthened.

Positive effects in the school year 2021/2022 visible during the insight of the Senior advisor into the professional and pedagogical work of teachers are:

- increased level of digital maturity of each teacher
- easier use of digital technology as an auxiliary tool
- acceptance of videoconferencing tools for simple and fast communication (meetings and agreements with colleagues, preparation and assistance to students. parent meetings, class councils, teachers' councils, professional meetings and workshops)
- improving the infrastructure of each school: faster and more reliable internet, better availability, and reliability of all LMS systems and tools for online communication,
- using wide range of various digital tools applicable in online and live teaching
- using ready-made and creating new digital educational materials - several online repositories available
- availability of teachers through digital channels for helping students with learning difficulties or for advanced activities for the gifted ones
- establishing faster and better student-teacher communication
- establishing faster and better teacher-parent communication

References

- Croatian Academic and Research Network (2019). "E-Schools". Retrieved January 7, 2021, from <https://www.e-skole.hr/>
- Ministry of Science and Education (2014). *Education, Science and Technology Strategy*. Retrieved May 22, 2022, from <https://mzo.gov.hr/>
- Ministry of Science and Education (2015). *Comprehensive curricular reforms (Cjelovita kurikularna reforma – CKR)*. Retrieved October 12, 2021, from <http://www.kurikulum.hr/>
- Ministry of Science and Education (2019). *Decision on the adoption of the curriculum for the subject of Mathematics for primary and secondary schools in the Republic of Croatia*, Retrieved May 22, 2022, from <https://narodne-novine.nn.hr/>
- Ministry of Science and Education (2020) *National Project "School for Life"*, Retrieved June 2, 2021, from <https://skolazavot.hr/>

TEACHING AND LEARNING CENTERS: A STEM PERSPECTIVE ON THE IMPACT FOR AN INSTITUTION OF HIGHER EDUCATION

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Abstract

The true pillar of quality higher education is well-trained, effective, and knowledgeable faculty who are invested in the success of their students. The discipline-specific knowledge required for entering an academic career as a STEM faculty member is mostly gained through academic graduate and post-doctoral training. However, formal preparation in the areas of teaching and mentoring are often lacking, and typically occur through observation of more senior colleagues. In reality, when it comes to teaching and mentoring, many STEM faculty members “build the plane while flying it,” and mainly learn by trial and error. As all interactions between faculty and students can seriously impact student retention and success, there is a great need for faculty development opportunities in these areas. The focus of this communication is on the impact of mentor and pedagogical training at Xavier University of Louisiana from the STEM faculty perspective.

Keywords: *Faculty development, mentor and pedagogical training.*

1. Introduction

Looking back at my 27-year career as a chemistry faculty member at Xavier University of Louisiana (Xavier), I can clearly see my progression in gaining research and teaching expertise. Graduate school taught me how to think analytically, develop hypotheses worth pursuing, and think as an independent researcher. My time as a teaching assistant was my “only” opportunity to develop teaching skills before becoming a faculty member, and my experience with mentoring was limited to interactions with my research advisor and occasionally with undergraduate research students. To sum it up, as a new faculty member, I was ready to set up my own research group, start writing proposals, and involve students in my research projects. When it came to teaching, I could do a reasonably decent job covering the course material, but a “great” teacher, I was not. The realization that “satisfactorily teaching” and “effectively teaching” are different came to me years later as I started participating in pedagogical seminars and workshops offered by Xavier’s Center for the Advancement of Teaching and Faculty Development (the Center). The importance of mentoring skills and formal mentor training came to my attention years after that, when I first participated in the Preparing Mentors and Advisors at Xavier (P-MAX) Program.

Xavier University of Louisiana is a relatively small institution located in New Orleans, Louisiana. As with most things in New Orleans, the University has its own special character and culture, and is unique in many ways. Xavier is the only Black and Catholic university in the western hemisphere. It is also the only Catholic college founded by an American-born saint, Saint Katharine Drexel. The University’s Fall 2021 enrollment was 3,604 (approximately 76.9% African American/Black, 5.0% Asian, 5.7% White, 4.6% Hispanic or Latino, and 7.8% others; approximately 76.0% female and 23.9% male, 0.1% not reported). Of the 2,749 undergraduate students, 77.3% majored in biomedical sciences (Bioinformatics, Biochemistry, Biology, Chemistry, Computer Science, Data Science, Mathematics, Neuroscience, Physics, Psychology, Public Health Sciences, and Sociology). Xavier’s faculty are very diverse (approximately 36.7% African American/Black, 35.9% White, 6.5% Asian, 13.5% non-resident aliens, and 7.4% other; 46.2% female and 53.8% male).

Xavier is nationally recognized for its biomedical and physical sciences curricula, and the accomplishment of its students. Xavier’s success to a large extent has been due to the quality and dedication of its faculty and staff, and the full and selfless support they provide to Xavier students.

2. Methods

Xavier’s Center for the Advancement of Teaching and Faculty Development was established in 1994, and has since significantly evolved in scope of work and impact. It became much more active post-Hurricane Katrina with the hiring of a full-time director who possessed faculty development

experience. By that time, I was tenured, promoted, and had already been teaching and mentoring students for over a decade. My early-career faculty development mainly occurred through observation of more seasoned faculty and their mentoring. In 2011, a new position for a STEM Educational Improvement Specialist (EIS) was established in the Center using funds from the National Science Foundation (NSF)-funded Innovation Through Institutional Integration (I³) grant. Having a STEM-specific pedagogical resource made the Center's offerings more immediately relevant to the STEM disciplines.

Often STEM faculty, and scientists in general, have the perception that faculty development workshops consist of "touchy-feely" and/or vague discussions, when what they are looking for are precise, data-driven, evidence-based concepts and best practices presented efficiently. The presence of an EIS with a STEM background in the Center slowly broke down the departmental silos, opened new lines of communication, and brought the faculty together in a variety of ways. In fact, the EIS served as a STEM-Center liaison, informing the Center's offerings to ensure that they met the needs of STEM faculty while simultaneously encouraging faculty to utilize its resources and services.

As I started taking advantage of the workshops and seminars offered by the Center, I gradually realized that there is an art and science to teaching, and that merely delivering (or "covering") the course material is very different from delivering the course material in a way that maximizes student learning. Effective teaching requires knowledge of how students best learn, which has significantly evolved with the changes in technology and is informed by cognitive science.

In 2014, Xavier's *Project Pathways* received funding from the National Institutes of Health (NIH), National Institute of General Medical Sciences (NIGMS) BUILD (Building Infrastructure Leading to Diversity) Program. There are ten BUILD awardee institutions across the country, and together with the Center for Evaluation and Coordination (the CEC at the University of California, Los Angeles) and the institutions awarded funding under the National Research Mentoring Network (NRMN) Program, they form the Diversity Program Consortium (the DPC, www.diversityprogramconsortium.org/), aiming to increase diversity across the biomedical research careers through enhanced training and mentoring. Under this funding, the Center started offering mentorship education workshops, which have made significant changes in the mentoring culture at Xavier. The EIS participated in the "Train the Trainer" workshops offered by the NRMN to become a Trained Facilitator of mentorship education workshops, and went on to design and implement the P-MAX (Preparing Mentors and Advisors at Xavier) Program. P-MAX is modeled after the Entering Mentoring Program developed at the University of Wisconsin-Madison and tailored to fit Xavier's culture and mission. The program consists of an eight-hour summer session followed by three, one-hour sessions in each of the fall and spring semesters of the academic year. Topics covered include but are not limited to: definition and practice of mentoring; effective communication (including identifying one's communication style, adapting to other communication styles, tailoring one's communication style to situational expectations, general strategies for improving communication, active listening, and providing constructive feedback); setting and aligning expectations; developing a mentoring contract/compact (including support for developing one); use of individual development plans (IDPs, including details on how to assist and guide students in developing theirs); writing a mentoring philosophy (including support for developing one); implicit bias and cultural responsiveness training (including understanding identity, privilege, prejudice, discrimination, stereotypes and stereotype threat, and combating implicit bias); inclusive mentoring; scholarship of mentoring and advising; and self-care for mentors. The sessions are moderated by the Trainer and multiple internal and external experts as guest facilitators. Participants completing the summer session and at least four out of the six academic year sessions receive a certificate of completion.

Originally, biomedical faculty and staff working with undergraduate research students were invited to participate in P-MAX training. Over time, as the buy-in by the administration and across the Institution increased, this training became an expectation, and later a requirement for grant proposal internal clearance for any research projects involving students. Soon faculty and staff from other disciplines and other institutions also started taking advantage of the training. The P-MAX training is now available virtually through the Center and is open to all interested individuals free of charge.

3. Discussion

As a P-MAX participant, I learned that effective mentoring could improve teaching and skills-training effectiveness, as well as student retention and success. In addition, it could encourage students traditionally underrepresented in STEM/biomedical research fields to participate, persist, and excel in those areas. I also learned that being a "mentor" is much more involved than being a "research or academic advisor", and that being the mentor to individuals from groups that are underrepresented in the sciences, especially those with cultural backgrounds that are different from the mentor's, is much more complicated. As of 2022, I have served as the research mentor to over 100 undergraduate students from underrepresented groups. I have always taken this role very seriously and did my best to be a role model and a source of information for my mentees. However, once I participated in the P-MAX workshops,

especially sessions on implicit bias, cultural responsiveness, and diversity, equity, and inclusion (DEI), I realized that I had much more to learn and many ways to improve.

For instance, I had never considered that implicit bias could influence my actions, decisions, or impressions, and I had never questioned my gut reactions to different situations. Being aware of the existence of implicit bias has made me more alert and attentive to my own thoughts and reactions, more observant of the signs of its presence in others, and better equipped to combat it.

As a teacher, mentor, and research advisor, I often assign my students projects, request that they complete certain tasks, give them direction and advice, and correct their mistakes. Awareness of the existence of stereotype threat and its potential impacts on students' science identity, self-confidence, performance, and achievement has assisted me in finding approaches that could diminish them on my students and mentees. Some such approaches are to emphasize their positive individual attributes, accomplishments, and contributions; verbally and visibly show my trust in their abilities as scientists in training; and make sure that they see me as a supportive ally.

Cultural responsiveness was another topic that I had never explicitly considered in my mentoring. I always considered myself to be respectful of other people's cultures, religions, and backgrounds. For the first time, I questioned whether being respectful is enough, and whether behaviors I consider to be respectful could be perceived differently. I began to make a conscious effort to understand other people at a more culturally sensitive, fundamental level.

In addition, through P-MAX sessions, I became more informed about DEI-related issues, and how they affect our communities, including academia, at all levels. During the recent events highlighting the still prominent racial injustice in the United States, and the resulting social unrest, this training became very important in my understanding of, and communications with my mentees, who are mostly from the racial/ethnic groups directly affected. As a result, I began to be more explicit in my inclusivity efforts. I also realized the true importance of acknowledging and addressing systematic inequities (social, economic, racial, cultural, etc.) rather than focusing only on equality within the classroom.

As a result of P-MAX training, I began developing a mentoring philosophy and mentor-mentee compacts (contracts). These documents allow me to periodically reflect on why and how I serve as a mentor and to make the requirements, standards, and expectations of my mentor-mentee relationships very clear to my mentees from the beginning. Rather than using a generic document for all mentees, I now start with a basic mentor-mentee compact template that has all the necessary sections, and finalize it in discussion with each mentee, so that it would address the needs of each individual relationship, including the preferred methods of communication. In addition, I started assisting my mentees in developing IDPs, which help them in clarifying their goals and identifying the required steps in the pathways to achieving them.

As our EIS often says at the P-MAX workshops, "Good mentors are developed, not born". Even though certain personality traits may be driving forces for becoming a teacher, good teachers are also developed not born. There certainly is a lot of overlap between teaching and mentoring.

The direct impacts of faculty development on student learning and success might be hard to assess; however, its impacts on faculty retention, productivity, effectiveness, and career advancement, important contributors to student success, are well known.

Acknowledgement

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References

- Ambrose, S.A. et al. (Eds.) (2010) *How learning works: Seven research-based principles for smart teaching*. San Francisco, CA: Jossey-Bass
- Entering Mentoring Recognition. Facilitator Recognition Program. (n.d.). <https://sites.google.com/view/nrmnfacilitatorcertification/entering-mentoring-recognition?authuser=0>
- Learn more about the Xavier University of Louisiana's Center for the Advancement of Teaching and Faculty Development and its activities at cat.xula.edu
- Xavier University of Louisiana 2021-2022 Profile. Retrieved on February 10, 2022 from URL <https://www.xula.edu/opira/2021-2022-university-profile.pdf>

APPLICATION IN THE EDUCATIONAL CONTEXT OF INFORMATIVE AND INSTRUCTIONAL INTERVENTION PROGRAMS FOR THE READING COMPREHENSION OF SCHOOLCHILDREN FROM THE 3RD TO THE 5TH OF ELEMENTARY SCHOOL

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Abstract

Schoolchildren who have reading comprehension difficulties are out of step with their class group. This lag tends to increase over time, as curricular contents increase in quantity and complexity with the passage of school grades. Therefore, it is necessary that these difficulties are remedied so that these schoolchildren can develop academically. This study aimed to compare the performance of schoolchildren from the 3rd to the 5th of Elementary School in the application of two intervention programs in reading comprehension, one informative and the other instructional. A total of 211 schoolchildren from municipal public schools participated, of both genders, aged between eight and ten years and 11 months of age, divided into three groups, GI, GII and GIII. The schoolchildren were submitted to an assessment of reading comprehension and the results were statistically analyzed. The schoolchildren were placed in three types of program, one of control and two of intervention. The schoolchildren in the Control program did not receive specific activities aimed at the use of reading comprehension strategies. Those from the Informative program received mediation from the teacher in the application of strategies and those from the Instructional program were mediated by the teacher and the researcher. These schoolchildren received work-related activities with literal and inferential information on micro and macrostructure. The statistical results indicated that the schoolchildren of the Informative and Instructional programs, submitted to the application of the interventions, obtained superior performance in relation to the schoolchildren of the Control program, not submitted to the Intervention. The results indicated that the schoolchildren presented a lower performance, mainly for the macrostructure inferential questions, as well as indicating that after the application of the programs, the schoolchildren submitted to the intervention activities presented superior performance in reading comprehension regardless of the way in which the programs were applied. Based on the results analyzed, it was possible to conclude that the use of specific strategies aimed at reading comprehension provided significant results for the schoolchildren, since in both programs it was observed that there was an improvement in reading comprehension, although not all groups could benefit. of all proposed activities. There is, therefore, the need for revisions for applications in future studies.

Keywords: *Learning, teaching, reading, reading comprehension, education.*

1. Introduction

Educators and professionals who work with schoolchildren are aware of the difficulties that many of them have in reading comprehension skills (Nicolielo-Carrilho, Crenitte, Lopes-Herrera, & Hage, 2018). These schoolchildren are out of step with their class-group. This gap tends to increase over time, as curricular content increases in quantity and complexity with the passage of school grades (Shannon & Leesa, 2020).

Considering these factors, this study proposed to offer two intervention programs with reading comprehension to be used by teachers in the classroom, one in the form of Informative application and the other in the form of Instructional application.

2. Objective

To compare the performance of schoolchildren from the 3rd to the 5th of Elementary School in the application of two intervention programs, one informative and the other instructional, in reading comprehension.

3. Methods

This research was carried out after approval by the Research Ethics Committee, under protocol 0720/2013, approved on 05/29/2013.

3.1. Participants

A total of 211 schoolchildren from the 3rd to the 5th year of elementary public education participated, from three schools in the interior of the state of São Paulo, of both genders, aged between seven and ten years. The schoolchildren were divided into groups according to their level of education, as follows: GI (3rd year schoolchildren), GII (4th year schoolchildren) and GIII (5th year schoolchildren).

Their performances were compared by school grade and according to the applied program. Thus, the performance of the 3rd year schoolchildren submitted to the application of the information program were compared to the schoolchildren of the same grade, but submitted to the application of the instructional program, as well as both were compared to the 3rd year schoolchildren belonging to the control group.

Therefore, the participating schoolchildren were grouped as follows: Group I (GI): 69 3rd year schoolchildren (20 from the INFO group, 24 from the INST and 25 from the CONT); Group II (GII): 78 4th grade schoolchildren (19 from INFO, 27 from INST and 32 from CONT); Group III (GIII): 73 5th grade schoolchildren (18 from INFO, 26 from INST and 29 from CONT)

Exclusion criteria were: difficulties in decoding, registration of sensory, motor or cognitive impairment in school records and non-presentation of the Free and Informed Consent Form signed by the parents or guardians of the schoolchildren.

3.2. Methodology

The Informative and Instructional Programs were applied using narrative texts with the objective of offering strategies to promote the knowledge of the structural parts of the narrative, the basic elements, the causal relationships, the aspects of information processing (micro and macro structure and perception of coherence, reaching a critical and reflective reading and also expository texts with the aim of developing knowledge of thematic progression, structural organization, aspects of information processing (micro and macro structure), the construction of the macrostructure and self-regulation.

Teachers in the control group (CONT) did not receive any type of guidance on specific and targeted work with reading comprehension, continuing with classroom activities. The teachers of the informative group (INFO) received guidance on the cognitive and metacognitive processes involved in reading comprehension as well as guidance on how to mediate during the application of the strategies provided for specific and directed work with reading comprehension. The orientations were carried out in four four-hour sessions, one session dedicated to the theoretical part and the other three to workshops.

The teachers of the instructional group (INST), in addition to the guidelines received, were helped by the researcher in the mediations in the classroom while working with strategies for reading comprehension. This assistance was intended to resolve doubts and resolve immediate difficulties in mediations. The activities were developed in the classroom by the teacher in 12 sessions, one per week.

All participating schoolchildren underwent reading comprehension assessment after the end of the application of the programs in order to compare the performances of the groups studied.

The schoolchildren were collectively evaluated in the classroom through the Reading Comprehension Assessment Protocol - Procomle (Cunha & Capellini, 2019), with the application of two texts, one narrative and one expository, respectively named TN and TE. Each text contains eight multiple-choice questions, divided between literal and inferential, related to the microstructure and macrostructure of the text.

Data were statistically analyzed using the SPSS statistical program, version 21.0. The Mann-Whitney test was used in order to verify possible differences between the groups studied, with values lower than 5% (0.050) being adopted as a significance level.

4. Results and discussion

For the narrative text (TN), the INFO group, in comparison with the CONT group, benefited from the program, as the three groups presented superior performances for macrostructure inferential questions, corroborating previous studies (Diakidoy, Mouskounti, & Ioannides, 2011; Jiang & Farquharson, 2018).

In comparing the results of the evaluation between the Informative group and the control group for the expository text (ET), it was observed that the GI presented similar performances after the application of the program, suggesting that for this level of education the program was not effective. However, it was found that GII and GIII of the INFO group improved their performance for the inferential and literal macrostructure questions, indicating the use of these schoolchildren in the proposed activities, results that corroborate the study by Shannon and Leesa (2020).

In comparing the results of the evaluation between the Instructional group and the control group for NT, it was observed that the schoolchildren benefited from the program mainly in the questions whose answers required the elaboration of inferences for both micro and macrostructure propositions, data that corroborate studies of Lee (2011), Nicolielo-Carrilho, Crenitte, Lopes-Herrera and Hage (2018) and Novaes, Zuanetti and Fukuda (2019).

In comparing the results of the evaluation between the INST and CONT groups for TE, it was shown that only the IG of the INST group benefited from the application of the program, showing improved performance for questions that required the generation of inferences within the microstructure of the text. Such results were opposite to those presented by the INFO group, as GII and GIII year benefited from the intervention program, but GI did not. Similar data were found by Williams et al., (2014) and Jiang, and Farquharson (2018).

Comparing the results of the evaluation between the INFO group and the INST for TN, it was found that only GII and GIII of the INST group showed an improvement in performance for the literal and inferential questions. While the GI showed a similar performance to the INFO group, suggesting that the direct instructions did not make these schoolchildren perform better.

Comparing the results of the evaluation between the INFO and INST groups for TE, it was observed that GI and GIII of the INST group presented superior performance for the literal and inferential questions of macrostructure, indicating that the direct instructions received had a greater effect than this group. However, the same did not occur for the schoolchildren from GII, who showed similar performance between the groups that received direct instruction and those that did not, suggesting that the way in which the program was applied did not make a difference for this level of education, results according to with studies by Spinillo and Hodges (2012) and Wijekumar, Meyer and Lei (2017).

5. Conclusion

The present study indicated that it was possible to verify the effectiveness of the applied programs, because regardless of the form of application, there was an increase in reading comprehension when comparing the groups submitted to the programs with the non-submitted groups, verifying that when direct strategies were used on knowledge of the explicit and implicit information in the text, as well as the organization of this information, making the student aware of his/her possibility of making relationships between the ideas presented in the text, between new and already acquired knowledge, providing, in this way, retention of the information and, therefore, the realization of their learning.

References

- Cunha, V.L.O., & Capellini, S.A. (2019). *Procomle- Protocolo de avaliação da compreensão de leitura para escolares do 3º ao 5º ano*. Ribeirão Preto: BookToy.
- Diakidoy, I.A.N., Mouskounti, T., & Ioannides, C. (2011). Comprehension and learning from refutation and expository texts. *Reading Research Quarterly*, 46(1):22-38.
- Jiang, H., & Farquharson, K. (2018). Are working memory and behavioral attention equally important for both reading and listening comprehension? A developmental comparison. *Reading and Writing*, 31(7):1449-77. doi: 10.1007/s11145-018-9840-y
- Lee, S.H. (2011). Dynamic testing, working memory, and reading comprehension growth in children with reading disabilities. *Journal Learning Disability*, 44(4):358-71.
- Nicolielo-Carrilho, A.P., Crenitte, P.A.P., Lopes-Herrera, S.A., & Hage, S.R.V. (2018). Relationship between phonological working memory, metacognitive skills and reading comprehension in children with learning disabilities. *Journal Applicant Oral Science*; 26:e20170414. doi: 10.1590/1678-7757-2017-0414.
- Novaes, C.B., Zuanetti, P.A., & Fukuda, M.T.H. (2019). Efeitos da intervenção em memória de trabalho em escolares com dificuldades de compreensão de leitura. *Revista CEFAC*; 21(4): e17918 | doi: 10.1590/1982-0216/201921417918.
- Spinillo, A.G., & Hodges, L.V.S.D. (2012). Análise de Erros e Compreensão de Textos: Comparações entre Diferentes Situações de Leitura. *Psicologia: Teoria e Pesquisa*, 28 (4): 381-388.
- Shannon, S., & Leesa, M. (2020). Explicit Text Structure Instruction Supports Expository Text Comprehension for Adolescents with Learning Disabilities: A Systematic Review. *Learning Disability Quarterly*; 1-14. doi: 10.1177/0731948720906490.
- Wijekumar, G., Meyer, B.J.F., & Lei, P. (2017). Web-based text structure strategy instruction improves seventh graders' content area reading comprehension. *Journal of Educational Psychology*, 109(6), 741-760. <https://doi.org/10.1037/edu0000168>
- Williams, J.P., Pollini, S., Nubla-Kung, A.M., Snyder, A.E, Garcia, A, Ordynans, J.G., & Atkins, J.G. (2014). An intervention to improve comprehension of cause/effect through expository text structure instruction. *Journal of Educational Psychology*, 106(1), 1-17. <https://doi.org/10.1037/a0033215>.

READINESS OF FUTURE PRIMARY-SCHOOL TEACHERS TO SOLVE NON-STANDARD MATHEMATICAL PROBLEMS

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Abstract

The paper will present partial results of a pilot research entitled “Readiness of future primary-school teachers to solve non-standard mathematical problems”. For the purposes of the research, a didactic test was designed – a set of 10 non-standard mathematical problems. The problems were chosen in difficulty corresponding to the curriculum of the 5th grade of primary school. The difficulty of the individual problems was statistically verified. A questionnaire survey method was chosen for the research. 74 students of the field of Teaching at the 1st Level of Primary School from the Faculty of Education of Palacký University in Olomouc participated in the pilot research. The researchers plan to carry out the research in a national and wider international context. In the pilot research, we were particularly interested in the success of the respondents in solving individual problems and the test as a whole, and the subjectively perceived difficulty of the individual problems in the context of the achieved success rate. It can be concluded that not all the prospective teachers were able to solve all the assigned problems. Some mistakes were caused by inattention, others by the stress factor of the time limit. The analysis of the subjectively perceived difficulty of the problem in relation to the success rate was interesting. We believe that the results of the research should be reflected in the concept of undergraduate teacher training.

Keywords: *Mathematics, solving, problem, teacher.*

1. Introduction

Successfully solving a mathematical problem is one of the basic requirements for pupils in mathematics. Successful solving of mathematical problems is also one of the key competencies of a future teacher. In addition to solving the problem itself, the prospective teacher should have a good understanding of the mathematical nature of the problem and should be able to explain the solution to the pupil from different points of view. However, our students – future teachers – often hesitate in the case of non-standard problems and are not sure of the correctness of the solution.

By non-standard problems we mean, in accordance with the National Research Council (2001), problems whose solutions do not depend to a large extent on the usual methods used in mathematics teaching. They require a certain level of intellectual maturity in pupils as well as the ability to reason logically and think creatively. For non-standard problems there is often no single correct solution; the pupils need to think, they need insight and understanding of the meaning of the assignment, and only then are they able to solve the problem. The ability to successfully solve non-standard mathematical problems is embedded in the primary school curriculum (MEYS, 2021). It is also closely related to the issue of developing pupils’ mathematical literacy.

2. Readiness of future primary-school teachers to solve non-standard mathematical problems research (RNMP Research)

The RNMP research is devoted to a deeper analysis of the issue of solving non-standard mathematical problems by students of Teaching at Primary School. The authors observe the success rate of students in solving problems, the identification of problematic mathematical topics, the degree of relevance between the student’s performance and his/her self-assessment of the success of his/her own performance, the degree of professional self-confidence in solving non-standard mathematical problems, and the degree of readiness for a future profession in the field.

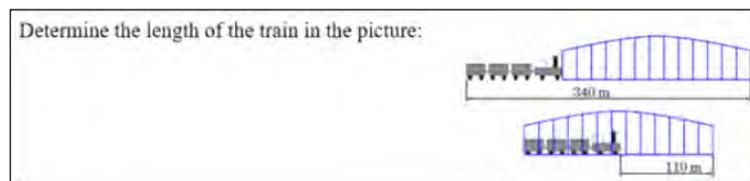
In this paper we will discuss partial results of the pilot study, which was carried out in 2020. The study involved 74 students of the field of Teaching at Primary School at Palacký University Olomouc. The students were deliberately chosen at different stages of their studies – at the beginning, in the middle and at the end. 21 students (i.e. 28.38 %) were in their 1st year, 26 students (i.e. 35.14 %) were in the 3rd year and 27 students (i.e. 36.48 %) were in the 5th year. We will focus on answering the following research questions:

- What is the success rate of students, future primary-school teachers, in solving non-standard mathematical problems intended for pupils of the 5th grade? (RQ1)
- Are the students sufficiently prepared to solve non-standard problems in their future teaching jobs? (RQ2)
- Does the success rate of solving the problem correspond to the subjectively perceived difficulty of the problem? (RQ3)

2.1. Conducting the research

For the purpose of the research, a set of 10 non-standard mathematical problems was compiled. The problems were chosen in difficulty corresponding to the curriculum of the 5th grade of primary school. Figure 1 shows an example of test problem T10. For each of the problems, the respondents were asked to rate the success of their solution on a 1-5 point scale. At the end of the test, the respondents were asked to indicate which of the problems they perceived as the most difficult and which as the easiest. The initial assumption was that the future teacher should be able to successfully solve mathematical problems of the level of difficulty of the 5th grade.

Figure 1. Assignment of problem T10.

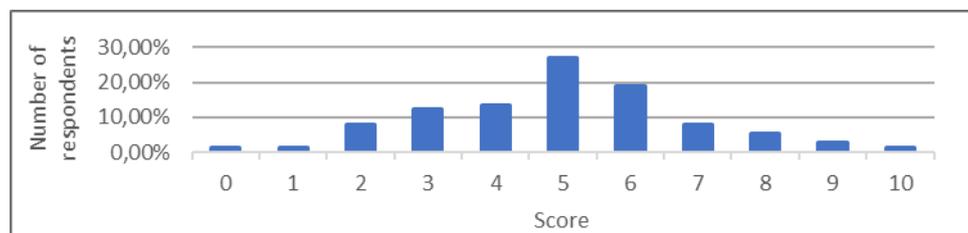


Based on the answers of the respondents, the difficulty of each problem was statistically determined according to Chráska (Chráska, 2007). The difficulty value Q is given by the relation of $Q = 100 \frac{b}{n}$, where b is the number of respondents who solved the problem incorrectly or not at all, and n is the number of all respondents. Value of $Q \in \langle 0, 100 \rangle$. A problem can be considered difficult if $Q > 80$. If $Q < 20$, the problem is easy. The results are summarised in Table 1. Easy problems include T_2 and T_4 ; on the contrary, problems T_1 and T_9 can be considered difficult.

3. Discussion

The scores achieved by the respondents in the didactic test are shown in Graph 1. Scores included a range from 0 points (minimum) to 10 points (maximum). We assumed that prospective teachers should correctly solve all the problems presented. The results were surprising to us.

Graph 1. Respondents' scores in the didactic test.



Only one student of the 5th year solved all the problems correctly. Most of the students (i.e. 27.03 %) achieved a score of 5 points. Only 36.49 % (i.e. 27) of the respondents scored higher than 5. The results of 10 respondents (i.e. 10.81 %), who scored 0, 1 and 2 points in the test, are quite striking. The results achieved by the students did not depend on the year of study. Students of the 5th year did produce slightly better results than students in the other participating years, but the differences were not statistically significant. We believe that the students involved generally do not have sufficient skills in

solving non-standard problems. The evaluation of the difficulty of each problem is summarised in Table 1. According to the results obtained, problems T2 and T4 can be classified as easy problems and problems T1 and T9 as difficult ones.

Table 1. Difficulty of test problems.

Test problem	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10
n_s	12	64	42	67	29	54	28	42	10	18
Q	83.78	13.51	43.24	9.46	60.81	27.03	62.16	43.24	86.49	75.68

Key: n_s – number of successful solvers, Q – difficulty coefficient.

The respondents' subjective evaluation of the difficulty of problems T1, T2, T4 corresponds to the results obtained in the test. Significant differences can be observed in problems T8 and T9. Although the respondents perceived T8 as the second most difficult problem, 56.76 % of the respondents successfully completed it. In contrast, problem T9, which has the highest difficulty coefficient Q , was perceived by the respondents as only moderately difficult. However, only 18.51 % of the respondents successfully solved it. A self-reflection of one's own performance in the case of this problem did not correspond to the objective outcome.

As part of the analysis of the results, we examined whether the respondents adequately perceived their success in solving the individual problems in the didactic test. A detailed analysis is beyond the scope of this text. Let us just give summary results that can lead us to deeper reflection. For most of the problems, the respondents overestimated their performance. Specifically, for problem T10 (Figure 1), there were 18 correct solutions, although 26 respondents thought they had solved the problem correctly. Only 10 successful solvers were sure of the correctness of their answer. These findings point to the possibility of a deeper interpretation of the results in the area of prospective teachers' self-confidence and adequate self-assessment.

4. Conclusions

The development of pupils' mathematical literacy is closely linked to solving application word problems, which are often non-standard. This means those problems for which it is not possible to use a pre-learned solution algorithm. It is striking that the research respondents, prospective teachers, were unable to successfully solve such problems at the level of difficulty of the 5th grade. The results of the research indicated the need to revise the concept of undergraduate mathematics training of primary-school teachers. So far, these are partial results that should be verified in a broader international research.

Acknowledgements

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References

- Chráška, M. (2007). *Metody pedagogického výzkumu: základy kvantitativního výzkumu*. Prague: Grada.
- MEYS. (2021). *Framework Education Programme for Primary Education*. Research Institute of Education. Retrieved 21.9.2021, from: http://www.nuv.cz/file/4982_1_1/.
- National Research Council (2001) *Adding It Up: Helping Children Learn Mathematics*. Washington, DC: The National Academies Press.

AND THEN I ASK THE COMMUNITY - NURSING PROFESSIONAL IDENTITY DEVELOPMENT IN VIRTUAL COMMUNITIES OF PRACTICE

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Abstract

Virtual Communities of Practice in the context of nursing - understood as interest-based associations of people who exchange nursing knowledge and nursing experiences using online platforms - also develop their significance in case of professional identity development.

"What does it mean to be a nursing professional?" is a central question in the nursing education context, in which the foundation for the development of a professional identity is laid. While findings already exist regarding the development of nursing professional identity in the context of different learning places (nursing school and nursing practice), it's still open, how the participation in virtual Communities of Practice can influence the development of professional identity already in the context of nursing education.

This research project explores the following questions: *Which nursing related themes show up in the context of virtual Communities of Practice? How the process of nursing professional identity development is influenced by the participation of nursing scholars in virtual Communities of Practice? Which meaning the learners attribute to the participation in virtual Communities of Practice with regard to the formation of nursing professional identity?*

The goal of the study is to develop the virtual Community of Practice as a learning space that supports the process of identity formation already in nursing education. Furthermore, the findings will be used to shed light on the medial reality of nursing scholars and to derive curricular consequences.

Within the framework of a netnographic research design, data collection will be conducted via field observations of community activities and will additionally be supplemented by focused individual interviews with community members. In the context of data analysis, the documentary method will be used in addition to the production of dense descriptions.

Keywords: *Virtual communities of practice, nursing education, professional identity development.*

1. Introduction

One way of exchanging professional knowledge and experience via Internet represent virtual Communities of Practice (Rolls et al. 2019, p. 1382). The establishment of these Communities in the healthcare sector has national and international significance, as evidenced by the initiation of various research projects (Struminger et al. 2017; Bermejo-Caja et al. 2019). The term "community of practice" was coined in 1991 by Lave and Wenger as part of their monograph "Situated learning. Legitimate peripheral participation." Communities of Practice are considered groups of people existing over an extended period of time who have an interest in a common topic and want to build and share knowledge together (North/ Franz/ Lembke 2004, p. 8). Communities of Practice are self-organized, dynamic systems that can be located inside or outside of organizations and usually have an informal character (Wenger 1998, p. 2). According to Wenger (2011, p. 1f.), they are also characterized by the fact that their members share a common area of interest ("domain"), exchange information about this ("community"), and thus build up a common culture of practice ("practice"). Participation in a community of practice takes place on a voluntary basis and it do not necessarily have to be face-to-face. According to an assessment by North, Franz and Lembke (2004, p. 91), most Communities of Practice exist virtually, which in turn enables interaction and communication processes that are unbounded in time and space. Complementing the definition of non-virtual Communities of Practice, virtual Communities of Practice specifically in healthcare are considered as "a common online platform to provide healthcare professionals with the opportunity to access highly specialized knowledge, build a professional support network and promote the translation of research evidence into practice." (Shaw et al. 2021) Participation

in aforementioned Communities can provide a variety of support, such as working together on professional problems, finding alternative solutions and interpretations, search professionally relevant information, conducting collegial consultations and promoting interprofessional working (Bermejo-Caja et al. 2019, p. 403; Rolls et al. 2019, p. 1393; Terry et al. 2019, pp. 372-375). Virtual Communities of Practice also have an impact on the process of professional identity formation (North/ Franz/ Lembke 2004, p. 9; Terry et al. 2019, p. 372). The formation of professional identity is described as the result of a developmental process that is closely linked to the development of professional competence (Heinemann/ Rauner 2008, p. 10). Professional identity development thus takes place as a gradual growing into the respective professional Community of Practice. Identification with the profession is characterized primarily by an interest in orientation, (co-)design and quality. In the field of nursing, the development of professional identity takes place in fields of tension characterized by crises (Bohrer/Walter 2015, p. 25f.). The confrontation with the above-mentioned areas of tension is expressed in various types of self-assertion (Bohrer/Walter 2015, p. 26). These are characterized by learners becoming increasingly independent, i.e. taking responsibility and making and arguing their own decisions. Furthermore, by taking a position as learners, which also includes expressing learning needs, questioning things and demanding feedback (Bohrer/ Walter, p. 26). The latter aspects in particular are also found in the context of participation in virtual Communities of Practice: one's own learning needs are identified and put up for discussion online. At the same time, other community members provide feedback and position themselves with respect to a particular learning subject. While findings regarding the development of nursing professional identity in the context of different learning places (nursing school and nursing practice) exist, it's open, if virtual Communities of Practice also provide a home for identities (North/ Franz and Lembke 2004, p. 9) or whether and to what extent participation in the aforementioned Communities can influence the development of professional identity already in the context of nursing education.

2. Objectives

In the context of nursing education, learners are particularly challenged to initiate the development of a stable professional identity - not least due to the demand for evidence-based nursing practice and the debate about Nursing 4.0. Against the backdrop of the Nursing Profession Reform (2019) in Germany, questions of nursing professional identity formation become priority because there's a new job title „Pflegefachfrau/ Pflegefachmann“ with far-reaching changes in the requirements and activity profile of the aforementioned occupational group. Thus, the answer to the question "What does it mean to be a nursing professional?" is of central relevance. In addition to the learning locations of nursing school and nursing practice, there is an increase in the importance of informal learning opportunities that manifest themselves in virtual space and also have an influence on the development of professional identity. In the context of this dissertation project, virtual Communities of Practice are to be explored as a further place of learning. The insights generated in this process can be used for integration into the interplay of different learning places that are significant in the context of professional identity development. The understanding of the learners' media reality can also help to develop curricular units on this basis and to generate new learning spaces, in which formal and informal forms of learning in virtual and non-virtual places experience an interweaving. The following research questions arise from the aforementioned objective:

- (1): Which nursing related themes show up in the context of virtual Communities of Practice?
- (2): How the process of nursing professional identity development is influenced by the participation of nursing scholars in virtual Communities of Practice?
- (3): Which meaning the learners attribute to the participation in virtual Communities of Practice with regard to the formation of nursing professional identity?

3. Design and methods

The focus of this research project is the question HOW the process of nursing professional identity development is influenced by participation in virtual Communities of Practice. Therefore an ethnographic approach is needed, which enables an explorative and interpretative description of ways and means of human interactions (Hitzler/ Eisewicht 2016, p. 63). With the increasing emergence of virtual worlds, approaches to ethnographic research have also evolved. In 1996, the Canadian cultural anthropologist Kozinets founded a format of ethnographic fieldwork that is particularly suited to the study of online Communities. "Netnography" (Kozinets 2019) enables the analysis of computer-mediated interactions within virtual Communities. Netnography is primarily understood as a qualitative research approach, as the discovery of human behaviors and interactions within virtual worlds are at the center of the research interest. The data collection is primarily carried out by observing the community activities,

which are particularly evident in the context of forum communication. An unstructured, open approach is recommended initially in the research project, which becomes increasingly focused in the course of the research process. In the present study, three observation periods of the Community „krankenschwester.de“ are planned, each lasting three months. The last observation period will be supplemented by focused individual interviews with community members. This is done to gain insight into the participants' attributions of meaning and subjective experiences (Misoch 2019, p. 83). Observation protocols, field notes, documented forum communication, and transcribed interviews form the basis for the evaluation of the data. In addition to the production of dense descriptions, meaning that is revealed in the intertwining between individual and group perspectives should be tapped using the documentary method according to Bohnsack (2013). A particular challenge of internet-based research is the adherence to ethics principles, such as informed consent or the unrestricted voluntariness of participation. The planned project will be reviewed by the ethics committee of the "Deutsche Gesellschaft für Pflegewissenschaft e. V."

References

- Bermejo-Caja, Carlos Jesús & Koatz, Débora & Orrego, Carola & Perestelo-Pérez, Lilisbeth & González-González, Ana Isabel & Ballester, Marta & Pacheco-Huergo, Valeria & del Rey-Granado, Yolanda & Muñoz-Balsa, Marcos & Ramírez-Puerta, Ana Belén & Canellas-Criado, Yolanda & Pérez-Rivas, Francisco Javier & Toledo-Chávarri, Ana & Martínez-Marcos, Mercedes & e-MPODERA group. (2019). Acceptability and feasibility of a virtual community of practice to primary care professionals regarding patient empowerment: a qualitative pilot study. *BMC Health Services Research*, Vol. 19 (1), 1-10.
- Bohnsack, Ralf. (2013). Typenbildung, Generalisierung und komparative Analyse: Grundprinzipien der dokumentarischen Methode. In Bohnsack, Ralf & Nentwig-Gesemann, Iris & Nohl, Arnd Michael (Eds.), *Die dokumentarische Methode und ihre Forschungspraxis: Grundlagen qualitativer Sozialforschung (241-270)* (3 Rev. ed.). Wiesbaden: Springer VS: 241-270.
- Bohrer, Annerose & Walter, Anja. (2015). Entwicklung beruflicher Identität. Empirische Erkenntnisse zum Lernen in der Berufspraxis. *Pädagogik der Gesundheitsberufe*, Vol. 2 (3), 23–31.
- Heinemann, Lars & Rauner, Felix. (2008). Identität und Engagement. Konstruktion eines Instruments zur Beschreibung der Entwicklung beruflichen Engagements und beruflicher Identität. Retrieved 15.04., 2021, from https://www.researchgate.net/publication/285740061_Heinemann_Lars_und_Felix_Rauner_2008_Identitat_und_Engagement_Konstruktion_eines_Instruments_zur_Beschreibung_der_Entwicklung_beruflichen_Engagements_und_beruflicher_Identitaet
- Hitzler, Ronald & Eisewicht, Paul. (2016). *Lebensweltanalytische Ethnographie. Im Anschluss an Anne Honer*. Weinheim, Basel: Beltz Juventa.
- Kozinets, Robert V. (2019). *Netnography. The Essential Guide to Qualitative Social Media Research* (3. ed.). London: SAGE Publications.
- Lave, Jean & Wenger, Etienne. (1991). *Situated learning. Legitimate peripheral participation*. Cambridge: Cambridge University Press.
- Misoch, Sabina. (2019). *Qualitative Interviews* (2. Rev. ed.). Berlin, Boston: De Gruyter Oldenbourg.
- North, Klaus & Franz, Michael & Lembke, Gerald. (2004). Wissenserzeugung und -austausch in Wissensgemeinschaften. Communities of practice. Arbeitsgemeinschaft Betriebliche Weiterbildungsforschung (ABWF). Berlin. Retrieved 01.02., 2021, from <https://www.econstor.eu/handle/10419/105480>
- Rolls, Kaye Denise & Hansen, Margaret M. & Jackson, Debra & Elliott, Doug. (2019). Intensive care nurses on social media. An exploration of knowledge exchange on an intensive care virtual community of practice. *Journal of Clinical Nursing*, Vol. 29 (7-8), 1381–1397.
- Shaw, Louise/ Jazayeri, Dana/ Kiegaldie, Debra/ Morris, Meg (2021): Virtual communities of practice to improve clinical outcomes in healthcare: protocol for a 10-year scoping review. In: *BMJ Open* (11), 1-6.
- Struminger, Bruce & Arora, Sanjeev & Zalud-Cerrato, Sarah & Lowrance, David. (2017). Building virtual communities of practice for health. *The Lancet*, Vol. 390, 632-634.
- Terry, Daniel R. & Nguyen, Hoang & Peck, Blake & Smith, Andrew & Phan, Hoang. (2019). Communities of practice. A systematic review and meta-synthesis of what it means and how it really works among nursing students and novices. *Journal of Clinical Nursing*, Vol. 29 (3-4), 370-380.
- Wenger, Etienne. (1998). *Communities of Practice*. Cambridge: Cambridge University Press.
- Wenger, Etienne. (2011). Communities of practice. A brief introduction. Retrieved 12.02., 2021, from <https://scholarsbank.uoregon.edu/xmlui/handle/1794/11736>

POSSIBILITIES OF DEVELOPMENT OF PUPILS' MATHEMATICAL LITERACY

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Abstract

In this article, we deal with the development of mathematical literacy of pupils and students. The article responds to the current requirement to focus mathematics education on the practical use of knowledge in everyday life, i.e., on mathematical literacy.

The article is motivated by the results of a questionnaire survey conducted on a group of 159 students at the university teaching program in the Faculty of Education, Palacký University, Czech Republic, in 2021. It turns out that most future mathematics teachers are interested in developing mathematical literacy of their future pupils and students and are willing to continue their education in this field, for example, by participating in seminars on the development of mathematical literacy in children of all ages.

The aim of the article is to show ideas for a seminar for future mathematics teachers. We use mathematical examples to illustrate different approaches to the development of mathematical literacy and the joint development of mathematical and digital literacy.

Keywords: *Mathematical literacy, mathematics examples, questionnaire survey, prospective teachers.*

1. Introduction

Mathematical literacy can be briefly characterized as the ability to apply mathematical knowledge, procedures and thinking in everyday life. The importance of mathematical literacy for society is also evidenced by the fact that, since the middle of the 20th century, comparative research has been carried out around the world to find out how pupils' knowledge and skills differ between countries and different education systems. The International Association for Evaluation of Educational Achievement (IEA) and the Organization for Economic Co-operation (OECD) have the longest tradition in conducting this research. The OECD is conducting perhaps the best-known mathematical literacy research project called the Program for International Student Assessment (PISA). This research examines the knowledge and skills of pupils needed for their effective application in modern society and emphasizes the importance of education as a preparation for real life in modern society, thus laying the foundations of mathematical literacy. Here we present the OECD definition of mathematical literacy: Mathematical literacy is an individual's capacity to identify and understand the role that mathematics plays in the world, to make well-founded judgements and to use and engage with mathematics in ways that meet the needs of that individual's life as a constructive, concerned, and reflective citizen (OECD, 2003). The second major international survey of pupils' knowledge and skills, which covers the areas of mathematics, is the TIMSS (Trends in Mathematics and Science Study) survey under the auspices of the IEA.

To find out the awareness of mathematical literacy and its importance among prospective teachers, a questionnaire of our own design was created, which was distributed online in the spring of 2021 among undergraduate students at the Department of Mathematics of the Faculty of Education, Palacký University in Olomouc, Czech Republic. The questionnaire was answered by 159 respondents. It contains items determining the general orientation of respondents in the field of mathematical literacy, also finds out their opinion on the availability of suitable resources for the development of mathematical literacy, their use in teaching and the like.

Respondents consider it important

- to develop mathematical literacy in pupils,
- to cultivate a positive attitude of pupils towards mathematics,
- to show the connection of mathematics with other subjects such as computer science, physics, natural and social sciences.

Students showed great interest in further education in the development of mathematical literacy of pupils and students.

2. Objectives

In teaching mathematics, emphasis should be placed on the applicability of mathematics and on building students' positive attitudes towards mathematics. For this reason, we are creating a Mathematical Literacy Seminar for students, prospective mathematics teachers, at our Faculty of Education.

3. Methodology

The methodology for the seminar on mathematical literacy for prospective mathematics teachers has the following steps:

1. A brief theoretical introduction to mathematical literacy.
2. Comparative research (PISA, TIMSS).
3. Examples of methodological materials for the development of mathematical literacy, their sources.

4. Discussion of students' ideas for the development of mathematical literacy.

The aim of the course is to give students stimuli to think about how mathematical literacy can be developed in children.

4. Discussion

How to develop digital literacy? We can give a lot of ideas and suggestions. However, every teacher must find his or her way to the pupils or students. It is necessary to teach mathematics with understanding and interestingly. It is a responsible job.

In this contribution we will present just a few ideas on where to look for inspiration. A suitable tool for developing mathematical literacy is to connect mathematics with other school subjects and providing examples from the practice of contemporary life.

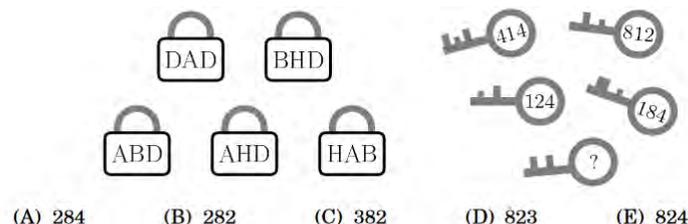
Many different articles on mathematical literacy can be found on the Internet, such as the SCIENTIX internet platform, which gathers and promotes best practice in science teaching and learning in Europe and organizes science, technology, engineering, and mathematics teacher training and workshops. In the Czech Republic, the popular methodological portal www.rvp.cz and others can be recommended.

Suitable examples for the development of mathematical literacy can be drawn from the above-mentioned international research TIMSS and PISA or from mathematical competitions such as the Mathematical Kangaroo. It is an international mathematics competition in more than 92 countries for primary school pupils and high school students. The competition is held once a year. The challenge consists of multi-option forms that are not standard issues with laptops and come from a variety of topics. In addition to basic computing skills, they require inspirational ideas, perseverance, creativity and imagination, logical thinking, and other problem-solving strategies. There are often small stories, interesting problems and surprising results that encourage discussion with friends and family.

4.1. Math Kangaroo problems

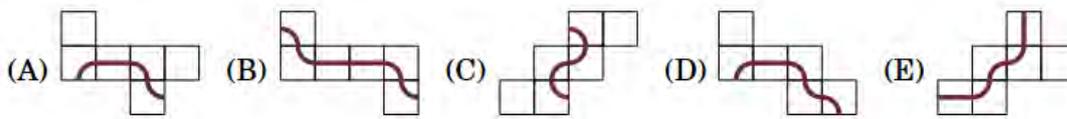
- Example from the category Kadet (age 14-15) for 3 points (easy level) from 2015: The cyclist rides at a speed of 5 meters per second. The circumference of each of the wheels of his bicycle is 125 centimeters. How many full revolutions will each lap make in 5 seconds?
(A) 4 (B) 5 (C) 10 (D) 20 (E) 25
- Example from the category Benjamin (age 12-13) for 4 points (middle level) from 2017: In the picture you can see 5 coded locks and 5 keys to them. Identify the missing key code.

Figure 1. Five coded locks and five keys to them (and offered answers (A) to (E)).



- Example from the category Benjamin (age 12-13) for 5 points (difficult level) from 2019: Each of the following images represents a cube network. Only one of the cubes has after folding on its surface a closed line. Which one?

Figure 2. Cube networks (and offered answers (A) to (E)).



4.2. PISA and TIMSS problems

Released issues PISA 2015 Mathematics items can be found at <https://www.oecd.org/pisa/test/>.

The released Trends in International Mathematics and Science Study (TIMSS) 2011 grade 4 mathematics assessment items can be found on https://nces.ed.gov/timss/pdf/TIMSS2011_G4_Math.pdf. This is not a complete set of all TIMSS 2011 assessment items because some items are kept confidential so that they may be used in subsequent cycles of TIMSS to measure trends.

4.3. Connecting mathematical and digital literacy

It is often very beneficial for mathematics to integrate digital technologies into teaching in all types of schools in a suitable way. Nowadays, for example, when even simple applications that allow complex symbolic calculations are available, schools still have a lot of time-consuming effort in mechanical calculations, so there is not much time left for an illustrative and interesting explanation of the new subject and especially for a constructivist approach to teaching mathematics. Digital technologies can be helpful in certain situations not only to facilitate calculations but also when illustrating the interpretation of a new topic or to verify algorithms.

5. Conclusions

There is no clear guidance on how to develop mathematical literacy in teaching. The recommendation is to try to teach mathematics with understanding, responsibly and interestingly.

Acknowledgements

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References

OECD (2003) *The PISA 2003 Assessment Framework - Mathematics, Reading, Science and Problem Solving Knowledge and Skills*. Retrieved from https://www.oecd.org/education/school/programme_forinternationalstudentassessmentpisa/33707192.pdf

A CALL FOR DIVERSITY TRAINING FOR CHILDREN IN JAPAN

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Abstract

Growing diversity in Japan's population has not been matched by changes in attitudes regarding "difference." The old notion of racial and cultural homogeneity still holds sway in Japan, especially within the official education system. This has led to a disconnect between classroom realities and government policies which do little to address the changing needs of an increasingly diverse student body. For historical reasons, and as a result of more recent demographic trends, there are now large numbers of Koreans, Brazilians, South Asians and other foreign nationals in Japan. Many of these foreign residents have children attending Japanese public schools that were never intended to educate anyone but Japanese students. Moreover, marginalized groups such as members of the LGBTQ and special needs communities are gaining an increasing presence both in public awareness and within the public school system. Despite these changes, changes that are only accelerating, the official school system has done little to foster changes in attitude toward people who are different from the idealized norm. In addition, studies show that these sorts of attitudes can become fixed at a very early age, effectively at the preschool level. This has led us to produce a children's book intended to serve as a form of diversity training for young children. In this way we hope to encourage more open and accepting attitudes among those who will grow up in an ever more diverse Japan.

Keywords: Japan, diversity training, inclusion.

1. Increase of foreign residents

In the past thirty years, the number of foreigners in Japanese society has increased to the point where they now constitute approximately 2.89 million people, 2.3% of the population. The largest numbers of foreign residents are from the following groups:

1.1. Koreans: *Zainichi*

Korean refers to Koreans (and their descendants) who immigrated to Japan before 1945 while Korea was still under Japanese rule. *Zainichi* means short-term residence, although the group has been here for nearly four generations. In the 1980's, some Koreans emigrated for economic reasons; they are not considered *zainichi*. There are approximately 600,000 Koreans residing in Japan as "special permanent residents."

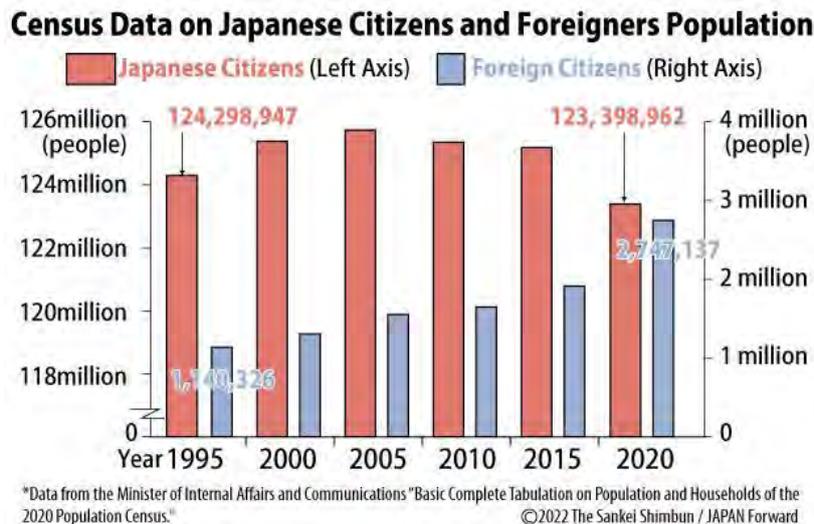
1.2. Japanese-Brazilians or South Americans

In the 1990's the Immigration Control and Refugee Recognition Act was revised to allow those with Japanese ancestry access to work in Japan, mostly in in factories and low-paying, difficult jobs. Approximately three generations stayed, and the number of Brazilians alone is now roughly 300,000.

1.3. Southeast Asians

Japan's rapidly aging population has created a labor shortage that has spurred an increase in foreign workers, now frequently from Southeast Asia. Southeast Asians in fact are the fastest growing group at present. As the graph below indicates, revisions regarding visa and work status started bringing in more workers from Southeast Asia in the mid-2000's, especially as care workers for the elderly. In 2019, a further revision of immigration law was aimed at bringing in more unskilled workers for 14 different industries suffering acute labor shortages.

Figure 1. Japan Ministry of Internal Affairs graph that shows a sinking native population and a rising tide of “foreigners,” who in fact still only represent about 2 percent of the total population.



2. Increase in representation of marginalized groups

2.1. LGTBQ population

Until very recently, the LGTBQ movement had been largely invisible in Japan. Current trends have led to greater public awareness of LGTBQ issues and an increasing emphasis on LGTBQ rights. Discussions of these topics are beginning to impact the education system regarding children’s rights, dress codes, gender-neutral bathrooms, etc.

2.2. Special needs students

The last 10 years have also seen a growing awareness of those with learning disabilities. Traditionally the physically or mentally challenged were segregated in special schools and generally kept out of public view. Now, in part due to falling birthrates, there is more talk of mainstreaming such students, both to increase their presence in society and to take advantage of the empty classrooms in many local schools.

3. Slow response to change

3.1. Changing needs, unchanging attitudes

Despite these many changes in the makeup of the student body, the education establishment in Japan has been slow to respond to the changing needs of students who are often no longer as typical as the students the system was designed for. Schools confronted by “different” students tend either toward segregation or total assimilation, without regard to the educational drawbacks of either approach.

3.2. International, global, and unique

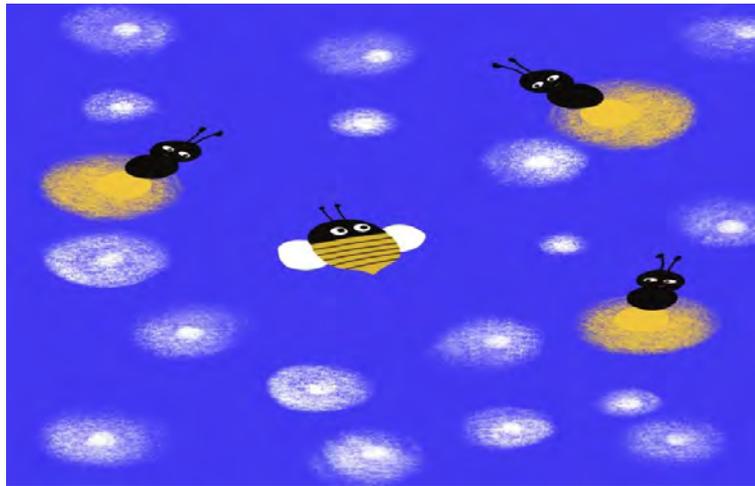
Japan’s Ministry of Education has issued vague directives to encourage Japanese students to learn more about the world outside Japan. But regional schools have the actual responsibility for creating programs that illuminate what is meant by “internationalization,” “self-expression,” or “critical thinking.” Many primary schools use one school lunch a month to highlight the cuisine of a foreign country, or set aside class time to occasionally meet some of the foreigners in the community. The introduction of English classes from third grade is also intended to foster self-expression and global awareness.

Yet research suggests that children pick up their attitudes about differences in gender, race, and culture before they enter primary school. A study asking children to choose preferences for playmates suggests that by three years of age, many children are already forming ideas about “difference” regarding gender; by five years old, these preferences are quite set. (Kinzler et al., 2011.) This tendency to categorize at an early age is especially pronounced in Japan where notions of homogeneity work to create a highly developed sense of what is normal and what is aberrant.

3.3. Attitude shaping

This suggests that efforts to shape attitudes toward diversity and inclusion are more likely to be successful the earlier they are begun. With this in mind, we believe a children's book aimed at the preschool child and read by parents or preschool teachers provides an important tool for fostering more open attitudes toward difference. To this end, we have created the book *Bibi the Bee*. Our hope is that in producing this book (in multilingual form) we can begin to move the conversation about diversity in a positive direction, helping children learn to accept and appreciate the diversity that will soon become only too apparent to them.

Figure 2. *Bibi the Bee*, Text by Michelle Henault Morrone and Yumi Matsuyama; Illustrations by Cecca Morrone.



References

- Allport, G. (1954). *The Nature of Prejudice*. Basic Books.
- Anzures, G., Quinn, P.C., Pascalis, O., Slater, A.M., Tanaka, J.W., & Lee, K. (2013). Developmental Origins of the Other-Race Effect. *Current Directions in Psychological Science*, 22, 173-178. Sage Publications.
- Badger, J.R., Shapiro L.R. Category Structure Affects the Developmental Trajectory of Children's Inductive Inferences for Both Natural Kinds and Artefacts. *Think Reasoning*. 2015;21(2):206–229.
- Bar-Haim, Y., Ziv, T., Lamy, D., & Hodes, R.M. (2006). Nature and Nurture in Own Race Processing, *Psychological Science*, 17, 159-163.
- Collins, P.H. (2019). *Intersectionality as Critical Theory*. Durham and London: Duke University Press, pp. 2-5; 20-41.
- Juniwatasari, R. (2019). Japan's New Immigration Bill. *Japan Watch Project*. <http://japanwatch.today/th/blog/post/japans-new-immigration-bill>
- Kelly, D.J., Quinn, P.C., Slater, A. M., Lee, K., Gibson, A. Smith, M., ... Pascalis, O., (2005). Three Month-olds, But Not Newborns, Prefer Own-race Faces. *Developmental Science*, 8, F31-F36.
- Kinzler, K. D., & Spelke, E.S. (2011). Do Infants Show Social Preferences for People Differing in Race? *Cognition*, 119, 1-9.
- Kinzler, K.D., Shutts, K.I., Dejesus, J., & Spelke, E.S. (2009). Accent Trumps Race in Guiding Children's Social Preferences. *Social Cognition*, 27, 623-634.
- Kyozuka, T., Eguchi R., (2019). Short of Labor, Japanese Companies Vie for Southeast Asian Workers, *Nikkei Asia*. <https://asia.nikkei.com/Spotlight/Japan-immigration/Short-of-labor-Japanese-companies-vie-for-Southeast-Asian-workers>
- LGBTQ Rights in Japan (2022). <https://www.equaldex.com/region/japan>
- Wong, B. (2021). What Asia's LGBTQ+ Movement Can Learn from Japan. *Time Magazine* <https://time.com/5951039/asia-lgbtq-japan-lgbt/>
- Yuki, M. (2003). Diversity of Education and Schooling Choices among Nikkei Brazilians in Japan and Educational Support: A Comparative Study. 2000-2002 Grant in Aid for Scientific Research B2.

DEVELOPING MATHEMATICAL PRE-LITERACY AND ROBOTIC TOYS FROM THE PERSPECTIVE OF SCHOOL PRACTICE

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Abstract

We encounter mathematics and mathematical concepts in our everyday lives. The foundation for later mathematical skills lies in the good development of pre-mathematical ideas in a child's preschool years. In this paper we will discuss partial results of the study entitled "Mathematics and Reading Preschool Literacy (MRPL1)", in which 119 teachers from 72 kindergartens from different parts of the Czech Republic participated. The focus will be mainly on the use of modern robotic tools based on the trend of incorporating digital technologies into preschool education. Targeted work with these tools can significantly contribute to the development of children's spatial orientation, their numerical skills, logical reasoning and algorithmizing. In the application part we will focus specifically on the possibilities of educational use of the robotic toy Bee Bot.

The research has revealed that the need to develop children's mathematical literacy in kindergartens is still neglected by teachers. While teachers do acknowledge its importance, they themselves do not know how to develop children's mathematical pre-literacy. In their own practice, they prefer the children to play spontaneously and fill in pre-printed worksheets. It is encouraging that the teachers have shown interest in the new ideas. Activities related to Bee Bot interested them. Overall, however, they lack sufficient methodological support. Based on the findings, educational activities with Bee Bot have been included as part of the undergraduate education of kindergarten teachers at the Faculty of Education of Palacký University in Olomouc.

Keywords: *Mathematics, pre-literacy, teaching, robot, toys.*

1. Introduction

The definition of the concept of mathematical literacy is not uniform in specialised literature. A number of authors use the definition of mathematical literacy provided by the International Research Committee of OECD. "Mathematical literacy is the ability of an individual to know and understand the role mathematics plays in the world, make well-founded judgements and tap mathematics so that it fulfils that individual's needs as a creative, interested and thinking citizen." (PISA 2003). It can be said that mathematical literacy is manifested when the child/pupil uses his/her knowledge and abilities to solve various types of problems that may have a supra-field context. It is the use of mathematical competencies in a range of situations, from everyday simple situations to unusual and difficult ones. We perceive mathematical pre-literacy as mathematical literacy developed at the child's preschool age (Uhlířová & Cibáková, 2019)

Robotic toys are becoming a contemporary phenomenon. The idea behind these toys is that the child can "program" himself/herself how the toy will behave. Robotic toys provide a new type of educational environment that has a strong motivational framework. They encourage discovery through trial and error, allowing immediate feedback and active work with errors. With systematically guided activities, they have significant potential for developing children's cognitive abilities. The most famous toys of this type suitable for preschool age include Bee Bot, Blue Bot, Code-a-pillar, Code & Go Robot Mouse, Botley Robot, Ozobot. Bee Bot (BB) is a programmable robotic toy in the shape of a bee. BB moves on a square mat in 4 directions: right, left, forward and backward. Up to 40 commands can be "programmed".

In our paper we will focus on the reflection of the current educational environment of the kindergarten. We will try and answer the following research questions:

RQ1 Do kindergarten teachers have robotic toys at their disposal?

RQ2 Do teachers have enough methodological materials for developing mathematical pre-literacy through robotic toys?

2. Mathematics and reading literacy in preschool education (MRLPE1 research)

The Mathematics and Reading Preschool Literacy 1 (MRPLE1) study was focused on the examination of the education environment of kindergartens in the context of developing the mathematical and reading pre-literacy in children, and on the reflection of the teaching of kindergarten teachers with a focus on the development of the aforesaid literacies. (Uhlířová & Laitochová, 2020) In the text of this paper we will focus only on the issue of developing mathematical pre-literacy through robotic toys in the context of the formulated research questions.

2.1. Research instrument

The method of non-standardised questionnaire survey in combination with an interview was chosen for the research. The questionnaire consisted of 28 items. Attention was paid to 4 areas: Personal prerequisites for the development of the pre-literacy in question (A), Material conditions for the development of the pre-literacy in question (B), Obstacles to the development of the pre-literacy in question (C), Education needs for the development of the pre-literacy in question (D). The data obtained were transferred to MS Excel and processed. Basic descriptive statistics were used.

2.2. Characteristics of the research sample

The MRPLE1 research involved 119 teachers from 72 kindergartens from different parts of the Czech Republic. Kindergartens from cities as well as small villages were represented. The questionnaire survey was anonymous and took place in September and October 2019. Beginning as well as experienced teachers participated in the questionnaire survey. The average length of teaching practice in the group of respondents was 7.8 years.

3. Results

As part of the description of the educational environment, we were interested in whether teachers had suitable material conditions for developing mathematical pre-literacy in the kindergarten environment. Questions Q10 to Q15 dealt with material conditions. Overall, it can be stated that teachers are satisfied with their material conditions and that didactic aids are continuously provided to kindergartens. (Uhlířová, Laitochová, 2020). Based on personal interviews with teachers, the problem is not a lack of didactic aids. Rather, teachers do not know how to use the tools effectively to develop mathematical pre-literacy. They lack specific methodological suggestions. At the same time, there is such a wide range of educational materials on the market that it is very difficult to navigate. Questions Q13 to Q15 dealt exclusively with robotic toys.

Q13. Do you have robotic toys in your kindergarten? If you do, please specify which ones.

Q14. Do you use robotic toys to develop mathematical pre-literacy? If you do, please specify how.

Q15. Would you welcome methodological support on how to work with robotic toys?

Only 8 (i.e. 6.7 %) teachers reported having robotic toys in their kindergarten. In all cases it was Bee Bot (BB). 18 respondents reported having interactive whiteboards or children's tablets. However, these are not included in the category of robotic toys. Some of the responses to question 14 are as follows: *counting, route finding, reasoning, orientation in space*. All the respondents who have a BB in their kindergarten said they would be interested in methodological support on how to work with robotic toys (Q15). We were pleased that a total of 81 respondents (i.e. 68.07 %) had answered question 15 in the affirmative. The responses suggest that teachers are interested in new possibilities. The low availability of robotic toys may be due to a lack of teacher awareness of new tools. Based on the information gathered, we created a set of methodological suggestions for developing mathematical pre-literacy through activities with BB. The suggestions were tested in the practice of the kindergarten in the form of a pedagogical experiment. The experiment lasted 5 days and involved 11 children aged 4-7 years. Figure 1 shows the implementation of the experiment, specifically the Maze activity.

Figure 1. Performing the Maze activity.



The children were very interested in all the activities tested. It was possible to observe a gradual improvement in the children's personal performances. Some of the children preferred to work individually on their own, while others turned to the teacher for help and sought the right solution with the support of the teacher's authority. Overall, it can be concluded that the performance of all the children improved significantly over the course of the experiment. The children liked the bee and demanded repetition of the activities. The researchers registered the need for age appropriateness of the tasks. For the youngest respondent (boy, 4 years old), some of the activities were beyond his abilities. On the part of the researchers, the difficulty of the tasks was reduced so that the disappointment of failure did not outweigh the motivational emphasis of working with the robotic toy. It is important that the teacher prioritises an individual approach to children and respects their learning needs and interests.

4. Conclusions

The issue of robotic toys in the context of developing mathematical pre-literacy is still fresh. We are convinced that it makes sense to include activities with robotic toys in preschool education. However, teachers lack sufficient methodological support in practice. Based on this conviction, the issue of robotic toys and mathematical pre-literacy has been included in the curriculum of undergraduate education of kindergarten teachers at Palacký University Olomouc.

Acknowledgements

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References

- Palečková, J., & Tomášek, V. (2005) *Učení pro zítřek (Learning for Tomorrow): results of the research of OECD PISA 2003*. Prague: Institute for Information on Education.
- Uhlířová M., & Cibáková D. (2019) Mathematical pre-literacy from the point of view of pre-primary-school teachers. In Chova LG., Martínez AL., Torres IC. (Eds.) *EDULEARN19 Proceedings*. [CD] (pp. 2340-1117). Valencia: IATED.
- Uhlířová M., & Laitochová J. (2020) Kindergarten Teacher's Reflection about the Development of Children's Mathematical Pre-Literacy. In Chova LG., Martínez AL., Torres IC. (Eds.) *INTED2020 Proceedings*. [CD] (pp. 3632-3638). Valencia: IATED.

CREATIVE WRITING IN CONTEXT OF UNIVERSITIES

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Abstract

We present an old process developed more than a hundred years ago at American universities. It means professional, journalistic and academic forms of writing. It also includes poetry and narrative forms. Creative writing has always been at the heart of university education. Today, there are more than 500 bachelor's degree programs and 250 master's degree programs in this subject in the United States. In other fields of study, it is mandatory to enrol in this subject.

After World War II, it came to Europe, first to England and later to Germany. Here, "... since the 'Sturm und Drang' (1770-1789) of the early Goethe period, the autodidactic poetics of the cult of genius prevailed. The teachability of creative writing has been disputed ever since and its dissemination has therefore always had a hard time in Germany" [von Werder 2000:99]. It is rarely found in the curricula of German universities. At the Dresden University of Applied Sciences, we have been practicing it for five years with great response from social work students. They learn different methods: professional writing for partners and administration, poetic writing for children's or adult groups, scientific language for their final thesis and later publications.

Although we offer it as an elective, more than 80% of students choose it. Final papers are also written on these creative topics or using the methods learned. "Writing forces economy and precision. What swirls chaotically around in our heads at the same time has to be ordered into succession when writing" [Bütow in Tieger 2000:9].

The winners of this training are not only our former students! Children in after-school programs and youth clubs improve their writing skills through play. Patients in hospitals work on their biographies. People who only write on the computer discover slow and meaningful writing, activating their emotional system.

Therefore, this paper will show how clients benefit from creative writing skills of their social workers and what gain other disciplines can expect as well.

Keywords: *Methods and target groups of creative writing, experiences.*

1. Methods

For Creative Writing we use two groups of methods. One is the classical writing games, some of which are thousands of years old and help to think and organise thoughts in a literary way. The other are methods that do not belong to the classical canon of creative writing, but are important for future social workers. Basically these are:

1. individual or group writing with feedback, first of the group and second of the group leader on how the texts have been understood (reflection)
2. methods related to studies and university requirements (e.g. the Bachelor's thesis to be written) and methods for fun
3. methods related to the student's own person as well as to the future clientele
4. historical and modern writing tasks.

The tasks that do not belong to the classical canon of creative writing are:

1. learning the rules of "easy language" for people with learning disabilities or illnesses that make written communication difficult for them
2. dealing with official language
3. writing for websites, conceptions or preambles.

Examples of the methods mentioned are:

1. Writing can take place with individuals in the guidance of children in need, near illiterate adults and in therapeutic contexts. Writing groups take place in social group work with children or young people at school and in leisure groups. Writing can be done with adults and elderly at any time, e.g. as "literary socialising" [Mattenklott 1979]. Exercises for this are autobiographical writing using acrostics, snowballs, haikus, an ABC-darium, anagrams, group poems or poetry competitions [von Werder 2000:38]. Everything is possible, from the simplest letter game for writing beginners to complex texts.
In the reflection, all texts created are read aloud and discussed sympathetically by the group. This triggers a strong self-reflection process in the writers. Immediately after writing, they experience - which is not granted to poets - how their texts are understood: Do the listeners really get what I wanted to tell them? Are my linguistic possibilities sufficient to present a fact? Is the relationship between self-presentation and factual content right?
2. Discs for study can, on the one hand, strive to liquefy language: thanks to the culture of short writing in the media, young people have become accustomed to only making lists instead of coherent texts. WhatsApp and shopping lists often lack coherence. Methods such as "automatic writing", making excerpts, rewriting the beginnings of texts and embedding quotations are possibilities.
The counterpart, i.e. writing short texts that do not have a superficial meaning ("I only write when I have to do"), but train the writing itself, are e.g. limericks or lipograms (texts in which letters are omitted).
3. Writing on the topic of "illness and health" can be both for oneself and for the work with clients. Many different methods are possible, not only autobiographical ones. Culturally, illnesses and disabilities are taboo. Writing about them is breaking a taboo. In these texts, subsequent reflection is particularly important.
4. Historical writing tasks can cause a change of perspective in addition to the pleasure of writing. A different use of words and different weightings - slow poetic writing with the hand instead of everyday goal-oriented and factual writing play a role here. Figure poems, magical or concrete poetry are possible [Lodge 1993:166].
5. Nothing is more difficult than "easy language". It follows a set of rules like everyday language, but this is still little known in Germany. No sentence may have more than 5-7 words, commas, abbreviations, passive constructions and metaphors must be avoided. This language is often criticised by writers and journalists as impoverishment and adulteration, because it is highly simplified with a small vocabulary. Synonyms, that make our languages come alive are avoided. Nevertheless, this form of written language helps people with disabilities to understand contexts or laws.
6. For about twenty-five years, people in the social field have been trying to adapt the historically evolved language to the requirements of modern times. The point is that women and men are mentioned, that people with disabilities, people of other religions or other preferences of living together are not spoken of in derogatory vocabulary [Pusch 1999:14]. A correct expression that does not come across as silly, awkward or official is often not easy to find [Müller; Fuchs 1993:21]. This, too, can become a task for creative writing. There are no ready-made exercises for this in German yet.
7. The language of the German authorities has become easier in recent years, but still poses a challenge for many sections of the population. Future social pedagogues need to know this language in order to be able to help their clients. If we encourage people from educationally disadvantaged backgrounds to study, the more necessary it is to introduce them to the official language and to make it people-, women- and career-friendly [Müller; Fuchs 1993:146].
8. Development reports for children and young people, association statutes, preambles and conceptions – according to the current needs of the group – are developed with the students. Often new projects are started in social projects with the recruitment of new staff and advertised on websites. Social work rarely has helpers in public relations – this has to be done by the employees themselves.

References

- Bütow, T. (2000). "The new writing scene" in Tieger, Gerhild (Hg.) "Learning creative writing at universities, institutes, literature offices, adult education centres and writing schools in Germany, Austria and Switzerland". Berlin, Germany: Autorenhaus-Publisher Plinke.
- Lodge, D. (1998). "The Art of Fiction". Munich, Germany: Heyne TB Publishers.
- Mattenklott, G. (1979). "Literary Sociability – Writing in School. With texts by young people and suggestions for the classroom". Stuttgart, Germany: Metzler-Publishers.
- Müller, S., Fuchs, C. (1993). "Handbook on non-sexist language use in public texts". Frankfurt/M., Germany: Fischer-Publishers.
- Pusch, L. F. (1999). "The woman is not worth talking about". Frankfurt/M., Germany Suhrkamp- Publishers.
- Von Werder, L. (2000). "Introduction to Creative Writing". Milow, Germany: Schibri-Publishers.

SCHOOL MATHEMATICS AND DIGITAL LITERACY

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Abstract

In this article, we focus on the intended development of digital literacy of pupils in all schools, which is presented in the Strategy of the Education Policy in the Czech Republic until 2030+, issued by the Ministry of Education, Youth and Sports in the year 2020. The use of information technologies needs to be integrated into the methods and content of various subjects. From this point of view, we consider the training of future mathematics teachers. How to use digital technology in teaching mathematics?

We deal with a questionnaire survey conducted among students of mathematics teaching at the Faculty of Education, Palacký University in Olomouc in 2021. The objectives of the research were to determine the current readiness of future mathematics teachers to use digital technologies, their awareness of the benefits of digital technology in mathematics in teaching, their view on appropriate use of digital technologies in teaching and their attitude to mastering the basics of programming and the subsequent use of this skill in teaching mathematics. We analyze and process the data obtained from the questionnaire using standard statistical methods.

These findings are very beneficial for 21st century teacher educators. The ability to properly use digital technologies in teaching mathematics has an undeniable pedagogical benefit for the education of a new generation of students. The results of the survey show that students, who are mostly 19 to 21 years old, are acutely aware of the importance of digital technologies today.

Keywords: Mathematics teachers, digital literacy, pedagogical contribution, questionnaire.

1. Introduction

In this article we are based on the idea of the intended development of digital literacy of pupils of all schools, which is presented in the Strategy of the educational policy of the Czech Republic until 2030+, (Ministry of Education, Youth and Sports, 2020). We address the views of future mathematics teachers on the applications of digital technologies in mathematics teaching at schools and their effectiveness.

2. Methods

The research investigation mentioned in the abstract was performed on students of the Mathematics Teacher program, Faculty of Education, Palacký University in Olomouc, Czech Republic. To become a mathematics teacher in (lower) secondary education in the Czech Republic, a student must complete three years of bachelor study and two years of master study.

A questionnaire was created, which was distributed online in the spring of 2021 among bachelor students of the Mathematics Teacher program. Many of our students took part in the survey, a total of 60 students (40 first-year and 24 second-year students). A four-point Likert scale was used for the processed data.

3. Results

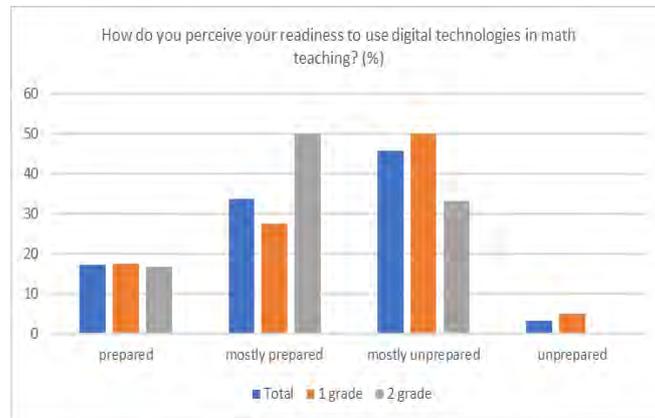
We will list the individual items of the questionnaire and the results obtained.

3.1. How do you perceive your readiness to use digital technologies in mathematics teaching?

In the first half of the bachelor's study, only 34 respondents (53.1%) feel ready for the use of digital technologies in teaching and 30 respondents (46.9%) feel unprepared. Of these, 11 respondents (17.2%) feel fully prepared, 23 respondents (35.9%) feel rather prepared, and 28 respondents (43.8%) feel

rather unprepared, and 2 respondents (3.1%) feel completely prepared. not ready. Given that students still have half of their bachelor's studies and then two more years of master's studies, we can consider the result quite satisfactory. Now let's look at what students expect from further higher education in this regard. For more information for students in total and separately in the first and second year of bachelor's study, see *Figure 1*.

Figure 1. Students' readiness to use digital technologies in mathematics teaching in total and separately in the first and second year of bachelor's study.



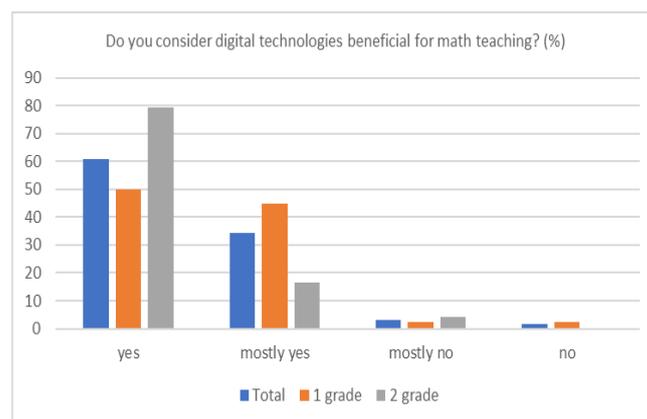
3.2. Do you expect to be sufficiently prepared after graduating from mathematics teaching?

Students' expectations are quite high, 60 respondents (93.8%) expect to be sufficiently prepared for teaching mathematics using DG, of which 19 (27.9%) answer yes and 41 (64%) rather yes. Furthermore, 3 respondents (4.7%) answer rather no and only 1 (1.6%) do not answer at all.

3.3. Do you consider digital technologies beneficial for mathematics teaching?

In the answers to the question about the contribution of DG for mathematics teaching, most positive answers predominate, namely a total of 61 (95.3%), 39 respondents (60.9%) are fully convinced, 22 respondents (34.4%) answer more yes. The answer does not appear in 2 respondents (3.1%) and not only in 1 respondent (1.6%). For more information for students in total and separately in the first and second year of bachelor's study, see *Figure 2*.

Figure 2. Students' opinion (in total and separately in the first and second year of bachelor's study) on the benefits of digital technologies for mathematics teaching.



3.4. How can you use digital technology in teaching math? Specify some ideas

Students most often state use for plotting functions and various graphs: 28 answers, facilitating calculations and practicing the curriculum: 27 answers, greater clarity of interpretation: 21 answers, suitability for teaching geometry and drawing: 18 answers, more fun math: 4 answers.

3.5. Is it beneficial for a math teacher to be able to program and use this skill occasionally during math teaching (primary or secondary school)?

We receive quite surprisingly many positive answers to this question, from 56 respondents (87.5%), of which 24 (37.5%) agree completely and 32 (50%) tend to agree. Furthermore, 4 respondents (6.3%) tend to disagree and so did 4 respondents (6.3%) disagree at all.

3.6. Can you write a simple program in some programming language?

10 respondents (15.6%) can write a simple program in a programming language. These are mainly the following Python programming languages (6 respondents), some version of the C language (4 respondents), then Visual Basic (1 respondent). However, it is interesting that out of 54 respondents (84.4% of the total number) who do not know any programming language, even 43 students (80%) are interested in learning some programming language.

3.7. Indicate what mathematical software can you use? (Excel, Wolfram Cloud, etc.)

All students (except one) stated that they can use at least one, but usually two or more, of the following supporting software in mathematics. Most often EXCEL (28 replies), Wolfram Cloud (17), GeoGebra (10) Wolfram Alpha (8), Maple (1), Mathematica (1).

4. Conclusions

Due to the interest of future mathematics teachers to know the basics of programming (see 3.6.), we offer students an optional course Programming for Mathematics Teachers. The aim of the course is to develop algorithmic thinking and give students insight about how a computer program is created and how it functions.

A research survey of students preparing for the profession of lower secondary mathematics teacher shows that students understand the challenge of today's introduction of digital technologies into practice, including education. In addition to developing mathematical literacy, they are also interested in digital literacy and their interconnections. It is possible to teach mathematics without digital technologies, but nowadays there is no justification for that. It is necessary to find a suitable application of digital technologies in teaching mathematics.

Universities preparing prospective teachers must also prepare for this situation. The mentioned research survey is the starting point for our Mathematics Department for projects that integrate digital technologies into teaching in all types of schools in a suitable and non-violent way. Nowadays, when even simple applications are available that allow complex symbolic calculations, there is still a lot of (unnecessary) effort in schools in mechanical calculations, so for teaching mathematics there is no time left (Wolfram, 2020). One of the projects focuses on Computer-Based Mathematics teaching and aims to create sample notebooks in the Wolfram Cloud program for teaching mathematics of children aged 11 to 15. Our other projects also focus on developing mathematical literacy, often with the support of digital technologies.

Acknowledgements

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References

- Ministry of Education, Youth and Sports. (2020) *Strategie vzdělávací politiky v České republice do roku 2030+*. Retrieved from https://www.edu.cz/wp-content/uploads/2020/10/brozura_S2030_19_10_2020.pdf.
- Wolfram C. (2020) *The Math(s) Fix: An Education Blueprint for the AI Age*. Champaign, IL: Wolfram Media, Incorporated.

SLOVAK UNIVERSITY STUDENTS' HEALTH IN THE CONTEXT OF TRAIT EMOTIONAL INTELLIGENCE

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Abstract

The study theoretically and empirically analyzes trait emotional intelligence (EI) potential in the context of health (health domains and attitude by WHO and BMI index) by self-report tools: trait EI (global level, factors: well-being, self-control, emotionality, sociability) by TEIQue-ASF (Petrides, 2009) and health domains (physical health, psychological health, social relations, environment) and general health attitude by WHOQOL-BREF (WHO, 1996) and BMI index of future teachers as potential educational leaders in Slovakia (N=107, $M_{age}=22.3$, $/SD=2.9$; 83% of females). Statistically significant positive moderate to strong relations between trait EI (and its factors) and health domains and global health attitude were proved (up to 40% of global health is predicted by trait EI). While BMI was neither in relation with trait EI nor health. There were significant differences between overweight and healthy weight in health domains and attitude in favor to healthy weight ones. The study emphasizes the importance of socio-emotional learning of educational emotionally intelligent leaders. The study is a part of a research project "Psychological Approach to Creation, Implementation, and Verification of Educational Leader's Competence Model Development (APVV-17-0557)".

Keywords: *Trait emotional intelligence, health, BMI, socio-emotional learning, educational leaders.*

1. Introduction

In the current post-pandemic period, it is more important than ever to care, support and promote an individual's health, physical and mental, at all levels of schools, not excluding universities. Social, emotional and mental health difficulties at schools have changed also the role of an educational leader. The mental health and wellbeing at schools become a priority for leaders. The attention is drawn to understanding others, understanding factors affecting health, developing strategies for health to be cared, developed, and managed at schools. Only a healthy leader at school can mobilize and influence others, for the purpose of addressing and reaching common school aims guiding a healthy individual into this world as „*healthy citizens are the greatest asset any country can have*“ (W. S. Churchill).

Health is explained as a state of complete physical, mental and social well-being, not only as a lack of illness or weakness (WHO, 2018, 2019, 2020). Data from Slovak official studies indicate that between 2009 and 2019, there is mental disorder increase up to 42.8% (NCZISK, 2021); especially up to 72% in the emerging adulthood period following pandemic period (Hajduk, 2021). A lot of experts agree one of the protective factors to prevent or mitigate the impact of emotional disorders, is emotional intelligence (EI) (Gebregergis et al., 2020; Biolik-Moron, 2021), EI as an ability (Martins et al., 2010) and EI as a personality trait (Petrides, 2009, Schutte et al., 2007). The research aim was to explore trait EI in the context of health explained by WHO of university students, future teachers at schools. In line with the mentioned research results, we stated a research hypothesis and question.

RH1: *We presuppose there is positive relation between trait EI, health and BMI of university students.*

RQ1: *Is there a significant difference between underweight, healthy weight vs. overweight ones and trait EI and attitudes to health?*

2. Method

2.1. Research sample

The research sample consisted of 107 university students, future teachers of various subjects (average age: 22.3 $/SD=2.9$; 83% of females) from three universities in Slovakia preparing future teachers. All the participants signed informed consent, and were participating in the research voluntarily.

2.2. Method

Two self-report measures and BMI calculation were used.

WHOQOL-BREF quality of life inventory (1996) developed by WHO to determine the health domains and health attitude. We used a shorten form from WHOQOL-100. It measures life quality via four domains (physical health, mental health, relationships, environment). It contains of 26 questions scaled on a 5-point Likert scale (1-strongly disagree to 5-strongly agree), a higher rating indicates a higher level of health.

Trait EI was assessed by the short Slovak version of the Trait Emotional Intelligence Questionnaire-Adolescent's Short Form (TEIQue-ASF, Kaliská, Heinzová & Nábělková, 2019) created by Petrides (2009). The instrument consists of 30 items scaled by a 7-point Likert scale (1-completely disagree to 7-completely agree), a higher rating indicates a higher level of trait EI.

Body mass index (BMI) as a measure of body fat based on height and weight.

3. Results

According to the descriptive indicators the data were normally distributed. Descriptive indicators indicate the global trait EI level (AM=5.08) of this research sample is reaching the 61st percentile according to the Slovak percentile norms for the Arising Adulthood period of a norm sample (N=1264; AM_{age}=21.2; /SD=.7/, Kaliská, Heinzová, & Nábělková, 2019, p. 78). The BMI index refers to normal or healthy weight (18.5-24.9). All of the observed inner consistencies of the instruments estimated by Cronbach's alpha coefficients reached acceptable values (TEIQue: $\alpha=.897$; WHOQOL-BREF: $\alpha=.854$).

We were interested in RH1: *We presuppose there is positive relation between trait EI, health and BMI of university students* and the results are presented in Table 1.

Table 1. Correlation analysis of the variables.

		2	3	4	5	6	7	8	9	10	11 BMI
TEIQue-SF	1 Well-being	.52 ***	.62 ***	.27 **	.79 ***	.43 ***	.68 ***	.34 ***	.46 ***	.61 ***	-.00
	2 Self-control		.46 ***	.46 ***	.76 ***	.39 ***	.51 ***	.31 **	.32 ***	.46 ***	.07
	3 Emotionality			.42 ***	.83 ***	.41 ***	.45 ***	.38 ***	.46 ***	.54 ***	-.04
	4 Sociability				.63 ***	.15	.27 **	.23 *	.14	.22 *	.15
	5 Global trait EI					.46 ***	.61 ***	.41 ***	.46 ***	.59 ***	.05
WHOQOL-BREF	6 Physical health						.57 ***	.32 **	.57 ***	.82 ***	-.12
	7 Psychological health							.40 ***	.43 ***	.77 ***	-.10
	8 Social relations								.48 ***	.61 ***	-.18
	9 Environment									.82 ***	-.02
	10 Global health										-.12

* $p < .05$, ** $p < .01$, *** $p < .001$;

All the factors and global trait EI is significantly moderately to strongly related to all health domains and global health attitude. BMI index is neither related significantly to trait EI nor to health domains. The regression analysis between global level of trait EI and global health attitude estimated up to 40% of global health attitude prediction by global level of trait EI ($F(1,134)=65.42, p \leq .001$).

Then we asked RQ1: *Is there a significant difference between underweight, healthy weight vs. overweight ones and trait EI and health domains and attitude?* The results are presented in Table 2.

We decided to analyze trait EI and health domain differences according to a student's weight only for female group as there was only 17% of males. There were no differences in these three groups in trait EI ($F(2,85)=.325, p=.723$). The only significant differences in health domains and global health attitude with a large effect size were between healthy and overweight females in favor to healthy weight ones.

Table 2. Health domain and health attitude differences between underweight, healthy weight and overweight (BMI index) of the research sample.

Females (N=89)		BMI ≤18.5 Underweight (N=12)	18.6 ≤ BMI ≤ 24.90 Healthy weight (N=58)	BMI ≥ 24.93 Overweight (N=19)	p (between groups)	Healthy vs. Overweight	Hedge's g index
WHOQOL-BREF	Physical health	M=3.77	M=4.14	M=3.42	.004	.001	1.08
		SD=.65	SD=.56	SD=.92			
	Psychological health	M=3.73	M=3.96	M=3.07	.000	.000	1.31
		SD=.22	SD=.51	SD=1.05			
	Social relations	M=3.93	M=4.00	M=3.28	.013	.003	1.03
		SD=1.12	SD=.64	SD=.86			
	Environment	M=3.85	M=3.97	M=3.47	.042	.012	.80
		SD=.19	SD=.58	SD=.74			
	Global health attitude	M=3.80	M=4.02	M=3.33	.000	.000	1.29
		SD=.28	SD=.41	SD=.81			

4. Conclusions

Analysis of the relations between trait EI and health support our expectations as a higher level of trait EI presupposes (up to 40%) a better attitude to health, and individual's life health quality. According to trait EI, we can state if an individual can control, regulate, manage emotion of his/her own and of the others, s/he can live a better healthy life. Another importance is there are significant differences between those who are overweight and healthy weight, as the healthy weight ones score higher in all health aspects.

Efforts to improve mental and physical health resulted in the establishment of the Mental Health Council by Ministry of Health in Slovakia (2021), and these efforts need to be coordinated by the Ministry of Education in Slovakia as well. WHO (2018, 2020) also emphasizes as a top priority the focus on an individual's socio-emotional health via supporting socio-emotional learning. This creates a baseline for educational prevention programs.

We are aware also of several limitations of our research, e.g., choice of university students; the specific research sample does not allow to generalize the results to other subject groups; usage of self-report instruments may be influenced by the desirability effect, and the study design itself.

A school needs a healthy emotionally intelligent educational leader who will be at his/her best when making important decisions affecting other people's lives and the power and organizational health as such. *Your health is what you make of it. Everything you do and think either adds to the vitality, energy and spirit you possess or takes away from it.* (A. Wigmore)

References

- Biolik-Moron, M. (2021). Trait emotional intelligence and emotional experiences during the COVID-19 pandemic outbreak in Poland. In *Personality and Individual Differences*, 168 (110348), doi.org/10.1016/j.paid.2020.110348
- Gebregergis, W.T., et al. (2020). The impact of emotional intelligence on depression among international students studying in China: The mediating effect of acculturative stress. In *International Journal of Intercultural Relations*, 79 (12), 82-93. doi: https://doi.org/10.1016/j.ijintrel.2020.08.008
- Hajdúk, M. (2021). *Ako vplyva pandémie na naše psychické zdravie?* Tlačová konferencia UK.
- Kaliská, L., Heinzová, Z., & Nábělková, E. (2019). *Trait Emotional Intelligence Questionnaire TEIQue-SF/TEIQue-CSF: Revised manual to short forms*. Belianum.
- Martins, A., Ramalho, N., & Morin, E. (2010). A comprehensive meta-analysis of relationship between Emotional Intelligence and health. In *Personal and Individual Differences*. 49(2010), 554-564.
- NCZISK (2021). *Psychiatrická starostlivosť v SR 2020*. Bratislava: NCZISK
- Petrides, K. V. (2009). *Trait Emotional Intelligence Questionnaire (TEIQue)*. Technical Manual. London: London Psychometric Laboratory.
- Schutte, N. S., Malouff, J. M., Thorsteinsson, E. B., Bhullar, N., & Rooke, S. E. (2007). A meta-analytic investigation of the relationship between emotional intelligence and health. In *Personality and Individual Differences*, 42(6), 921-933.
- World Health Organization. (2020). *WHO director-General's opening remarks at the media briefing on COVID-19 - 11 March 2020*. Available from: https://www.who.int/dg/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19%2D%2D11-march-2020
- WHO/MSD/19.1 (2019). *Special initiative for mental health (2019-2023)* Universal Health Coverage for Mental Health.
- World Health Organization (2018). *Mental health atlas 2017* ISBN 978-92-4-151401-9 ©

PSYCHOLOGICAL AND SOCIAL RISKS OF DIGITALIZATION IN ADOLESCENTS

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Abstract

The paper is primarily focused on the psychological and social risks of digitalization in adolescent girls and boys. Recently, we have witnessed an increasing digitalization in adolescents, especially during Covid-19 restrictions. Several factors play a positive and negative role in using digital media in the development process. In this paper, we focus on clarifying key problems from the psychological point of view. The research was based on a qualitative (interview) research design. The sample consisted of 45 adolescents aged between 16- and 23-year-old. It is well known that contemporary adolescents are surrounded by digital media that fulfil entertaining and educational, informational, and social functions. It is essential to have good models during identity-forming, and adolescents are often looking for their models online. Our findings showed fundamental problems of adolescents these days: the FOMO effect (Fear of missing out), feeling of loneliness and cyberbullying. On the other hand, we found a high level of digital literacy, a substitute for face-to-face social interaction by the mobile application during Covid-19 restrictions, and the use of digital devices for relaxation, entertainment, and education.

Keywords: *Adolescents, digitalization, lifestyle, identity.*

1. Introduction

Digitalization is a phenomenon that brings us both benefits and threats. Technological devices have become more accessible to young people. We can see the benefits of easily accessible information, faster decision-making and problem-solving. In this paper, we focus on the positive and negative aspects of digitalization in adolescents. Among the threats, we should mention lower physical activity, higher anxiety, feeling of loneliness, threat of dependence on digital media, and cyberbullying, i.e., a method for bullies using digital media. We see a revolution in usage with the arrival of smartphones on the market, both among children, young people, and adults. It is well known that digital technology affects all generations, but adolescents are more vulnerable because of the identity process.

Adolescence is a period between puberty and adulthood, with a more open-minded, risk-taking, and impulsive behaviour (Hammond et al., 2012). Identity development during adolescence and young adulthood is the topic of many studies or books (Erikson, 1968; Berzonsky & Pappini, 2015). The emphasis is on normative developmental tasks (Erikson, 1968), an effort to formulate meaningful identities in the social context (Ferrer-Wreder & Kroger, 2020). Nowadays, gender, sexuality, digital technology, and social media play a particular role in forming identity when young people are concerned with resolving “issues of intimacy, generativity, and integrity” (Ferrer & Kroger, 2020, p.12). Apprehension about adolescents’ social media and digital technology use is undeniable (e.g., UNICEF, 2017). They are continuously connected for entertainment and communication. They make virtual profiles to try different forms of presentations of themselves (Manago, 2014), which is the phase of identity process creation. On the other hand, we must focus on a very serious problem these days, the FOMO effect (fear of missing out), fear of missing something, and fear of disconnection. It is hazardous in adolescents’ development period. The period of creating their identity when being a part of a social group is significant. To be accepted by their peers on social networking sites such as Instagram or TikTok, and to be informed through instant messengers such as WhatsApp (Dienlin & Johannes, 2020) are crucial. Adolescents’ fear of missing out on what is happening on social sites should be taken seriously.

Digital literacy should be developed since young childhood, all the way through adolescence and adulthood (van Laar et al., 2017). “Digital literacy can be defined as a social practice that involves reading, writing and multimodal meaning-making through a range of digital technologies” (Marsh, 2020, p.21). Despite described issues, the popularity and use of digital technologies by young people will rise. Therefore, it is essential to know not only what types of digital devices adolescents use and how, but also whether they are aware of the perceived threats from digital technologies.

2. Methods

The research was based on a qualitative research design that used semi-structured interviews. There were 45 participants (N=35 girls, N=10 boys) between 16 and 23 years old (AM=19,8 yrs). The interview lasted 45 minutes, was recorded on audiotapes with their written consent, and subsequently transcribed. The interview scenario was divided into four sections: 1/ time spent with digital technologies; 2/ how technologies are used by themselves and with other people (family, friends etc.); 3/ digital-free leisure; and 4/ perceived threats from digital technologies. We used thematic analysis to uncover the main topics which are linked to the construction of adolescents' identities focusing on digital technologies.

3. Results

The findings showed that adolescents' life with technology is grouped into five main topics. 1/ the importance of digital media in adolescents' life; 2/ activities on social networking sites; 3/ online games activities; 4/ offline activities; 5/ threats in the digital environment.

3.1. The importance of digital media in adolescents' life

This topic was dominated by the need to advocate for increased use of digital technologies both **for leisure activities** and for preparation **for school**: “*We are still doing projects and have to look for information on the internet*” (P28). In terms of the number of digital technologies, participants admitted to owning a mobile phone (100%), a tablet (32.5%), a laptop or desktop computer (87%), and a game console (35.2%). Several adolescents admitted that the laptop, tablet, and desktop was purchased during the first wave of Covid-19 when they were forced to take classes from home. The need to use mobile technologies was also rationalised for leisure activities: “*...since we are banned from going out to play sports (government restrictions related to the second wave of Covid-19, authors note), I go for long walks with my dog. I use an app to measure my step count and listen to Spotify's music*” (P31).

3.2. Activities on social networking sites

Research participants spent 7.4 hours in digital technology environments, with the most time spent on social media (4.3 hours) Instagram, TikTok, YouTube. Time spent on social networks was filled with satisfying the need for **fun**: “*it is fun to see the different tricks on TikTok*” (P21), **social contact**: “*...during my covid time, I took videos and photos and put them on Instagram and kept track of how many likes I got*” (P41), and **learning new things**: “*I learned the Spanish language thanks to a YouTube tutorial because I like their culture and food*” (P8).

3.3. Online games activities

Online games activities were in the second place in the use of digital technologies. Adolescents preferred **sports, strategy-oriented, and adventure-oriented games**: “*I have very high score...you know...it is a great feeling if I win against Peter in football*” (P45).

3.4. Offline activities

Offline activities were mainly concentrated on **board games** with siblings, parents and friends: “*I like to play Activities during weekends....it is amusing*” (P12). **Housework** represented other activities without digital technology: “*I helped my mother with cooking and gardening*” (P19). **Manual skills** were practiced both indoors and outdoors: “*My mom taught me to knit. I am very proud of myself*” (P4); “*...my dad and I were making a new shed for Ali, the dog*” (P21).

3.5. Threats in the digital environment

Adolescents consider **cyberbullying** to be the biggest threat in the online world: “*I have experienced abuse and gossips of my person on social networks...I did not tell anyone. I was shamed...*” (P9). However, we have also encountered other problems such as **FOMO**: “*I am afraid of missing something if I switch off my mobile phone...*” (P22), **loneliness**: “*I often feel that I am the only one in the*

world...I do not have any friends” (P33), **insomnia**: “...yes, I sometimes feel that I do not need to sleep...but in the morning, I am exhausted (P41), **anxiety**: “I am afraid that something will happen...you know, the Covid-19 virus is very dangerous...I fear for my grandparents’ lives...you know, they are old and weak...” (P37). There are fully aware of threats in the digital environment and the need to be protected: “I do not communicate with strangers, I think about what information can be on my social profile...” (P44).

4. Conclusions

Digitalization is having a significant impact on everyone's life. Therefore, it is important to take a closer look at how it affects the lives of adolescent youth, especially during the Covid-19 pandemic. The time that, among other things, has caused an increase in the use of digital technologies (online learning from home) among adolescents. Therefore, our research aim was to find out what and how adolescents use digital devices if they are aware of the perceived threats from digital technologies. The results pointed out five key categories/topics associated with digital technologies: 1/ the importance of digital media in adolescents' life; 2/ activities on social networking sites; 3/ online games activities; 4/ offline activities; 5/ threats in the digital environment. The first topic, “the importance of digital media in adolescents' life”, is used mainly for leisure activities and duties and linked with school. The second topic, “activities on social networking sites”, uncovered the need to connect with friends and present themselves through online networking sites. They also have much fun with digital technologies and preferred online games primarily oriented toward sport, adventure, and strategy, which was contained in the third topic, “online games activities”. The fourth topic, “offline activities” concerned housework, board games, and manual skills. The fifth topic, “threats in the digital environment”, expressed awareness of the digital space threats such as cyberbullying, FOMO (fear of missing out), loneliness, insomnia, and anxiety. On the other hand, digital literacy was high, although the participants were aware of their reserves and wanted more practical teaching based on experiential learning.

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References

- Berzonsky, M.D., & Papini, D.R. (2015). Cognitive reasoning, identity components, and identity processing styles. *Identity: An International Journal of Theory and Research*, 15, 74–88.
- Dienlin, T., & Johannes, N. (2020). The impact of digital technology use on adolescent well-being. *Dialogues in Clinical Neuroscience*, 22(2), 135–142.
- Erikson, E.H. (1968). *Identity, Youth and crisis*. New York: W. W. Norton Company.
- Ferrer-Wreder, L., & Kroger, J. (2020). *Identity in Adolescence: The Balance between Self and Other*. 4e, NY: Routledge.
- Hammond, C. J, Potenza M.N, & Mayes L.C. (2012). Development of impulse control, inhibition, and self-regulatory behaviors in normative populations across the lifespan. (In J.E. Grant, M.N. Potenza (Eds.), *The Oxford Handbook of Impulse Control Disorders*. (pp. 232–244). Oxford: Oxford University Press.
- Manago, A. M. (2014). Identity development in the digital age: The case of social networking sites. In K. C. McLean, & M. Syed (Eds.), *The Oxford Handbook of Identity Development* (pp. 1–33). New York: Oxford University Press.
- Marsh, J. (2020). Researching the digital literacy and multimodal practices of young children: a European agenda for change. In. Ostad, O. et al. (Eds). *The Routledge Handbook of Digital Literacies in Early Childhood*. NY: Routledge
- UNICEF (2017). *Children in a digital world: The state of the world’s children 2017*. New York: UNICEF Division of Communication.
- van Laar, E., van Deursen, A. J. A. M., van Dijk, J. A. G. M., & de Haan, J. (2017). The relation between 21st-century skills and digital skills: a systematic literature review. *Computers in Human Behavior*, 72, 577–588.

NOMOPHOBIA AND PRIMARY SCHOOL CHILDREN'S EMOTIONAL AND PERSONAL FACTORS

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Abstract

Nomophobia as a new form of phobia is becoming a very serious topic threatening the ones responsible for education and upbringing of a new generation. The aim of our research was to find out whether nomophobia (assessed by Nomophobia questionnaire, NMP-Q, Yildirim & Correia, 2015) differs in the context of gender ($N=110$, $M_{age}=14,51$; $SD=.501$, 53.6% of girls) and is related to emotional aspects, i.e. trait emotional intelligence (EI, Trait Emotional Intelligence Questionnaire-Adolescent's Short Form, TEIQue-ASF, Petrides, 2009), self-esteem (Rosenberg's Self-esteem Scale, RSS, Rosenberg, 1965) and trait anxiety (Spielberger's Trait Anxiety Inventory, STAI, Spielberger, Gorsuch, & Lushene, 1983). The analysis has proved statistically significant gender differences in nomophobia in favor to boys ($p=.000$), significant negative relations with trait EI and trait anxiety, and significant positive relation with self-esteem. The study discusses the importance of social-emotional education as a form of nomophobia addiction prevention. The study presents the partial results of KEGA 028UMB-4/2021 and KEGA 039UMB-4/2021 projects.

Keywords: *Nomophobia, trait emotional intelligence, self-esteem, trait anxiety, socio-emotional learning.*

1. Introduction

Current data indicate an increasing tendency in youngster's emotional disorders. Their mental health has deteriorated significantly as a result of the global COVID-19 pandemic. Current research proves a two-fold increase in their incidence compared to the previous period (Watson et al., 2021). The study offers an empirical analysis of the modern addiction phenomenon, namely nomophobia ("no", "mobile", "phobia") in the context of mental health factors. An increase in youngsters suffering from nomophobia (Qutishat et al., 2020) is characterized by fear of a functioning mobile phone unavailability access. Phone and internet addiction are associated with anxiety, depression, low self-esteem, and loneliness (Kara et al., 2019). Results from Oxford University (Przybylsky et al., 2017) show that the time young people spend with their mobiles increases their well-being. Nomophobia has not been searched sufficiently (Rodríguez Garcia et al., 2020) and has become a public health issue. However, an effective and efficient way to prevent any addictions is one of the fundamental educational goals in the 21st century. Based on the studies (Yalcin et al., 2022) revealing the susceptibility of individuals with low emotional intelligence (EI) to addictions, we predicted a potential of EI as a form of prevention. We formulated a research aim to search primary school pupils' nomophobia level in relation to their trait EI, self-esteem, and trait anxiety. In line with the research results mentioned above, we questioned and hypothesized the following.

RQ1: *Is there a gender difference in the level of nomophobia (assessed by the NMP-Q questionnaire)?*

Firstly, (H1) *individuals with higher trait EI would display lower levels of nomophobia.*

Secondly, (H2) *individuals with higher level of self-esteem would display lower levels of nomophobia.*

And, (H3) *individuals with higher level of trait anxiety would display higher levels of nomophobia.*

2. Method

2.1. Research sample

The research sample consisted of 110 pupils (average age: 14.51 / $SD=.50$ /; 54% of females) of primary schools in their last two years as we assumed that they had owned mobiles for several years. One of the questions was about mobile possession and the number of years they have owned a mobile. Each

participant has a mobile at least for 2 years. The research sample was obtained by targeted sampling as a part of preventive activity realized at schools to talk about modern technologies. The parental approval in a form of informed consent was signed two weeks before assessment.

2.2. Method

We used four self-report measures.

Nomophobia Questionnaire (NMP-Q, Yildirim & Correi, 2015). The questionnaire consists of 20-items scaled by 7-point Lickert scale, assessing a global level of nomophobia, a higher rating indicates a higher level of nomophobia. Reliability estimate in the sense of inner consistency was $\alpha=.87$.

Trait EI was assessed by the short Slovak version of the Trait Emotional Intelligence Questionnaire-Adolescent's Short Form (TEIQue-ASF, Kaliská, Heinzová, & Nábělková, 2019) created by Petrides (2009). The instrument consists of 30 items answered by a 7-point Likert scale (1-completely disagree to 7-completely agree), a higher rating indicates a higher level of trait EI. Reliability was .88.

Rosenberg's Self-esteem Scale (RSS, Rosenberg, 1965) was used to assess the self-esteem level. Reliability estimate in the sense of inner consistency was .749.

The State-Trait Anxiety Inventory was used to measure trait anxiety (STAI, adapted in Slovakia by Muller et al., 1980). Reliability estimate was .874.

All used tools reached highly acceptable values of Cronbach's alpha coefficients. After testing the normal distribution for further data analysis, apart from descriptive statistics, Student's t-test and Pearson's correlation analyses were run to estimate the differences and relations of nomophobia to other variables.

3. Results

The statistical analysis of gender differences in nomophobia level is presented in Table 1.

Table 1. Gender Difference in Nomophobia.

	Females (N=59)	Males (N=51)	t	p	d
Min	32.00	35.00	4.079	.000	.78
Max	124.00	117.00			
AM	84.34	69.14			
SD	19.10	19.82			
Med	84.00	65.00			
Skewness	-.027	.288			
Kurtosis	-.147	-.716			

t – Student's t-test value, p – statistical significance, d- Cohen's d effect size

As the data were normally distributed, we used Student's t-test analysis to find out the differences between girls and boys in the level of nomophobia. A statistically significant difference with a large effect size in favor of boys who reached lower levels of nomophobia was proved.

Our next three research hypotheses were based on searching the relations between nomophobia and trait EI, self-esteem and trait anxiety. Trait EI was taken as a personality trait related to an individual's emotionality, and also trait anxiety was analyzed as a personality factor. The results are presented in Table 2.

Table 2. Relations between Nomophobia and Trait EI, Trait Anxiety and Self-esteem.

Nomophobia	N=110	Trait EI	Trait Anxiety	Self-esteem
	Total sample (N=110)	-.289**	.354***	-.255*
	Girls (N=59)	-.318**	.334**	-.239
	Boys (N=51)	-.184	.088	-.073

* $p < .05$, ** $p < .01$, *** $p < .001$;

We can state nomophobia is significantly weakly related to trait EI and self-esteem and significantly moderately related to trait anxiety only for girls. These results also support the construct validity of nomophobia, especially its convergent aspect to trait anxiety and discriminant aspect to trait EI and self-esteem for the girls. There were no significant relations for a boy's group.

4. Conclusions

We have proved a statistically significant gender difference in nomophobia. As Daei et al. (2019) confirm more frequent symptoms of nomophobia for females. Nomophobia determines an individual's (especially female's) personal, emotional and social life and self-perception possibly endangering their

mental health. Our presumption of trait EI lower level related to any addiction, in our case to nomophobia, was also supported only for girl's sample. The same results were obtained with different research samples (e.g., university females in Yalcin et al., 2022).

Wahyuningtyas et al. (2020) found students' lower self-esteem related to nomophobia symptoms as supported by our results for girls. Nomophobia as another form of addiction has a negative effect on self-image, as girls are more sensitive. Low youngster's self-esteem is triggered by social medias. Low self-esteem causes feelings of inferiority and lack of self-confidence. If an individual does not have self-esteem, she (but also, he) can become more vulnerable to addiction. This leads us to further analysis of significant relation between nomophobia and trait anxiety as proved by Veerapu et al. (2019). Frequent use of phones leads to pathological addiction, depression symptoms, e.g., fear and anxiety possibly leading into trait anxiety. It determines also other mental disorders that need to be studied further on.

There are several limitations of our research, e.g., choice of primary school pupils; the specific research sample does not allow to generalize the results to other subject groups; usage of self-report instruments may be influenced by the desirability effect, and the study design itself.

The results of our research presuppose nomophobia as a modern technological threat can contribute to mental disorder increase creating a precondition for other addictions. Our primary role as teachers is to support youngster's mental health. One possible solution is to implement the 4Cs of the Philosophy for Children concept, where via development of four competences (critical and creative thinking and caring and cooperative competences) using socio-emotional learning and counselling from professionals helps to overcome negative emotions, prevents also other addictions as „FOMO“ (Fear Of Missing Out) or „FOBO“ (Fear Of Being Offline).

References

- Daei, A., Ashrafi-Rizi, H., & Soleymani, M. (2019). Nomophobia and health hazards: Smartphone use and addiction among university students. In *Int J Prev Med.* 2019, 10: 202. doi: 10.4103/ijpvm.IJPVM_184_19
- Kaliská, L., Heinzová, Z., & Nábělková, E. (2019). *Trait Emotional Intelligence Questionnaire TEIQue-SF/TEIQue-CSF: Revised manual to short forms.* Belianum.
- Kara, M., Baytemir, K., & Incemar-Kara, F. (2019). Duration of daily smartphone usage as an antecedent of nomophobia: exploring multiple mediation of loneliness and anxiety. In *Behaviour & Information Technology*, 40(1), 2021, 85-98.
- Petrides, K. V. (2009). *Trait Emotional Intelligence Questionnaire (TEIQue)*. Technical Manual. London: London Psychometric Laboratory.
- Przybylski, A. K., & Weinstein, N. (2017). A Large-Scale Test of the Goldilocks Hypothesis: Quantifying the Relations Between Digital-Screen Use and the Mental Well-Being of Adolescents. In *Psychological Science*, 28(2), 2017, doi.org/10.1177/0956797616678438
- Qutishat, M., Lazarus, E.R., Razmy, A.M., & Packianathand, S. (2020). University students' nomophobia prevalence, sociodemographic factors and relationship with academic performance at a University in Oman. In *International Journal of Africa Nursing Sciences*, 13, 2020, 1-6, doi.org/10.1016/j.ijans.2020.100206
- Rodríguez-García, A.M., Moreno-Guerrero, A.J. & Belmonte, J.L. (2020). Nomophobia: An Individual's Growing Fear of Being without a Smartphone-A Systematic Literature Review. In *International Journal of Environmental Research and Public Health*, 17(2):580, doi: 10.3390/ijerph17020580
- Yalcin, R.C., Fayganoğlu, P. & Begenirbaş, M. (2022). University students' challenge with technology: Relationship of emotional intelligence and nomophobia. In *Business & Management Studies: An International Journal*, 10(1), 2022, 82–98. <https://doi.org/10.15295/bmij.v10i1.1924>
- Wahyuningtyas, T.A., Wibowo, M.E., & Mulawarman, M. (2020). Metaphor Reality Group Counseling Techniques to Increase Self-Esteem Students with Nomophobia Symptoms. In *Jurnal Bimbingan Konseling*, 10(1) (2021): 45–50, <https://doi.org/10.15294/jubk.v10i1.35375>
- Veerapu, N. Philip, R. Vasireddy, R. Gurralla, S. & Kanna, S. (2019). A study on nomophobia and its correlation with sleeping difficulty and anxiety among medical students in a medical college, Telangana. In *Int J Community Med Public Health*. 2019 May;6(5):2074-2076.
- Watson, R.H. (2021). COVID-19 and psychosis risk: Real or delusional concern? In *Neuroscience Letters*, 741 (10).

DIFFERENCES IN PREFERRED VALUE STRUCTURE BETWEEN ADOLESCENT BOYS AND GIRLS

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Abstract

The article's main purpose is to present the value structure of adolescents. The period of adolescence is significantly important in an adolescent's life in terms of the formation of the value structure. The structure of values firmly directs adolescents to choose their lifestyle and shows the direction of personality motivation. The preference for specific values is influenced not only by the adolescent's personality, but also by his interests, needs, attitudes, and various events in his life. The research sample consisted of Slovak adolescents (N=335, girls N=205, boys N=130). The average age was 16.3 years. Our interest was focused on gender differences in the structure of values, measured using the Portrait Value Questionnaire (PVQ, Schwartz, 2003). The results showed a difference in preferred value structures (statistically significant) between girls and boys. Girls scored higher in the values of self-direction, universalism, openness to change, and self-transcendence.

Keywords: *Adolescents, values, the structure of values, gender.*

1. Introduction

Values play a fundamental role in everyone's life. They are formed and shaped in the process of socialization and acculturation, influencing us throughout our lives. The author Prunner (2002) understands the value in its three meanings - value as a quality of things, on which human efforts are oriented (aimed at satisfying human needs), value as a positive appreciation of the object of human ties (relations), and value as a general criterion based on which various objects are evaluated. All the values preferred by an individual do not have the same weight and meaning for him. According to Duffková (2008), the basis for an individual's value orientation is the set and system of values accepted, recognized, and preferred by him/her - the value orientation itself is then a certain ordering of values expressing what a person prefers and what he/she considers to be significant or more significant than others. The developmental period of adolescence is particularly important in the process of value formation, especially in terms of adolescent identity formation. The value structure directs adolescents in their choice of lifestyle, motivates them to form aspirations and goals, but also the choice of means for their fulfillment, and thus influences the formation of their personality. At the same time, the preference for particular values is influenced not only by the personality of the adolescent, but also by his or her interests, needs, attitudes, and various events in his or her life, and of course by the media and social groups. Value orientation changes and develops throughout life. Due to the development and maturation of the individual during ontogeny, but also, for example, due to the impact of various events that occur in the course of his or her life, shifts in the ranking of values, but also more serious changes (for example, in connection with the stages of a person's life or due to the impact of a strong, traumatic experience) occur.

Our research aimed to find out what values and value orientations are preferred by adolescent boys and girls in Slovakia.

2. Method and research sample

The research sample was composed of 335 Slovak adolescents (N=335, girls N=205, boys N=130) aged from 14 to 18 years (AM=16.3). To detect the values and value orientation of searched sample, we have used PVQ (Portrait Value Questionnaire) an abridged version of a 56-item Schwartz Value Survey (Schwartz, 2003). The questionnaire consists of 21 characters persons and the task of participants was to indicate at a 6-point categorical scale (1. very much like me, 2. like me, 3. somewhat

like me, 4. a little like me, 5. not like me, 6. not like me at all), how much they resemble given portraits. Given portraits of people surveyed ten values: power, achievement, hedonism, stimulation, self-direction, universalism, benevolence, tradition, conformity, and security (the value of the first order). Ten values were possible to combine into four levels higher (2nd order – value orientations). These are Self-Enhancement, Self-Transcendence, Openness to change, and Conservation.

Table 1. Reliability coefficients for the 1st and 2nd order values of the Portrait Values Questionnaire (PVQ).

Values - 1 st order	Amount of items	Cronbach's α	Values - 2 nd order	Cronbach's α
Power	2	0.64	Self-Enhancement	0.72
Achievement	2	0.69		
Universalism	3	0.44	Self-Transcendence	0.50
Benevolence	2	0.56		
Hedonism	2	0.71	Openness to change	0.58
Stimulation	2	0.49		
Self-Direction	2	0.45		
Tradition	2	0.31	Conservation	0.43
Conformity	2	0.60		
Security	2	0.56		

3. Results

When we look at the differences in the representation of each value in terms of gender, we see that between boys and girls, the differentiation in the representation of values in adolescents is statistically significant at the 0.1% and 5% levels of significance in the values: *universalism* ($t=-3.39$; $p=0.001$) and *self-determination* ($t=-2.42$; $p=0.016$).

Table 2. Differences in value characters (*t*-test) of adolescent boys ($N=130$) and girls ($N=205$).

Values	AM Boys	AM Girls	T	P
1st order				
1st order				
Universalism	4.73	5.03	-3.39	0.001
Benevolence	4.98	5.11	-1.40	0.163
Conformity	3.81	3.64	1.29	0.197
Tradition	4.18	4.10	0.75	0.456
Security	3.98	4.11	2.75	0.423
Power	3.67	3.53	-0.97	0.330
Achievement	3.98	3.94	0.35	0.729
Hedonism	4.98	5.15	-1.61	0.108
Stimulation	4.09	4.21	-0.85	0.397
Self-Direction	4.73	4.98	-2.42	0.016
2nd order				
Self-Transcendence	4.85	5.07	-2.92	0.004
Self-Enhancement	3.83	3.73	0.74	0.460
Conservation	3.99	3.95	0.455	0.650
Openness to change	4.06	4.78	-2.08	0.039

The aforementioned differences were also reflected in the level of 2nd order values, which means that statistically significant differences in the representation of values emerged between boys and girls in *self-transcendence* ($t=-2.92$; $p=0.004$) and *openness to change* ($t=-2.08$; $p=0.039$) (Table 2).

We observed an increase in values in favor of girls compared to boys in the value of *universalism*, i.e., understanding, appreciation, tolerance, inner harmony, and protection of society and nature. The increase in the structure of girls' values was also shown in *self-determination*, i.e. the need to be independent, to invent new things all the time. In terms of preferred value orientation, it is clear that the difference in terms of gender in adolescent girls showed an increase in *self-transcendence* (formed by universalism and benevolence) and *openness to change* (formed by hedonism, stimulation, and self-determination).

The highest represented value in girls is *hedonism* (characterized by joy and enjoyment of life). The value of *benevolence*, i.e. willingness to help, and being loyal to one's friends, emerged as the second-highest represented value for girls. The third value for girls was *universalism*.

For boys, the values of *benevolence* and *hedonism* were equally highly represented. In the second place, the values of *universalism* and *self-determination* are also equally highly represented. As can be seen, both girls and boys prefer the same values in the first three places, but girls score higher in them.

4. Conclusions

Not only for psychology but also for the field of pedagogy, especially in its practical aspect in educational practice, the knowledge of values and value orientations of adolescents is a key area. One of the, in our opinion, essential tasks of the educator is, within the educational aspect during the educational process, to influence the value system of the pupil in the sense of its formation.

The period of adolescence is particularly important in the life of an adolescent precisely in terms of the formation and shaping of the value structure. We aimed to find out the preference of values and value orientation of Slovak adolescents in terms of gender differences.

Based on the measurements found, girls most prefer the values of hedonism, benevolence, and universalism. Thus, for girls it is important to rejoice and enjoy life, they prefer the willingness to help and to be loyal to their friends, and they value understanding, tolerance, inner harmony, and protection of society and nature. For boys, the preference for the top-ranked values was similar to that of girls, only they were arranged in a different order and with a lower value for their scores. The values of benevolence, hedonism, universalism, and self-determination showed the highest scores for boys.

In the context of gender, we see significant differences in the representation of the 1st order values, namely the values of universalism and self-determination, in favor of higher values for girls compared to boys. Girls more than boys prefer understanding, appreciation, tolerance, inner harmony, and protection of society and nature, but also the need to be independent and to invent new things all the time. The above differences between boys and girls also translated to the level of 2nd order values, namely the higher values of self-transcendence and openness to change in girls.

Various influences from the side of society, whether in terms of the influences of small or large social groups, constantly confront a person's value system with various alternatives, external pressures of different nature, and social changes, which also have a great impact on young people and the educational system. In line with Poliaková (2013), we think that education should be a process of personality cultivation. The formation of values and value orientation of pupils is undoubtedly an important part of it.

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References

- Duffková, J. (2008). Variantnosť životného spôsobu/stylu – diferenciácie a alternatívne. In Duffková, J., Urban, L., & Dubský, J., *Sociologie životného stylu* (pp. 113 – 139). Plzeň: Vydavatelství a nakladatelství Aleš Čeněk, s.r.o..
- Poliaková, E. (2013). Funkcionálna hodnota vzdelávania a kariérneho poradenstva ako garanti sociálneho vzostupu a príležitostí. In Gajdošová, E. (Ed.), *Psychologické aspekty kvality školy* (pp. 36-38). Nitra: POLYMEDIA.
- Prunner, P. (2002). *Výskum hodnot*. Plzeň: Eroverlag.
- Schwartz, S. H. (2003). A Proposal for Measuring Value Orientations across Nations, Chapter 7. In *Questionnaire Development Package of the European Social Survey*. Retrieved from <http://www.Europeansocialsurvey.org>.

An illustration featuring several graduates in black gowns and yellow stoles, each appearing within a separate, tilted rectangular frame. The graduates are shown in various celebratory poses, such as holding up their caps or raising their arms. The background is a light, hazy blue with soft, white clouds. The overall style is clean and modern, representing a virtual graduation ceremony.

VIRTUAL PRESENTATIONS

PROGRAM NOTES: EDUCATING MUSICIANS AND AUDIENCES IN PROFESSIONAL MUSIC TRAINING—THE TUT EXPERIENCE

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Abstract

This paper is written in response to the request to consider musical experiences at Western Classical Music concerts, and more specifically, the role of the program note that informs listeners and performers about the historical context of the composition and includes the composers' biographical details and compositional thinking. Program notes are similar to reading the "spoilers" before seeing movies. What follows is based on observations and reflections from the Tainan University of Technology (TUT), Taiwan, and its educators' experiences of teaching graduate music students. The idea put forward is that the content of the program note reflects the performers' interpretations of the composer's ideas, and access to this note provides an opportunity for music educators to reconfigure and strengthen their pedagogical approaches. By recognizing the intended role of the program note and its relation to the interpretation, understanding, and collaboration in music course curricula, music educators continue to grow in their range of practices. Knowing a composer's intention can be used to develop the performance of the composition and understand the genre and cultural/social/historical/political connections of the composer and composition, thus providing useful experiences for music students.

Keywords: *Curriculum, composers, music concert, program note.*

1. Introduction

The background included in program notes provide fascinating insights into a composer's intentions,

and understanding the wider context of the music to be performed can sometimes quite radically affect its interpretation. In Western classical music concerts, the provision of program notes is a widespread practice dating back to the 18th century and is still commonly in use (Blom et al., 2016). Program notes help contextualize music and are helpful to even the most educated of audiences (Scaife, 2001). At classical music concerts, a program note is the usual medium for communicating information about the music to be heard and performed. Although there may be information in common, the program note is distinct from the CD cover note, from notes contained within a musical score, and from a composer's directions to performers (Blom et al., 2020). German romantic composer and pianist, Robert Schumann (1810-1856) demanded program notes (Koller, 2021). The demand required explaining how Schumann's writings pertain to the piece such as *Papillons*, Op. 2 and bring meaning to this romantic masterpiece.

Blom et al. (2016) noted that program notes tend to inform listeners and performers about the historical context and composer's biographical details and compositional thinking. However, the scant program note research conducted to date reveals that program notes may not foster as much understanding or enhance listener enjoyment as previously assumed. In the case of canonic works, performers and listeners may already be familiar with much of the information contained in the program note. In addition, according to Maus (1997), the lack of time and training are reasons for not using written program notes. That no studies were found that addressed how to give music education majors opportunities to practice these skills and none explored the benefits of increased knowledge about the concert repertoire for the performers involved is surprising because musicians use a highly specialized vocabulary that can be an obstacle to understanding for general audience members. Strategies for making program notes accessible to non-musicians that include keeping the audience's knowledge-level in mind have been discussed; for example, Henry and Zeiss (2018) noted that musical works first require instilling an appreciation for the value of program notes as an educational tool for students and audience members.

The concept of program notes is usually thought of as part of a curriculum, and program notes can permeate the classroom; include overt forms of communication, such as lecture-recitals and pre-concert talks; and enhance an audience's enjoyment of a concert and enrich their musical

understanding (Henry & Zeiss, 2018). As stated in England’s Action Ideal VIII by the Mayday Group (2018), ideally, music education makes important contributions to musical cultures (Kardos, 2018). This connection should be seen as the manifest link between music research and the learning taking place in educational institutions. Kardos (2018) noted that beyond issues of the vocational viability of graduates, specializations can foster potentially crippling literacy issues, for example, music performance graduates who cannot operate technology or music technologists who cannot read music, etc. Conventional music curricula create boundaries between practices, which in the real world are becoming increasingly blurred and/or irrelevant. It is critical that professional music training provide a wide range of practical experiences in combination with professional musicianship and the cultivation of artistic personalities to encourage broader understanding of exciting music cultures and the possibility for inquiry-based learning.

2. Literature review

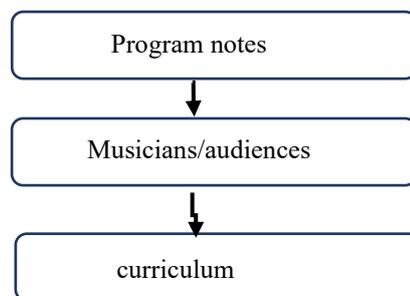
Because of the lack of extant research into program notes *per se*, a wide range of writings around the topic were sourced. These included studies of composers’ intentions, program notes for the music of composers who are no longer living, and listeners or audiences and classes’ teaching experiences. The writing of program notes is an important part of evaluating music diploma candidates’ performances in exams and reflects the fact that most performers and directors are asked at some point to write program notes for a recital or concert. It also allows examiners to assess how well students understand the musical and historical context of the repertoire students are performing. The importance of writing program notes should not be underestimated: Informative and clearly presented notes can significantly enhance the listening experience of the audience. Many musicians find writing program notes not just a powerful tool for increasing their audiences’ appreciation and enjoyment of the concert but also a useful way to clarify their thoughts about the music that they are to perform (Blom et al, 2016).

3. Relationships between musicians and audiences

The aim of this research is to explore the assumed relationship between program notes and musicians /audiences (see Figure 1). It was assumed that program notes, as naturally associated with knowing how to listen and think about the music performed at the strategic level, is the category initiating the relationship. The case of the TUT was examined. The main reasons for the choice are that the study of TUT’s Music Department and its curriculum has been ongoing since 2009. TUT offers a seven-year program from high school directly to a bachelor’s degree in vocational education, and artistry first requires mastery of the general concert audience, suggesting that TUT is a leader in professional music training. As a knowledgeable musician, I still enjoy reading program notes and continue to learn through them because no one can know everything in a vast musical repertoire. Students who are presenting recitals are encouraged to write notes for their audiences and themselves, and graduate students are often asked to tell me some interesting things about a composer they are studying. With the internet, it is so much easier for students to obtain information about a composer than it was in the past. It is exciting to see students think about music in a new way and begin to comprehend musical styles. Knowing the historical context of a piece makes for better interpretations and a better listening experience.

I also believe this is an important part of a student’s training and development and have created some excellent guidelines for students for writing program notes. Teachers may find these notes useful for their students.

Figure 1. Relationships between program notes, musicians/audiences, and curriculum.



The Master of Music degree programs at TUT are modeled after the guiding principles outlined by the National Association of Schools of Music (NASM, 2020). The purpose of the Master of Music degree work is to refine skills in music performance, music composition, research and writing, and pedagogy. The curriculum falls into three main categories in the TUT’s Music Department: Musicianship,

Applied Studies and Ensembles, and Major Requirements. The primary focus of an integrated or holistic curriculum is not on the disciplines themselves but on the themes, issues, or phenomena (American Association for the Advancement of Science, 2000). A thematic approach is used to integrate curricular content by common topical areas or themes into interdisciplinary and multidisciplinary units of study (Merritt, 2019). In the 1930s, American educator and composer Randall Thompson, supported by the Carnegie Foundation, conducted a study to determine the extent to which musical education was an essential component of education as a whole (Nelson, 2005). Nelson (2005) concluded by discussing the significance of a critical, holistic approach for processes of acquired expertise for policy development. The study was influential across the USA, encouraging the integration of musical studies with other disciplines.

4. Schumann's piano piece *Papillons*, op. 2 program notes for a classical Western concert

As an example, with respect to integration in a Research Methods and Thesis Writing class at graduate student level, performers are expected to write their program notes for a general concert audience, that is, an audience of non-musicians who are interested in music and are fairly knowledgeable. The teacher might take time in class to explain Schumann's Piano piece *Papillons*, Op. 2 as students rehearse the piece. For example, the teacher might alert students to what was going on in inventive and descriptive titles that come from his piano music at the time that Schumann composed this piece and discuss how it is similar or different to anything that audiences had heard before. Much like a college music lecture-recitals, the teacher can discuss with the students and raise awareness about how Schumann uses titles for his movements to reflect the tempo or speed at which he wants the music to be played. The teacher might also focus on literature and reflect on including program notes to notify the audience of what was written before the piece.

For example, Perahia (2014) noted that two artistic influences permeate Robert Schumann's second published work, an interconnected cycle of 12 dance pieces appearing in 1831 under the title *Papillons* (i.e., "Butterflies"). The first is the piano music of Schubert, especially his dance pieces and variations, which intrigued the young composer with their "psychologically unusual connection of ideas." The second is the work of German Romantic novelist Jean Paul Richter with whose fanciful writings Schumann became utterly besotted in his student years in Leipzig while studying law. Program notes inform the audience and facilitate a better listening experience by including what is interesting and relevant about the composer. For example, it is the scene of the masked ball at the end of Richter's novel *Flegeljahre* (1804, as cited in Perahia, 2014) that provides the dramatic "setting" for the cycle, a scene in which two brothers, in love with the same woman, vie to win her heart amid the gaiety and varied musical offerings of a social evening with a dance orchestra. The purpose of learning this piece goes beyond just playing good music well. It might incorporate an intentional introduction to new musical discourses and tools for students to add to their cognitive understanding of how music works (see Table 1). The program note helps both the student and audience understand that music is located within time and a culture.

Table 1. Integrated curriculum, instruction/teaching, learning, related strategies, and the program notes.

Curriculum	Instruction/Teaching
Research Methods and Thesis Writing, for example, using Schumann's piano music Op. 2 <i>Papillons</i> .	The program notes' requirements are integrated with descriptive titles.
Integrated	Integrated Curriculum
Incorporate program note writing into students' degree curricula, such as the course Research Methods and Thesis Writing.	The curriculum includes program notes, lecture-recitals, and pre-concert talks.
Integration	Learning
Regarding musicianship, instructors need to help their students develop a confident, respectful, and expressive stage presence.	A certain level of body awareness is key as this will assist students' expressive abilities and encourage them to use their physiology to support their musicality and technical prowess.
Strategies	Strategies
The didactic skills that can be cultivated specifically through the study of program notes include (a) the ability to keep the audience's knowledge-level in mind, and (b) the importance of precise, concise language.	The holistic instruction of performance and pedagogy appear as more overt forms of communication, such as program notes, lecture-recitals, and pre-concert talks, and enhance an audience's enjoyment of a concert as well as enrich their musical understanding.

5. Application of skills/knowledge competencies in the program notes writing

The 2020 *National Association of Schools of Music (NASM) Handbook* provides access to the NASM standards and guidelines that include proposed revisions to the NASM standards currently open for comment, including the Association's helpful Basic Competency Index by Discipline and Specialization for Undergraduate Degrees in Music (NASM, 2020). The *NASM Handbook* indicates standards applicable to all professional undergraduate music degrees. Expert status is established by these criteria: (a) common body of knowledge and skills, including performance, musicianship skills and analysis, composition/improvisation, history and repertory, and synthesis, (b) general studies competencies, and (c) recommendations for professional studies.

Each of the NASM core competencies is addressed below with descriptions of some of the specific educational interventions currently employed in the music theory block at the TUT's Music Department. This study's intent is not to evaluate the effectiveness of individual interventions but to create awareness about the variety of options for incorporating core competencies into the Research Methods and Thesis Writing of Music portion of graduate music curricula. For example, program notes help contextualize music and are helpful to even the most educated of audiences. Thus, for infrequent concert goers, program notes ground unfamiliar music in real life by providing information about the conception of the piece and what the composer might have wanted to convey (Koller, 2021). For example, a teacher might encourage her students to an in-class presentation about why and how to write program notes. The presentation might begin with a discussion about the purpose of notes. Next, she could give students information about how to write program notes. Thereafter, students could be advised to start by asking a series of questions, beginning with general ones such as "What do I want the audience to know about this piece? What should they listen for when they hear it? What is the most significant feature of this piece?" Furthermore, the teacher may urge students to consider more specific questions about the "who, what, why, where, and when" of the music. "What" questions could include what type of piece it is (descriptive titles, epigraph, etc.) as well as form. "Why" refers to the reason a piece was composed: Was it for a special occasion or a specific performer, for example. "Where" questions would include a work's cultural context.

6. Conclusion

Among the basic competencies by discipline and specialization in the TUT Music Department curriculum, program notes are the logical starting point for implementing competency-based education because the "often" or "always" included musical competencies (Robinson, 2019) already include essential standards. In addition, activities with those musical competencies and theory-based strategies are in place. It is possible that program notes are unique among the core music curriculum traditionally included in university coursework with its many opportunities to help students toward all three NASM core competencies, which are (a) a common body of knowledge and skills, (b) general studies competencies, and (c) recommendations for professional studies. Future work is needed to integrate all essential competencies, experiences, and opportunities across disciplines to further connect them to professional practices and make them outcomes-based so that every learner develops the skills, expertise, and knowledge to survive and thrive in the 21st century.

References

- American Association for the Advancement of Science. (2000). *Designs for science literacy*. Oxford University Press.
- Blom, D., Bennett, D., & Stevenson, I. (2016). The composer's program notes for newly written classical music: Content and intentions. *Frontiers in Psychology*, 7, 1-10. <https://doi.org/10.3389/fpsyg.2015.01672>
- Blom, D., Bennett, D., & Stevenson, I. (2020). Developing a framework for the analysis of program notes written for contemporary Classical music concerts. *Directory of Open Access Journals*, 11, 1-13. <https://doi.org/10.3389/fpsyg.2020.00376>
- Henry, M. L., & Zeiss, L. E. (2018). *Musicians as authors: Teaching the art of writing program notes*. <https://symposium.music.org/index.php/44/item/2208-musicians-as-authors-teaching-the-art-of-writing-program-notes#x8>
- Kardos, L. (2018). Making room for 21st century musicianship in higher education. *Action, Criticism, and Theory for Music Education*, 17(1), 33-47. <https://doi.org/10.22176/act17.1.33>

- Koller, J. (2021). Poco piano: Schumann demands program notes! <http://artsatmichigan.umich.edu/ink/2021/04/17/poco-piano-schumann-demands-program-notes/>
- Lau, H. F., & Li, C. (2013) (Eds.). *Curriculum innovations in changing societies: Chinese perspectives from Hong Kong, Taiwan and Mainland China* Sense.
- Margulis, E. H. (2010). When program notes don't help: Music descriptions and enjoyment. *Psychol. Music* 38, 285–302. <https://doi.org/10.1177/0305735609351921>
- Maus, F. E. (1997). Learning from 'occasional' writing. *Repercussions*, 6(2), 5-23.
- Mayday Group (2018). Action ideals. <http://www.maydaygroup.org/about-us/action-for-change-in-music-education/>
- Merritt, R. D. (2019). Integrated curriculum. *Research Starters Education*, (4/1), 1.
- Ministry of Education, Taiwan. (1997). Arts Education Act. <https://law.moj.gov.tw/ENG/LawClass/LawHistory.aspx?pcode=H0170037>
- National Association of Schools of Music. (2020). *National Association of Schools of Music handbook 2019-20*. <https://nasm.arts-accredit.org/wp-content/uploads/sites/2/2020/01/M-2019-20-Handbook-02-13-2020.pdf>
- Nelson, A. J. (2005). Cacophony or harmony? Multivocal logics and technology licensing by the Stanford University Department of Music. *Industrial and Corporate Change*, 14 (1), 93-118. <https://doi.org/10.1093/icc/dth045>
- Perahia, M. (2014). *Robert Schumann: Papillons, Op. 2*. <https://vanrecital.com/tag/papillons-op-2/>
- Robinson, E. (2019). *An examination of North Carolina music educators' preferences of musical competencies* (Publication No. 27629154) [Master's thesis]. ProQuest Dissertation and Theses Global.
- Scaife, N. (2001). *Writing programme notes: A guide for diploma candidates*. The Associated Board of the Royal Schools of Music. <https://gb.abrsm.org/media/62446/writingprognotesapr05.pdf>
- Teachout, D. J. (1997). Preservice and experienced teachers' opinions of skills and behaviors important to successful music teaching. *Journal of Research in Music Education*, 45, 41-50. <https://doi.org/10.1010.2307/3345464>

AN INNOVATIVE APPROACH IN THE EVALUATION OF SERVICE QUALITY IN A PEDAGOGICAL TRAINING PROGRAM

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Abstract

Quality is a term that is commonly considered to indicate a high level of customer satisfaction relative to factors that characterize a specific service. The most effective way to measure quality is to determine whether or not customers are satisfied. In the educational area, the constant search for improvements in the quality of educational services has led the scientific community to implement specialized measurement approaches in order to meet the quality expectations of trainees. The current research combines the evaluation model CIPP with the EppaikQual scale to measure the quality of the educational services of a Greek pedagogical training program. In this way, a management-oriented evaluation model is combined with a satisfaction measurement scale for the purpose of evaluating the program's quality from the trainees' perspectives. The research questions seek to determine the degree of trainee satisfaction based on the four levels of the evaluation and to define the level of the program's quality. A total of 489 trainee prospective teachers for the 2019–2020 academic period participated in the survey. The method of sampling without probabilities was adopted. After the completion of the program, participants were electronically provided with the measurement scale. The reliability and validity of the research tool were tested using confirmatory factor analysis. Data were analyzed by calculating the mean scores and the percentage frequencies of their agreement–disagreement in each index of the four levels of the evaluation. The survey results show that trainees are in general satisfied with the provided educational services. Their degree of satisfaction is higher for the learning outcomes and lower for the program inputs. In conclusion, it can be inferred that the participants in the training program appear to be satisfied, but they propose specific areas in which structural interventions are required in order to upgrade the level of quality of the educational services. The information gathered can contribute to sound administrative decisions with a view to improving and sustaining the training program.

Keywords: Program evaluation, CIPP, EppaikQual, service quality, pedagogical training, trainee satisfaction.

1. Introduction

Service quality is interpreted by means of the measurement of the degree of satisfaction of service recipients (Cronin & Taylor, 1992; Oliver, 1993). In the educational context, trainees are considered to be the most important stakeholders in an educational institution (Gremler & McCollough, 2002) because they are the direct recipients of its educational services and, in this sense, act as its "clients" (Green, 1994; Navarro et al., 2005). Student satisfaction is defined by Oliver and DeSarbo as "the favorability of a student's subjective evaluation of the various outcomes and experiences associated with education" (Elliott & Shin, 2002, p.198). In this effort, specific scales of measurement are used to assess student perceptions of the educational services they receive. To meet quality standards, educational institutions ought to adopt an evaluation system that will monitor and measure the performance of the services provided. The evaluation process of an educational program is a systematic and deliberate collection of information in order to determine what contributes to its success and what actions should be taken following the results of the evaluation process. Evaluation models that fall into the systemic evaluation approach more effectively serve the aims of training program evaluation (Philips, 1991). The Stufflebeam model (CIPP; 1971) appears to be more suitable for training programs provided by organizations outside the work context. The annual pedagogical training program of the School of Pedagogical and Technological Education (ASPETE) in Greece is also such an example. The CIPP model is based on the theory of complexity and therefore considers the educational program as an open system with emerging dynamic interactions between its parts and the environment (Gandomkar, 2018). The evaluation of a program is determined by means of four different types of evaluation, namely Context, Input, Process, and Product (CIPP). In the American school of thought, we find two perspectives on the

effective measurement of service quality. The first perspective supports the measurement of the quality of services by comparing their perceptual performance with consumer expectations (Parasuraman et al., 1988), while the second accepts as more effective the measurement of service quality through only its perceptual performance (Cronin & Taylor, 1992). The inclusion or exclusion of customer expectations as a determining factor in the measurement of quality has led the scientific community to two distinct examples: the disconfirmation paradigm and the perception paradigm. In the first example, the ServQual methodology of Parasuraman et al. (1988) is adopted, while in the second one, the ServPref methodology by Cronin and Taylor (1992) is used. The quality of services depends to a large extent on the service sector that is being evaluated and the main stakeholders on which the evaluation focuses (Surman & Tóth, 2019). Therefore, the quality dimensions of the measurement scales adopted in the aforesaid models differ among service industries and need to be modified to suit each specific industry in which they are applied. The EppaikQual scale (Athanasiadis et al., in press) is a measurement scale that has been designed and validated according to the perception paradigm for the measurement of the quality of educational services in a pedagogical training program in Greece. The quality of educational services is evaluated based on six quality dimensions which are interpreted by 34 indicators focused not only on academic issues but also on general quality aspects of the educational framework in which pedagogical training is provided.

2. Conceptual framework

For the evaluation of the annual pedagogical training program of ASPETE, we combined the CIPP model and the EppaikQual scale. In particular, we correlated the evaluation axes of the EppaikQual scale with the four levels of evaluation of the CIPP model. The correlation was made on the basis of a literature review and on the conceptual background of both the evaluation model and the measurement scale, thereby forming the corresponding conceptual framework that guides the present study. As stated by Parasuraman et al. (1988) and Bitner (1990), the program's perceived quality is interpreted via student satisfaction considering customer satisfaction as an antecedent to service quality.

Figure 1. Conceptual Framework.



3. Methodology

Prior to the data collection process, the necessary actions were taken to ensure the receipt of the required permission to carry out the evaluation. In addition, the trainee teachers were informed about the optional and non-binding nature of their participation. During the collection of the data, the anonymity of the subjects was ensured. The questionnaire was sent by e-mail at the end of the training program. The stakeholders of this evaluation study are the board of directors of the training program and the coordinators of the twelve departments in which the training program was implemented. In addition, researchers in the field of the evaluation of educational programs are also considered as a group of interest. The purpose of the evaluation is to provide information to program administration regarding its effectiveness based on the perceptions of the trainee candidate teachers. This study is a quantitative, external, and final evaluation, and through its outcomes, managerial staff can lead the development of a further formulation of interventions. The survey population includes all the trainee prospective teachers. The method of sampling without probabilities was adopted. The sample size (N=488) meets the requirements of the minimum total number of participants for the statistical analyses that will be used as it is greater than 100 observations and satisfies the 5:1 relationship between the participants and the variables to be analyzed (Hair et al., 2010).

4. Research questions

The following questions were raised by the researchers:

- To what degree are the trainees satisfied based on the Context level of the evaluation?
- To what degree are the trainees satisfied based on the Input level of the evaluation?
- To what degree are the trainees satisfied based on the Process level of the evaluation?
- To what degree are the trainees satisfied based on the Product level of the evaluation?
- What is the level of the quality of the pedagogical training program based on the student's degree of satisfaction?

5. Evaluation tool

Based on the above conceptual framework, a scale was formed to measure the quality of services in the pedagogical training program. The scale included 34 evaluation indicators in which participants were asked to declare their degree of agreement or disagreement by means of a seven-point Likert scale (1 is for strongly disagree and 7 is for fully agree).

Table 1. Trainees' satisfaction results by evaluation level.

C.I.P.P. Level	CIPP Evaluation Axes (Hasan et al.,2015; Neyazi et al.,2016)	EppaikQual Quality dimensions (Athanasiadis et al., in press)	EppaikQual Evaluation Axes (Athanasiadis et al., in press)	Indicators (N)
1. Context	Mission, Objectives	Curriculum	Mission, Objectives, Curriculum Content and Structure	6
2. Inputs	Human Resources, Laboratories & equipment	Educational & Administrative Staff Facilities & Infrastructure	Reliability, Behavior, Availability, Competence, Communication skills, Infrastructure	17
3. Process	Educational techniques, Teaching methods, Evaluation methods	Teaching organization, Curriculum	Teaching design, Teaching implementation, Evaluation methods	6
4. Product	Level of acquired knowledge and skills	Learning Outcomes	Acquired knowledge and skills, Teaching Practical experiences, Personal Development	5

6. Validity and reliability of the evaluation tool

The reliability of the internal consistency was assessed through Cronbach's alpha, which received values greater than a >0.7(Cronbach, 1951). The internal reliability of the measurement tool was also evaluated through the degree of the correlation of each variable with the total sum of all the variables in the measurement scale. The structural validity of the model was investigated through confirmatory factor analysis with the IBM Amos 23.0 package software. The combined measurement model adopted in this empirical study shows good fit to the data, as the set of goodness of fit indicators are within the field of acceptable values based on the literature. Results from a four-factor confirmatory analysis were RMSEA =.052, GFI=0.877, CFI=0.963, IFI= 0.063, PGFI= 0.713.

7. Results

In order to answer the research questions, the mean scores were calculated for the degree of agreement–disagreement by the trainee teachers with respect to each of the four levels of evaluation under the proposed methodology.

Table 2. Trainees' satisfaction results by evaluation level.

Evaluation indicators	Degree of Agreement-Disagreement (%)							M	S.d
	Absolutely Disagree	Little Disagree	Disagree	Neutral	Agree a little	Agree	Absolutely agree		
Context Evaluation									
Programs' Aims & Objectives	1,64	2,66	4,30	9,22	20,70	33,40	28,07	5,572	1,379
Curriculum Structure	1,84	3,07	5,94	11,27	20,90	31,35	25,61	5,428	1,443
Curriculum Contents	2,66	3,28	7,79	12,09	22,13	27,66	24,39	5,283	1,527
Structure of Teaching Practice Sessions	3,28	3,48	9,22	12,30	16,39	28,69	26,64	5,277	1,616
Implementation of Teaching Practice Sessions	2,66	3,07	9,22	13,32	17,21	30,33	24,18	5,270	1,552

Academic Workload	2,87	4,30	8,81	12,70	20,90	27,66	22,75	5,184	1,576
Input Evaluation									
Teachers' Cooperation	1,43	2,25	3,89	6,56	12,30	25,20	48,36	5,951	1,393
Teachers' Competence	0,82	2,25	3,48	5,74	14,96	29,30	43,44	5,934	1,301
Teachers' Updated Knowledge	1,20	2,00	2,70	8,80	15,00	35,90	34,40	5,795	1,297
Accessibility	3,48	2,25	2,66	7,79	12,70	29,51	41,60	5,789	1,512
Teachers' Availability	1,60	1,80	3,90	7,60	17,40	29,50	38,10	5,783	1,368
Teachers' Behavior	1,20	2,90	7,00	8,00	19,70	34,20	27,00	5,738	1,567
Staffs' Competence	3,07	4,92	2,66	7,58	14,75	24,80	42,21	5,693	1,606
Cleanliness	2,46	4,10	6,15	8,61	13,32	22,75	42,62	5,650	1,616
Teachers' Communication skills	0,40	2,90	3,90	12,50	19,30	35,20	25,80	5,564	1,294
Physical Aspects of the Classrooms (Heating–Cooling)	3,48	3,07	6,35	9,84	14,96	22,95	39,34	5,559	1,638
Teachers' Pedagogical Competence in Adult Education	2,25	2,66	5,53	7,99	21,31	29,71	30,53	5,547	1,458
Staffs' Behavior	2,66	3,89	3,89	7,38	14,75	23,57	43,85	5,529	1,401
Level of Bureaucracy	4,51	4,71	4,92	8,81	13,73	25,00	38,32	5,508	1,721
Physical Aspects of the Classrooms (Capacity)	4,71	3,07	8,20	9,63	15,78	24,80	33,81	5,383	1,707
Teachers' Reliability	2,90	4,10	8,00	8,80	19,70	27,50	29,10	5,371	1,594
Organizations' External Image	4,71	3,48	7,17	14,75	18,85	22,75	28,28	5,209	1,680
Process Evaluation									
Interaction Between Teacher and Trainees	1,64	2,66	4,30	8,20	18,24	33,40	31,56	5,651	1,389
Educational Techniques	2,05	3,89	3,07	10,66	18,44	29,92	31,97	5,571	1,470
Exploratory Learning	1,23	3,28	4,30	8,81	21,11	34,43	26,84	5,559	1,364
Co-configuration of Course Contents	1,23	3,69	5,94	12,30	24,59	31,76	20,49	5,325	1,387
Evaluation Methods	2,87	4,71	8,81	9,84	20,49	28,48	24,80	5,250	1,597
Evaluation Types	2,30	4,70	7,40	14,30	19,70	26,40	25,20	5,245	1,562
Product Evaluation									
Teaching Knowledge	0,82	1,43	3,28	6,97	19,67	31,97	35,86	5,826	1,239
Horizontal Skills	1,02	2,46	3,69	6,97	19,26	27,05	39,55	5,803	1,347
Teaching Skills	1,02	2,66	4,30	9,22	17,42	30,12	35,25	5,707	1,372
Pedagogical Knowledge	1,23	2,25	3,89	8,20	20,49	31,35	32,58	5,689	1,336
Teachers' Practical Experiences	2,46	2,05	3,48	10,45	21,72	27,66	32,17	5,586	1,430

8. Conclusions

The evaluation results indicate that the degree of satisfaction of the trainee candidate teachers is in the high satisfaction area, which corresponds to a range from 5.0 to 5.9 average degrees of satisfaction on the seven-point Likert scale which was adopted. This means that on average, the participants in the training program were satisfied, and the quality of the educational services of the pedagogical training program were considered to be high. However, student perceptions deviate significantly from the ideal level of quality which corresponds to a range from 6.8 to 7.0 degrees of satisfaction. From this perspective, we assess that the quality of education related to all of the indicators in the evaluation levels can be improved. Particularly, in the Context level, the highest deviation was found in the indicator of academic workload. This indicator is linked to curriculum requirements and especially to performance of duties on tight deadlines. At the level of Inputs, the values ranged between 4.73 and 5.95. These values indicate marginally high trainee satisfaction, and therefore, it is estimated that all evaluation axes in this level can be improved. The level of Process evaluation holds second place in the ranking of the overall satisfaction of the trainee candidate teachers as compared to the other levels. Effective management of the educational process of a training program significantly contributes to the achievement of predetermined learning outcomes (Mlambo, 2011; Schwerdt & Wuppermann, 2008), and we can conclude from this perspective that the satisfaction of the participants in this field acts as a sign of the effective achievement of the program's objectives. Confirming this, the Product evaluation level received the highest value on the satisfaction index of the trainee candidate teachers.

In the current study, we attempted to evaluate a pedagogical training program in Greece by combining the CIPP model and the EppaikQual scale. In this way, a management-oriented evaluation model is combined with a measurement scale for the purpose of evaluating the quality of the educational program from the trainees' perspective based on their satisfaction levels (Parasuraman et al., 1988; Cronin et al., 2000). The information gathered can contribute to sound administrative decisions with a view to improving and sustaining the training program.

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References

- Athanasiadis, A., Papadopoulou, V. & Kasimatis, K. (in press). Measuring service quality in pedagogical training programs: The EppaikQual Scale. SAGE open.
- Bitner, M. J. (1990). Evaluating service encounters: the effects of physical surroundings and employee responses. *Journal of marketing*, 54(2), 69-82.
- Cronbach, L.J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika* 16:297-334
- Cronin Jr, J. J., Brady, M. K., & Hult, G. T. M. (2000). Assessing the effects of quality, value, and customer satisfaction on consumer behavioral intentions in service environments. *Journal of retailing*, 76(2), 193-218.
- Cronin Jr, J. J., & Taylor, S. A. (1992). Measuring service quality: a reexamination and extension. *Journal of marketing*, 56(3), 55-68.
- Elliott, K. M., & Shin, D. (2002). Student satisfaction: An alternative approach to assessing this important concept. *Journal of Higher Education policy and management*, 24(2), 197-209.
- Gandomkar R. (2018). Comparing Kirkpatrick's original and new model with CIPP evaluation model. *Journal of Advances in Medical Education and Professionalism*, (2), 94-95. Retrieved from <http://search.ebscohost.com/login.aspx?direct=true&db=edsdoj&AN=edsdoj.8803ca7f2a664143b167a1c6ec4c7449&site=eds-live>
- Green, D. (1994). *What Is Quality in Higher Education?* Taylor & Francis, 1900 Frost Road, Bristol, PA 19007-1598.
- Gremler, D. D., & McCollough, M. A. (2002). Student satisfaction guarantees: an empirical examination of attitudes, antecedents, and consequences. *Journal of Marketing Education*, 24(2), 150-160.
- Hair, J. F., Gabriel, M., & Patel, V. (2014). AMOS covariance-based structural equation modeling (CB-SEM): Guidelines on its application as a marketing research tool. *Brazilian Journal of Marketing*, 13(2).
- Hasan, A., Yasin, S. N. T. M., & Yunus, M. F. M. (2015). A conceptual framework for mechatronics curriculum using Stufflebeam CIPP Evaluation Model. *Procedia-Social and Behavioral Sciences*, 195, 844-849.
- Mlambo, V. (2011). An analysis of some factors affecting student academic performance in an introductory biochemistry course at the University of the West Indies. *The Caribbean Teaching Scholar*, 1(2).
- Neyazi, N., Arab, M., Farzianpour, F., & Majdabadi, M. M. (2016). Evaluation of selected faculties at Tehran University of Medical Sciences using CIPP model in students and graduates' point of view. *Evaluation and program planning*, 59, 88-93.
- Navarro, M. M., Iglesias, M. P., & Torres, P. R. (2005). A new management element for universities: satisfaction with the offered courses. *International Journal of educational management*.
- Oliver, R. L. (1993). Cognitive, affective, and attribute bases of the satisfaction response. *Journal of consumer research*, 20(3), 418-430.
- Parasuraman, A., Zeithaml, V. A., & Berry, L. (1988). SERVQUAL: A multiple-item scale for measuring consumer perceptions of service quality. 1988, 64(1), 12-40.
- Phillips, J. J. (1991). *Handbook of evaluation and measurement methods*. Houston: Gulf Publishing Company.
- Schwerdt, G., & Wuppermann, A. C. (2008). Do teaching practices influence student achievement. CESIFO and IFO Institute for Economic Research, 1-19.
- Stufflebeam, D. L. (1971). The relevance of the CIPP evaluation model for educational accountability. Ανακτήθηκε 20/10/2021 από <https://files.eric.ed.gov/fulltext/ED062385.pdf>
- Surman, V., & Tóth, Z. E. (2019). Developing a service quality framework for a special type of course. *Periodica Polytechnica Social and Management Sciences*, 27(1), 66-86.

DEVELOPMENT OF A LESSON OBSERVATION SCHEDULE TO DOCUMENT PEDAGOGICAL CONTENT KNOWLEDGE FOR NATURE OF SCIENCE

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Abstract

The study describes the development of a lesson observation schedule, to document Science teacher pedagogical content knowledge for nature of science (PCKNOS) and a subsequent pilot study to test the instrument. The objective of the study was to develop an observation schedule that could document enacted PCKNOS. NOS refers to the epistemology and sociology of science, science as a way of knowing and understanding the natural world, and the role of values and beliefs of the scientific community in the development of scientific knowledge (Lederman, 1998; Lederman and Lederman, 2004). Shulman (1986) has defined pedagogical content knowledge as the intersection of the knowledge a teacher has of the subject material (content) and the translation of that knowledge into an accessible format for the learners (pedagogy). The ability of teachers to transform their understanding of NOS into a context suitable to facilitate student learning of NOS is known as PCK for NOS (Faikhamta, 2013). This PCK refers to a teacher's knowledge of which NOS aspects can be addressed in the teaching of science topics, an appropriate selection of instructional material or media and the correct use of metaphors, analogies or other pedagogical tools (Haunscin, Lee, & Akerson, 2011). According to literature, paper methodologies such as content representation and the pedagogical and professional experience repertoires (Betram and Loughran, 2011) are commonly used to measure science teachers' planned or espoused PCK. This study aimed to measure enacted PCK through lesson observation. The researcher developed a lesson observation schedule based on Aydeniz and Kirbulut's (2014) instrument to measure pre-service science teachers' topic specific PCK and included NOS aspects as presented in curriculum documents for science education. The schedule was piloted on two teachers through analyzing recorded lessons as the study was carried out during COVID-19 lockdown in 2020. Two raters were used to document teacher PCKNOS using the schedule and it was found to be suitable to measure PCKNOS.

Keywords: *Pedagogical content knowledge, nature of science.*

1. Introduction

This paper describes the development of an instrument, a lesson observation schedule, to measure Pedagogical Content Knowledge for Nature of Science (PCKNOS) of in-service Science teachers in South Africa and a subsequent pilot to test the instrument. The instrument measured enacted PCK of Science teachers through observation in the classroom. The observation schedule scored PCKNOS on a scale ranging from 1 to 5, following which the scores were then categorized as representing a naïve, developing or sophisticated PCKNOS. In compiling the observation schedule, the researcher adapted an instrument by Aydeniz and Kirbulut (2014) designed to measure and enhance topic specific PCK of pre-service Science teachers, termed the Secondary Teachers' Scientific Pedagogical Content Knowledge (STSPCK). In adapting STSPCK, the researcher used some of the observation statements that were related to PCKNOS. Further statements were extracted from aims and objectives in the South African curriculum statements for Science that had a focus on NOS. The aims of the study are listed below.

Aims

- To design an instrument to measure enacted PCKNOS
- To pilot the use of the instrument to measure enacted PCKNOS on in-service Science teachers

2. Pedagogical content knowledge for nature of science

Pedagogical Content Knowledge (PCK) has been defined by Shulman (1986) as the intersection of a teacher's knowledge of subject material (content) and how the teacher translates that material into a

format understandable by the learners (pedagogy). A review of literature reveals a plethora of definitions for Nature of Science (NOS) all alluding to what the actual character of science is. Erduran and Dagher (2014) have defined NOS using categories that depict science in a holistic system with dynamic interactions as aims and values; methods; scientific practices; scientific knowledge; social certification and dissemination; scientific ethos; social values; professional activities; social organizations and interactions; financial systems; and political power structures. Lederman (1998) referred to NOS as distinct principles characterizing science, known as the tenets of NOS: empirical; inferential; creative; theory-driven; tentative; myth of the scientific method; scientific theories; scientific laws; social dimensions of science; and social and cultural embeddedness of science. Research by Akerson, Abd-El-Khalick, and Lederman (2000) on Science teachers, both in-service and pre-service, has revealed a general naïve understanding of NOS. This holds truth for the South African context where Bantwini, Kurup, Linneman, Lynch, and Webb (2003); Gwebu (2015) found that teachers had naïve to transitional understandings of NOS. Understanding of NOS is important for the development of scientific literacy according to Chaiyabang and Thathong (2013). Vhurumuku (2010) describes scientifically literate citizens as having the ability to contribute to decision making processes concerning technology and the environment or issues pertaining to scientific research. Owing to the naïve understanding of NOS by South African teachers, this researcher in a PhD study developed a teacher professional development program to improve NOS understanding of in-service teachers. The study aimed to improve existing PCKNOS of participant teachers and track any changes in their PCKNOS post-training.

Faikhamta (2013) described PCK for NOS as the ability of educators to transform their understanding of NOS into a context suitable to facilitate student learning of NOS. This includes, but is not limited to, the appropriate selection of instructional material or media and the correct use of metaphors, analogies or other pedagogical tools (Haunscin et al., 2011) by the teacher to address NOS concepts during teaching. This enacted PCK would most appropriately be documented according to the researcher through lesson observations as opposed to documenting planned actions. Planned PCK known as espoused PCK by Aydeniz and Kirbulut (2014) has been documented through tools such as content representation developed by Loughran, Mulhall and Berry (2006) and there exists studies on the use of such tools. At the time of writing this research, there existed limited information on documenting enacted PCK of science teachers.

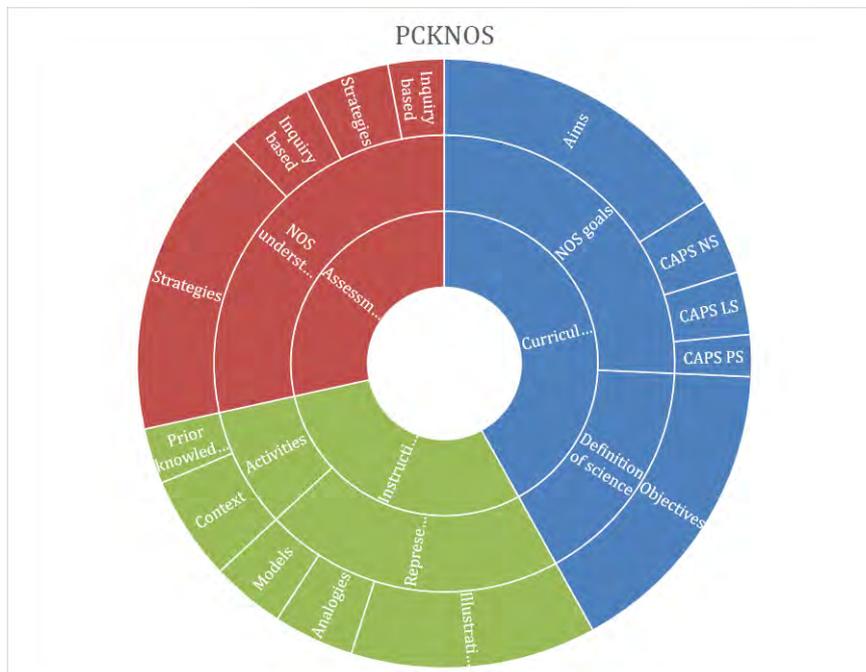
3. Conceptual framework

In developing the conceptual framework for this study based on PCKNOS, the researcher adapted the Secondary Teachers' Scientific Pedagogical Content Knowledge (STSPCK) tool for documenting PCK of high school Science teachers developed by Aydeniz and Kirbulut (2014). STSPCK was deemed appropriate to measure enacted PCK owing to its statements being posed as actionable teaching strategies that the researcher could observe. Similar to STSPCK, the PCKNOS tool developed for this study would seek to establish PCK domains of curriculum, instructional knowledge and assessment for NOS. Knowledge of curriculum comprises the goals and objectives of NOS for students in the science subject that they are being taught according to Magnusson, Borko, and Krajcik (1999). To document this PCK domain in the observation schedule, the researcher compiled statements extracted from aims, objectives and definitions of Science in the relevant curriculum documents. In South African high schools natural sciences (NS) is taught from grades 7-9 and is a compulsory subject, physical sciences (PS) and life sciences (LS) are optional subjects and taught from grades 10-12. Each subject has its own curriculum statement. For instance, the specific aims of physical sciences in the National Curriculum and Assessment Policy Statement (CAPS) require a teacher to have an understanding of NOS and its relationship to technology, society and the environment. In the PCKNOS observation schedule one of the observation statements for knowledge of curriculum reads: the teacher demonstrates an understanding of NOS and its relationship to technology. To establish instructional knowledge for NOS of the teacher, the observation schedule documented the illustrations, models or analogies used by the teachers to represent NOS knowledge, NOS specific activities and their pedagogical representations. Statements to document knowledge of instruction were adopted directly from the STSPCK tool. An exemplar statement reads: the teacher starts the lesson by helping children to discover what they already know about the concepts of NOS to be taught in the lesson. Finally assessment for NOS is the strategies employed by the teachers to evaluate NOS understanding by the learners and include assessment of inquiry based learning. Aydeniz and Kirbulut (2014) include inquiry based science in the STSPCK tool. Inquiry based science was relevant to PCKNOS, since inquiry based learning involves activities that include learners in discussions and science process skills indicative of NOS. Statements to document knowledge of assessment were adopted directly from the STSPCK tool. An exemplar statement reads: the

teacher uses problems that require the students to communicate their understanding of the concept through multiple means.

PCKNOS for this study comprises knowledge of curriculum, instruction and assessment. The diagram below is a visual representation of the PCKNOS framework as formulated by the researcher on which the lesson observation schedule is based.

Figure 1. PCKNOS framework.



3.1. PCKNOS lesson observation schedule

The observation schedule to document PCKNOS termed Nature of Science Pedagogical Content Knowledge tool (NOSPCK) comprised three sections. A) measures curriculum knowledge of NOS by the teacher using statements such as: the teacher emphasizes a curriculum that displays the tentative NOS. B) measures knowledge of instructional strategies using statements such as: the teacher starts the lesson by helping children to discover what they already know about the concepts of NOS to be taught in the lesson. C) measures knowledge of assessment strategies for NOS and includes statements such: as the teacher poses open ended questions on NOS. Each statement that documents teacher actions in these sections is allocated a rating based on a 5 point Likert scale of 1-5. 1 representing never occurs and 5 indicating that the action always occurs.

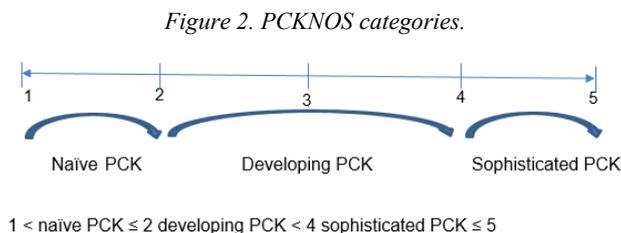
4. Methodology

To test the PCKNOS tool, two Science teachers were observed in their classrooms. Teacher one was teaching the topic of naming compounds to a grade 9 physical sciences class and teacher two taught the topic of genetics in life sciences to a grade 12 class. Both teachers were teaching at the same school, a private school in Johannesburg, South Africa. Due to COVID-19 restrictions at the time of conducting the study and limited access to classrooms by researchers, the teachers recorded online classes that they conducted and sent the recordings to the researcher. The two participant teachers formed part of a larger group of in-service teachers who were participating in a study to improve their understanding of NOS. The teachers were selected based on availability, willingness to participate and access to online services. Prior to the lesson observations, the teachers had completed questionnaires to assess their views of NOS and analysis of those documents had revealed that both teachers had a naïve understanding of NOS.

4.1. Data analysis

On receiving lesson recordings sent by participating teachers the researcher reviewed and transcribed the lessons. Occurrences that fulfill statements on the PCKNOS lesson observation schedule were documented. Each statement is allocated a rating on a 5 point Likert scale of 1-5. 1 representing an occurrence that never occurs and 5 indicating that the action always occurs. From these ratings the PCKNOS of a teacher is then categorized as naïve, developing or sophisticated. A teacher who falls in the

naïve category would have obtained scores between 1 and 2, and seldom demonstrates aspects of PCKNOS. A developing PCK is characterized by a teacher who sometimes conforms to the aspects of PCK on the observation schedule having scores above 2 but less than 4. A sophisticated PCK is evidenced by a teacher who obtains a score of 4 and 5, defined as often and always conforming to the aspects of PCK on the observation schedule. A visual representation of the categories is shown below:



4.2. Reliability and validity

To ensure reliability and validity in the data analysis process, two raters were used to analyze the data. Each rater reviewed the data independently assigning points on the Likert scale. Where there were differences in scores, discussions were held until a consensus was reached on the score that was to be allocated.

4.3. Findings

The two participating teachers displayed an overall naïve PCKNOS in their lessons. However, teacher 2 showed a developing PCK for knowledge of instruction of NOS. The table below shows some excerpts from the lesson observation schedule for the participating teachers:

Table 1. Excerpts from PCKNOS tool for teachers 1 and 2.

Statement	Score 1-5	Teacher 2 examples and comment
The teacher uses a curriculum that emphasizes NOS	3	Focuses only on science knowledge through theory of naming compounds and drawing models of compounds
the teacher uses probing questions to help students retrieve relevant information and experiences on NOS	1	Teacher centered instruction
Statement	Score 1-5	Teacher 1 examples and comment
the teacher demonstrates the social NOS	2	Teacher refers to arguments and debates amongst examiners about phenotypical orientations
the teacher emphasizes a curriculum that displays the empirical NOS	2	Uses history of science example of the case of haemophilia in a royal family

5. Discussion of findings

The overall under-developed PCKNOS of the two participating teachers is consistent with their naïve understanding of NOS. One of the domains of PCK is knowledge of content, it therefore follows that without knowledge and an understanding of NOS concepts the PCKNOS will be underdeveloped. This consistency in findings has led the researcher to conclude that the PCKNOS tool exhibits some reliability as an instrument to document enacted PCKNOS. The instrument will need to be tested on a larger group of participant teachers to verify these findings and further reliability of the instrument can then be commented on.

6. Conclusion

This paper has reported on the development and subsequent testing of an instrument to document teacher PCKNOS. The tool was tested on two in-service teachers and produced findings that are consistent with the views of nature of science of the teachers that had been documented using a separate instrument. These findings resonate with literature produced by Gwebu (2015), Govender and Zulu (2017), that in South Africa the NOS is a naively understood concept amongst teachers and there is a need for professional development of in-service teachers on NOS.

References

- Abd-El-Khalick, F., & Lederman, N. G. (2000). Improving science teachers' conceptions of nature of science: A critical review of the literature. *International Journal of Science Education*, 22, 665–701.
- Akerson, V. L., & Abd-El-Khalick, F., & Lederman, N. G. (2000). Influence of a reflective explicit activity based approach on elementary teachers' conceptions on nature of science. *Journal Research of Science Teachers*, 34(7), 673-699.
- Aydeniz, M., & Kirbulut, Z. D. (2014). Exploring challenges of assessing pre-service science teachers' pedagogical content knowledge (PCK). *Asia-Pacific Journal of Teacher Education*, 42(2), 147-166. doi: 10.1080/1359866X.2014.890696
- Bantwini, B., & Kurup, R., & Linneman, S. R., & Lynch, P., & Webb, P. (2003). South African science teachers' perception on the nature of science. *African Journal of Research in SMT Education*, 7, 35-50.
- Bertram, A., & Loughran, J. (2011). Science teachers' views on CoRes and PaP-eRs as a framework for articulating and developing pedagogical content knowledge. *Research in Science Education*, 42, 1-21. doi: 10.1007/s11165-011-9227-4
- Chaiyabang, M. K., & Thathong, K. (2013). Enhancing Thai teachers' understanding and instruction of the nature of science. Paper presented at 5th World Conference on Educational Services.
- Department of Basic Education. (2011). *Curriculum and Assessment Policy Statement: National Curriculum Statement Grades 10-12 Physical Sciences*. Pretoria, Government Printer.
- Erduran, S., & Dagher, Z. (2014). Family resemblance approach to characterizing science. *Reconceptualizing the nature of science for science education* (pp. 19-40). Netherlands: Springer.
- Faikhamta, C. (2013). The development of in-service science teachers' understandings of and orientations to teaching the nature of science within a PCK-based NOS course. *Research in Science Education*, 43(2), 847.
- Govender, G., & Zulu, D. (2017). Natural sciences junior high school teachers' understanding of the nature of science and its impact on their planning of lessons. *Journal of Baltic Science Education*, 16(3), 366-378.
- Gwebu, M. I. (2015). *The understanding of the nature of science among physical sciences teachers from the Badplaas circuit of the Mpumalanga Province* (Master's thesis, University of Johannesburg, Johannesburg, South Africa). Retrieved from https://ujcontent.uj.ac.za/vital/access/manager/Index?site_name=Research%20Output
- Haunscin, D. L., Lee, M. H., & Akerson, V. L. (2011). Elementary teachers' pedagogical content knowledge for teaching the nature of science. *Science Education*, 95, 145–167.
- Lederman, N.G. (1998). The state of science education: Subject matter without context. *Electronic Journal of Science Education*, 3(1). Retrieved August 20, 2013, from: <http://wolfweb.unr.edu/homepage/jcannon/ejse/lederman.html>
- Lederman, N. G., & Lederman, J. S. (2004). Revising instruction to teach nature of science. *The Science Teacher; Washington*, 71 (9), 36-39.
- Lederman, N. G. (2007). Nature of science: past, present and future. In S. K. Abell & N. G. Lederman (Eds.), *Handbook of research on science education* (831-879). Mahwah, New Jersey: Lawrence Erlbaum Publishers.
- Loughran, J., Mulhall, P., & Berry, A. (2006). *Understanding and developing science teachers' pedagogical content knowledge*. Rotterdam: Sense Publishers.
- Magnusson, S. J., Borko, H., & Krajcik, J. S. (1999). Nature, sources, and development of pedagogical content knowledge for science teaching. In J. Gess-Newsome & N. G. Lederman (Eds.), *Examining pedagogical content knowledge. Science and technology education library* (Vol.6). Springer, Dordrecht.
- Shulman, L. S. (1986). Those who understand: Knowledge growth in teaching. *Educational Researcher*, 15(1), 4-14.
- Vhurumuku, E. (2010). Using scientific investigations to explain the nature of science. In U. Ramnarain (Ed.), *Teaching scientific investigations* (26). Johannesburg: Macmillan.

THE ROLE OF MOTIVATION AND JOB SATISFACTION IN THE USE OF MODERN TEACHING MODELS

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Abstract

The aim of this paper is to examine the role of some socio-economic characteristics, familiarity with the concept of advanced teaching models, job satisfaction and motivation to work with children in the use of modern teaching models.

A total of 83 teachers of Technical Education participated in the research. An online questionnaire was created to collect data, which consisted of 4 scales (SES; Job Satisfaction, Motivation to work with children, and Familiarity with advanced teaching models).

Most teachers are very satisfied with their work and are highly motivated to work with children. The results show that 84.21% of teachers are familiar with some advanced teaching models. Job satisfaction has a statistically significant influence on the use of modern teaching models (project teaching, problem teaching, flipped classroom, interactive teaching, team teaching). Familiarity with advanced teaching models positively contributes to the use of modern teaching models.

We conclude that job satisfaction is a very important segment in all organizations. A satisfied employee will be more productive. Each school should examine employee satisfaction and provide training on modern teaching models, which is going to contribute to the quality of the educational process.

Keywords: *Job satisfaction, motivation, modern teaching models.*

1. Introduction

Teaching is joint activity of teachers and students with the aim of achieving educational goals. Given the ongoing speed of change in technology on a daily basis, it is necessary to make educational activity more effective than ever before. Teaching is often superficial, full of monologues that turns students away from the subject itself and the teaching content, it is often formalized and verbalized, which greatly reduces the lasting effect of knowledge and connecting theory with real life. Such instruction needs to be replaced with modern teaching techniques in order to encourage students to be independent, to learn by identifying and solving problems. Technical education introduces students to the world of technology and enables them to understand the technical environment around them, including knowing the benefits and possible dangers it represents to humanity and the environment, as well as the responsible and critical application and active participation in the creative development of technology.

Today, there are many models of modern teaching, but we will highlight only some of them in this paper, specifically: team teaching, project teaching, problem teaching, flipped classroom and interactive teaching. Quinn & Kanter (1984) define *team teaching* as “simply team work between two qualified instructors who, together, make presentation to an audience”. Meyer (2002) provides the following definition of a project: “*Project-based learning* is a joint attempt by teachers and students to connect life, learning and work so that a socially relevant problem related to the interests of participants is processed together (=process) leading to results (=product) that have useful value for the participants.” *Problem-based learning* is “an instructional (and curricular) learner-centered approach that empowers learners to conduct research, integrate theory and practice, and apply knowledge and skills to develop a viable solution to a defined problem” (Savery, 2015:9).

The flipped classroom is a new pedagogical method, which employs asynchronous video lectures and practice problems as homework, and active, group-based problem-solving activities in the classroom (Bishop & Verleger, 2013:1). *Interactive teaching* implies that all elements of the teaching process (content-related, psychological, cognitive, sociological and organizational) are functionally connected and form a harmonious whole (Drobnjak, 2007:81).

According to the results of previous studies (Huang et al., 2013), the teacher's job satisfaction plays a significant role in the quality of teaching. If teachers are satisfied, then they are more committed and involved in their work (Sargent & Hannum, 2005). It is expected that a school which has teachers with high levels of job satisfaction provides qualified education and brings up successful students (Demirtas, 2010). According to Snipes et al. (2005) job satisfaction consists of several facets, specifically: satisfaction with the supervisor, work, pay, advancement opportunities and the quality of cooperation with colleagues.

Motivational factors, especially working with children and the perception of one's own teaching abilities, are important predictors of job satisfaction (Šimić Šašić et al., 2013). Borić (2017) states that the most important factors motivating teachers to work are job satisfaction, realization that the work they do is valued and the atmosphere of collegiality. A review of previous research shows that there is a considerable number of studies that have dealt with teacher's job satisfaction or their motivation for work, but there is a lack of research that comprehensively addresses the role of these factors in the use of modern teaching methods.

2. Design

The aim of this paper is to examine the role of some socio-economic characteristics, familiarity with the concept of advanced teaching models, job satisfaction and motivation to work with children in the use of modern teaching models.

2.1. Respondents, procedure and measurement instruments

A total of 83 teachers, specifically 54 female primary school teachers and 29 male primary school teachers of Technical Education from several cities in the Republic of Croatia participated in the study. The data was collected in October 2021 using an online Google Form. A questionnaire was created for the purpose of this study, which consisted of general questions (gender, years of service, educational/non-educational study program, training), Job satisfaction scale (7 statements), Job motivation scale (7 statements) and Familiarity and use of modern teaching methods scale (5 subscales: project teaching, problem teaching, flipped classroom, interactive teaching and team teaching, and each subscale presents 5 statements). In all the Scales, respondents measured their agreement with presented statements on a scale from 1=strongly agree to 5=strongly disagree.

3. Results

The results of descriptive statistics show that teachers have an average of 9.18 years of service with an average deviation from the arithmetic mean of 9.81 years. The teacher with longest service has 32 years of service.

The largest number of teachers have completed graduate studies (n=74; 89.15%) in education – polytechnics (n=50; 60.24%). Almost the same number of teachers did and did not partake in additional teaching education or training (n=42: 50.60%).

The largest number of teachers rated their job satisfaction with a numerical value of 4 (n=43; 51.80%), while the average satisfaction rating was 3.87 with an average deviation from the arithmetic mean of 0.73.

Almost 90% of teachers rated their motivation for work with numerical values of 4 (n=33; 39.75%) and 5 (n=42; 50.60%) while the average motivation rating was 4.39 with an average deviation from the arithmetic mean of 0.67.

The average rate of use of modern teaching models is 2.60, a value lower than the limit value of 3, that is, the rate of use of modern forms of teaching is low (Table 1).

Table 1. Descriptive statistics of the use of modern teaching models.

	M	SD	N
Using modern teaching models	2.60	.63	83

All teachers believe that project teaching can be applied in instruction of some contents of Technical Education while 81 teachers (97.59%) consider that team teaching is applicable. The smallest number of teachers, that is, 57 teachers (68.67%) believe that the flipped classroom model can be used in teaching some contents of Technical Education (Table 2).

Table 2. Descriptive indicators of the possibility of applying certain teaching models.

	Project-based learning	Problem-based learning	Flipped classroom	Team teaching	Interactive teaching
Use	100.00	94.74	68.42	97.59	89.47
Do not use (%)	0	5.26	31.33	2.63	10.53

The value of the coefficient of determination is 0.436, that is, 43.6% of the sum of squares of deviations in the use of modern teaching models (project teaching, problem teaching, flipped classroom, interactive teaching, team teaching) is interpreted by the estimated regression model. The estimated model has a lower level of representativeness ($R^2 < 0.70$) (Table 3).

Table 3. Representativeness of the regression model.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.660 ^a	.436	.280	.5351
a. Predictors: gender, years of service, study program (educational/engineering), professional development, job satisfaction, motivation to work with children, familiarity with modern teaching models.				
b. Dependent Variable: Using modern teaching models				

ANOVA test is used to examine the statistical significance of the estimated model.

The empirical F ratio is 2.80, that is, it shows that the estimated model is statistically significant. The empirical level of significance is 0.020 (Table 4).

Table 4. Results of ANOVA analysis.

	Sum of Squares	Df	Mean Square	F	Sig.
Regression	6.416	8	.802	2.801	.020 ^b
Residual	8.304	29	.286		
Total	14.720	37			
a. Dependent Variable: Using modern teaching models					
b. Predictors: gender, years of service, study program (educational/engineering), professional development, job satisfaction, motivation to work with children, familiarity with modern teaching models.					

The following table shows the results of regression analysis (Table 5).

Table 5. Results of regression analysis.

Coefficients ^a							
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	1.107	.760		1.456	.156		
Gender	-.107	.190	-.083	-.565	.576	.935	1.070
Years of service	-.004	.012	-.067	-.377	.709	.635	1.574
Study program (educational/engineering)	-.186	.212	-.139	-.876	.388	.807	1.239
Professional development	.266	.220	.214	1.213	.235	.653	1.531
Job satisfaction	.341	.150	.401	2.270	.031	.650	1.539
Motivation to work with children	-.114	.164	-.123	-.695	.492	.648	1.544
Familiarity with modern teaching models	.888	.256	.520	3.467	.002	.902	1.109
a. Dependent Variable: Using modern teaching models							

Job satisfaction has a statistically significant influence on the use of modern teaching models (project teaching, problem teaching, flipped classroom, interactive teaching, team teaching). The estimated parameter has a value of 0.341, that is, for every increase in job satisfaction, an increase in the level of use of modern teaching methods can be expected and vice versa, with the value of other variables remaining the same. The estimated parameter is statistically significant ($p=0.031<0.050$).

Familiarity with the concept of advanced teaching models positively contributes to the use of modern teaching models (project teaching, problem teaching, flipped classroom, interactive teaching, team teaching), that is, for every one unit increase in the familiarity with the concept of advanced teaching models, an increase by 0.89 points in the use of modern teaching models can be expected and vice versa, with the value of other variables remaining the same. The estimated parameter is statistically significant ($p=0.002<0.050$).

4. Discussion

The descriptive results of this research show that primary school teachers of Technical Education do not sufficiently use modern teaching models. A possible explanation for this result may be that primary school teachers are not familiar with modern teaching models or do not have the opportunities and material working conditions, which is consistent with results of other similar studies (Anđić & Vidas, 2021). Descriptive statistics show that primary school teachers are satisfied with their work, and at the same time job satisfaction is a statistically significant predictor for the use of modern teaching models. This result can be interpreted as teachers being satisfied with their relationship with children and achieved educational goals (Türkoglu et al., 2017; Toropova et al., 2021). They are also satisfied with cooperation with colleagues, achieved working success, the quality of their work being recognized by their supervisors and advancement opportunities, which cumulatively contributes to teachers' job satisfaction (Borić, 2017). Familiarity with modern teaching methods is a statistically significant predictor for using the same, which is logical, since modern teaching models cannot be implemented in instruction unless teachers possess sufficient knowledge on their application, planning and realization in instruction, and unless they know how to encourage such forms of work that will activate the students (Holubová, 2010; Anđić, & Vidas, 2021).

5. Conclusion

The results of this research showed that primary school teachers of Technical Education do not sufficiently use advanced teaching methods. They believe that project teaching is most applicable in Technical Education, and the flipped classroom the least. According to the respondents' self-reports, their job motivation is very high. More than half of the respondents are very satisfied with their job. It was found that job satisfaction and familiarity with modern teaching models are statistically significant predictors for using modern advanced models. Based on the obtained results, we conclude that it is necessary to conduct continuous workshops and seminars for teachers in order to acquaint them with advanced models and encourage them to apply them.

References

- Anđić, D., Vidas, K. (2021). Istraživački pristup kao suvremena nastava ili tek odmak od tradicionalne nastave? Mišljenja učitelja o istraživačkom pristupu u nastavi prirode i društva. *Školski vjesnik: časopis za pedagoški teoriju i praksu*, 70(1), 147-175.
- Bishop, J., Verleger, M. A. (2013). The flipped classroom: A survey of the research. In *2013 ASEE Annual Conference & Exposition*, 23-1200.
- Borić, E. (2017). Zadovoljstvo poslom, motivacija učitelja za rad i poticanje razvoja kompetencija učenika. *Metodički ogledi: časopis za filozofiju odgoja*, 24(2), 23-38.
- Demirtas, Z. (2010). Teachers' job satisfaction levels. *Procedia-Social and Behavioral Sciences*, 9, 1069-1073.
- Drobnjak, N. (2007). Integrativna nastava. *Obrazovna tehnologija*, 1(2), 1-11.
- Holubová, R. (2010). Improving the quality of teaching by modern teaching methods. *Problems of Education in the 21st Century*, 25, 58-66.
- Huang, S., Huang, Y., Chang, W., Chang, L., & Kao, P. (2013). Exploring the effects of teacher job satisfaction on teaching effectiveness. In *International Journal of Modern Education Forum*, 2(1), 17-30.
- Meyer, H. (2002). *Didaktika razredne kvake*. Zagreb: Educa.

- Quinn, S., Kanter, S. (.1984), Team teaching: An Alternative to Lecture fatigue (JC 850 005) Paper on abstract: Innovation Abstracts
- Quinn, S. L., Kanter, S. B. (1984). Team Teaching: An Alternative to Lecture Fatigue. In *Innovation Abstracts*, 6 (34), 34
- Sargent, T., Hannum, E. (2005). Keeping teachers happy: Job satisfaction among primary school teachers in rural northwest China. *Comparative education review*, 49(2), 173-204.
- Savery, J. R. (2015). Overview of problem-based learning: Definitions and distinctions. *Essential readings in problem-based learning: Exploring and extending the legacy of Howard S. Barrows*, 9(2), 5-15.
- Snipes, R. L., Oswald, S. L., LaTour, M., Armenakis, A. A. (2005). The effects of specific job satisfaction facets on customer perceptions of service quality: an employee-level analysis. *Journal of business research*, 58(10), 1330-1339.
- Šimić Šašić, S., Klarin, M., Grbin, K. (2013). Motivacija za učiteljski poziv, zadovoljstvo studijem i zadovoljstvo izborom zanimanja. *Magistra Iadertina*, 8(1.), 7-27.
- Toropova, A., Myrberg, E., Johansson, S. (2021). Teacher job satisfaction: the importance of school working conditions and teacher characteristics. *Educational review*, 73(1), 71-97.
- Türkoglu, M. E., Cansoy, R., Parlar, H. (2017). Examining Relationship between Teachers' Self-Efficacy and Job Satisfaction. *Universal Journal of Educational Research*, 5(5), 765-772.

THE FUTURE AND SUSTAINABILITY OF MEANINGFUL EDUCATION LIES IN THE ABILITY OF SEASONED TEACHERS TO CULTIVATE NOVICE TEACHERS THROUGH STRENGTH-BASED-MENTORING

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Abstract

Newly qualified teachers are barraged with uncertainties and could seem inadequately prepared for the teaching profession. Even though graduates are believed to have sufficient subject content knowledge the average day could offer more interruptions than anticipated. Although this study will not aim dispute the quality or value of the curriculum offered; there seems to be an absence in the holistic development of educators. It is therefore imperative that experienced educators serve as mentors to expand the gain of their skills learnt through exposure and involvement in teaching, adding value to the education sector. As part of prospective doctoral study, the researcher will investigate whether a mentorship program for seasoned educators could offer guidance, stability and confidence to novice teachers by contributing maturity and responsibility.

South Africa has educational challenges 25 years post-apartheid; whether it be pit latrine, bilingual schools in monolingual areas (and vice versa) or often vandalized schools. These factors impact education ranging from macro- (education sector), meso- (socio-economic decline) as well as micro-level (teacher and learner) with majority support from the Department of Education to socio-economic challenges and little attention to educators. Hence, this study will purposefully focus on micro-level where educators could hold one another accountable to build educational capacity. The discovery of challenges novice teachers experience and whether possible gaps exist which could be filled by a suitable mentoring program will have initial priority, with the secondary intention to assist seasoned teachers on a road to self-discovery, embracing a servant leadership role in a quest to address these challenges, striving towards solutions in mentoring for the benefit of sustainable learning.

The study elects to include Secondary schools from different backgrounds in the Free State Educational District, involving teachers selected based on their eagerness to improve their life and teaching skills. A pragmatic research approach will be intended with the inherent use of mixed method research to analyze data. Quantitative data could point towards the possible gaps and challenges with the use of a questionnaire. From this data strengths-based-mentoring collaboration sessions will follow to obtain qualitative data about the suitability of a mentorship programme. Pragmatism as a research method complements the combination of positivism leading to the appreciation of its suitability in practice focusing on solutions.

Keywords: *Mentoring, novice, strength-based, leadership, accountability.*

1. Introduction

This literature review represents an envisaged study based on whether novice teachers could grow in both their personal and professional capacity when suitable and sufficient support are offered from seasoned educators. This reversed responsibility on seasoned educators to anticipate the gaps and shortfalls novice teachers might experience; stepping into a servant-leadership role offering guidance, stability and instil confidence to novice teachers; will be the key driver on the efficacy for the need of a mentorship programme in South African Education Sector.

To add context, the career paths of postgraduates in Education and Professional Accounting will be compared. Both individuals spend around four years on campus completing their studies. Both have been exposed to work integrated learning (WIL) and presumably engaged in numerous student activities building character to develop holistically. On completion of their respective degrees, the future accountant will do an internship prior to a position as an Accountant, the norm being approximately three years. Senior staff understand that interns are finding their feet, learning new skills; mostly retaining their status as students for three additional years. In contrast, Education Postgraduates in South Africa (novice teachers)

leave university as fourth-year students in December, walks into a school early January expected to be adults and at times take responsibility for Grade 12 learners. It proves to be a mammoth task to transform from a free-spirited student to a responsible adult in less than a month. It seems the development gap is a tad too great for a novice teacher to move from student to adult in such a short time frame without suitable support. Against these odds, South African Educators still manages to produce successful matriculants year after year, but the burden has to be lightened for novice teachers.

To date, the Department of Basic Education (DBE) has offered and implemented various support programmes to ensure stability in the education sector, although few exclusively support educators. Therefore, this research will aim to focus on the support of novice teachers who enters the work force with more than teaching on their plate.

2. Literature review

From literature by Porumb, Romania experienced similar challenges with beginner teachers and have according to literature successfully implemented a mentorship programme supporting their beginner teachers with a program aimed to improve the professional incorporation and active growth of beginner teachers. The programme initiates from university studies and continues towards a national formal system of traineeship which is coherent, cohesive and sustainable. This mentorship program in Romania has been formalised in September 2011 using the experience and potential of existing teachers, ensuring a measure of appeal to the teaching career through mentorship and support activities (Porumb 2015).

Porumb further remarks that document analysis in addition to survey-based research were used as research method; including 82 secondary education teachers who were trained to obtain the mentor status. The training program assured and improved inter correspondences through curricular coherence and their interdependence. The trainees largely agreed that assuring a high level of pedagogy conception and the penetration of the mentorship training program results from the professional model submitted. From this suggestion the researcher embarked on the hunt for a program with a reputable background to support the study to be done in South Africa's Central region.

Crossing the North Atlantic to Texas, USA, literature by Chetty and Hanushek indicated quality teaching relative to other school-based factors to the single most important predictor of student success (Chetty et al. 2014; Hanushek 2011). Associating with the sentiment, more researchers added that the most consistent observable characteristic associated with quality teaching is experience (Clotfelter, Ladd, and Vigdor 2006; Papay and Kraft 2015). This relationship between quality teaching and experience raises an important equity concern as early-career teachers, who are less effective at increasing student achievement are disproportionately assigned to historically underserved students (Goldhaber, Lavery, and Theobald 2015). This unbalanced representation of early-career teachers in particular settings also has equity implications for the stability of underserved students' learning environments with research by Cowan indicating that early-career teachers have a high attrition and mobility rate (Cowan and Goldhaber 2018).

Statistics from the United States by Gray in (Gray and Taie 2015) suggests one in ten teachers does not return to the classroom after their first year and nearly 20% of teachers left the profession entirely within five years. These high attrition rates negatively impact student assessment results (Goldhaber, Lavery, and Theobald 2015; Hanushek, Rivkin, and Schiman 2016). Maerman and Sorenson in turn found that teacher turnover negatively impacts the quality of instructional staff and student achievement in North Carolina, USA (Mearman et al. 2014; Sorensen and Ladd 2020).

It is from these instances where teachers are directly affected that the educational system starts to lose ground from the researcher's perspective.

Similar to Romania, the United States realised a change of focus towards teachers, with research indicating that although the effectiveness of streamlining their teaching ability increases throughout a teacher's career, early-career teachers demonstrate the greatest growth early in their careers (Podolsky, Kini, and Darling-Hammond 2019). Smith concurs that early-career teachers often participate in formal teacher education programs as student teachers in supervised surroundings, but their initial years in the profession are often their first experience as a full fletched teachers taking responsibility for all aspects of the classroom (Smith 2004). This sudden shift in responsibility could be a challenging phase for novice teachers and has rightly accrued a growing body of literature which identifies professional support such as mentoring and professional development to be essential to support novice teachers, encouraging their persistence (Darling-Hammond 2003; Goldhaber, Krieg, and Theobald 2020; Kraft et al. 2018; Podolsky, Kini, and Darling-Hammond 2019; Wood and Stanulis 2009).

3. Mentorship

Mentorship according to Ingersoll and Smith (2004) is described as a component of the teaching profession transformation process. It could be highly structured and formal or less formal and comforting; both intentional assisting novice teachers to acclimate to their new environment (Ingersoll and Strong 2011).

To provide additional support to novice teachers, career strengthening strategies have to be implemented. It often results in a monumental resource-intensive endeavor, but worthwhile in terms of career development. Although the research suggests that mentorship and professional development could shape and drive novice teachers' experiences, this study will mainly focus on a strength-based mentorship approach.

The researcher will aim to find the differences and comparisons between mentorship and coaching to maintain accuracy when roles are being allocated, to ensure a collaborative approach avoiding a top down structure creating a boss and worker setup.

4. Theoretical framework

With this review of the literature in mind, (Patton and McMahon 1999) Systems Theory Framework of Career Development could guide this study as the theory illustrates how a number of interrelated systems collectively impact an individual's career development, including the individual, social, and environmental-societal systems. The individual system includes attributes such as an individual's age, skills, health, gender, ethnicity, beliefs, interests, and skills. The workplace, community groups, educational institutions, family, and peers will be a key driver guides our approach to find a suitable mentor-mentee partnership.

The scarceness of research in terms of educational mentorship could be justifies the researcher probably to transition from a Theoretical to Conceptual framework as the study progresses since theoretically a problem does exist in the development and attrition of novice teachers. Conceptually the researcher will have to investigate the possibility that novice teachers might only be uncertain about the expectations and responsibilities culminating from their career choices. From the interviews with novice teachers the framework will conceptually indicate where the exact shortfalls exist to be addressed during the promising development of a mentorship programme.

Two likely theories related to Coaching and Mentoring are the Zone of Proximal Development (ZPD) described as the distance between what a learner is capable of doing unsupported versus what they can do supported, and Biggs's Presage-Process-Product Model (3P's) summarised as the movement of learning from a student's prior knowledge using learning focused activities to reach a desired outcome.

The GROW Model (used when dealt with performance considerations) could also proof a worthy contributor to the study since the goal in terms of the reality still has to be set.

5. Design and methodology

Since individual feedback are paramount, the researcher will indulge in a qualitative research approach, including scrupulous literature review. Formal interviews will be held; including pre- and post-interviews to measure possible growth during an active research pedagogy study.

The researcher enrolled for a Gallup strengths-based-coaching course as research tool to utilise during the interviews. Since the purpose is not to redesign existing mentorship programmes, Gallup as an existing course has been selected to investigate if Gallup could be used to define and motivate the development of a mentorship programme which could add value to novice teachers.

The Gallup coaching course requires certification to present, and therefore the researcher will first complete the course before approaching schools. When the researcher is a qualified Gallup coach, 5 schools, with diverse resources ranging from rural, urban, cross cultural, single medium and/or poor in the Free State Educational District, will be approached. The aim will be to include 10 teachers of which 5 seasoned and 5 novices, whom do not have to be subject related, but rather selected on eagerness to improve their personal skills and growth.

All participants will be invited to a workshop, participating in a Gallup online assessment similar to what the researcher has done. The workshop will then aim to manage individual attention and focus for the participants to learn about and from themselves and their peers.

The practical relevance of pragmatism as a research paradigm will be implemented during pragmatic research to analysed data. The purposeful use of quantitative data will be to find the possible gaps and challenges novice teachers might experience via interviews. The perceived frustration seasoned teachers might experience when novice teachers join the team of educators could drive the conversation.

From these gaps, challenges, and frustrations a strengths-based-mentoring collaboration session will be held. Qualitative research methods will be employed during this period discussing how participants deem a suitable mentorship programme could benefit sustainable teaching (Mitchell 2018).

6. Objectives

By being resolute in the application of such a strength-based-mentorship program, the purpose would be to instil confidence in novice teachers, using their strengths to build an education sector which provides support at each level of its hierarchy, taking responsibility of our own, and realising that support is readily available. Ultimately this study will aim to investigate how and if our education structure, internally and externally, can be impacted by implementing a strength-based-mentorship programme developing a responsibility model linked to educational hierarchy.

A mentoring programme offered by seasoned teachers could have a positive impact to capacitate novice teachers for their chosen career in teaching. Investigation will be done to discover possible challenges novice teachers' experiences and which gaps could be filled by a suitable mentoring program. These gaps or challenges could range from lack of experience in teaching; lack of exposure to various personalities in a single class; uncertainty on fluctuations in a classroom situation; time management; etc.

An intentional benefit will be to assist seasoned teachers on a road to self-discovery embracing a servant leadership role in a quest to identify potential problems or challenges experienced by novice teachers and providing mentoring to ensure sustainable learning takes place in our classrooms.

References

- Chetty, Raj et al. 2014. "Measuring the Impacts of Teachers II: Teacher Value-Added and Student Outcomes in Adulthood †." *American Economic Review* 104(9): 2633–79. <http://dx.doi.org/10.1257/aer.104.9.2633>http://obs.rc.fas.harvard.edu/chetty/cfr_analysis_code.zip. (February 23, 2022).
- Clotfelter, Charles T., Helen F. Ladd, and Jacob L. Vigdor. 2006. "Teacher-Student Matching and the Assessment of Teacher Effectiveness." *Journal of Human Resources* 41(4): 778–820.
- Cowan, James, and Dan Goldhaber. 2018. "Do Bonuses Affect Teacher Staffing and Student Achievement in High Poverty Schools? Evidence from an Incentive for National Board Certified Teachers in Washington State." *Economics of Education Review* 65: 138–52. <https://doi.org/10.1016/j.econedurev.2018.06.010> (April 8, 2022).
- Darling-Hammond, Linda. 2003. "Keeping Good Teachers: Why It Matters and What Leaders Can Do." *Educational Leadership* 60(8): 6–13.
- Goldhaber, Dan, John Krieg, and Roddy Theobald. 2020. "Effective like Me? Does Having a More Productive Mentor Improve the Productivity of Mentees?" *Labour Economics* 63: 101792. <https://doi.org/10.1016/j.labeco.2019.101792> (February 23, 2022).
- Goldhaber, Dan, Lesley Lavery, and Roddy Theobald. 2015. "Uneven Playing Field? Assessing the Teacher Quality Gap Between Advantaged and Disadvantaged Students." *Educational Researcher* 44(5): 293–307.
- Gray, Lucinda, and Soheyta Taie. 2015. *Public School Teacher Attrition and Mobility in the First Five Years: Results From the First Through Fifth Waves of the 2007–08 Beginning Teacher Longitudinal Study*. <http://nces.ed.gov>. (February 23, 2022).
- Hanushek, Eric A. 2011. "The Economic Value of Higher Teacher Quality." *Economics of Education Review* 30(3): 466–79.
- Hanushek, Eric A., Steven G. Rivkin, and Jeffrey C. Schiman. 2016. "Dynamic Effects of Teacher Turnover on the Quality of Instruction." *Economics of Education Review* 55: 132–48. <http://dx.doi.org/10.1016/j.econedurev.2016.08.004> (February 23, 2022).
- Ingersoll, Richard M., and Thomas M. Smith. 2004. "Do Teacher Induction and Mentoring Matter?:" *Economics of Education Review* 23(1): 28–40. <http://dx.doi.org/10.1177/019263650408863803> (March 4, 2022).
- Ingersoll, Richard M., and Michael Strong. 2011. "The Impact of Induction and Mentoring Programs for Beginning Teachers: A Critical Review of the Research." *Educational Researcher* 40(2): 201–33. <http://dx.doi.org/10.3102/0034654311403323> (April 11, 2022).
- Kraft, Matthew A et al. 2018. "The Effect of Teacher Coaching on Instruction and Achievement: A Meta-Analysis of the Causal Evidence." *Review of Educational Research* 88(4): 547–88.

- Mearman, Andrew et al. 2014. "Understanding Student Attendance in Business Schools: An Exploratory Study." *International Review of Economics Education* 17: 120–36.
- Mitchell, Anthony. 2018. "A Review of Mixed Methods, Pragmatism and Abduction Techniques." In *17th European Conference on Research Methodology for Business and Management Studies*, eds. Paola Demartini and Michela Marchiori. Roma: Academic Conferences and Publishing International Limited, 269–72. https://books.google.co.za/books?hl=en&lr=&id=gU9mDwAAQBAJ&oi=fnd&pg=PA269&dq=pragmatism+approach+in+research&ots=Eue5g_i2Q-&sig=v4h8fIzvLdnD6cRuGggybXi7XGI#v=onepage&q=pragmatism+approach+in+research&f=false (November 24, 2021).
- Papay, John P., and Matthew A. Kraft. 2015. "Productivity Returns to Experience in the Teacher Labor Market: Methodological Challenges and New Evidence on Long-Term Career Improvement." *Journal of Public Economics* 130: 105–19. <http://dx.doi.org/10.1016/j.jpubeco.2015.02.008> (February 23, 2022).
- Patton, W, and M McMahon. 1999. "Career Development and Systems Theory: A New Approach." : 285.
- Podolsky, Anne, Tara Kini, and Linda Darling-Hammond. 2019. "Does Teaching Experience Increase Teacher Effectiveness? A Review of US Research." *Journal of Professional Capital and Community* 4(4): 286–308.
- Porumb, Ioana. 2015. "The Quality of Mentorship in Education – A Resource in Growing the Attractiveness of the Teaching Career." *Procedia - Social and Behavioral Sciences* 180: 945–52.
- Smith, R M. 2004. "Do Teacher Induction and Mentoring Matter?" *NAASP Bulletin* 88: 28–40. https://repository.upenn.edu/gse_pubshttps://repository.upenn.edu/gse_pubs/134 (February 23, 2022).
- Sorensen, Lucy C, and Helen F Ladd. 2020. "National Center for Analysis of Longitudinal Data in Education Research the Hidden Costs of Teacher Turnover." : 46.
- Wood, Ann L., and Randi Nevins Stanulis. 2009. "Quality Teacher Induction: 'Fourth-Wave' (1997–2006) Induction Programs." *New Educator* 5(1): 1–23.

DEVELOPMENT OF A COURSE FOR E-LEARNING TO THE TEACHING OF THE SUBJECT ANALYSIS OF VARIANCE

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Abstract

The random design is the simplest of all the designs that are used to compare two or more treatments. The analysis of variance is the central technique in the analysis of experimental data, the general idea of this technique is to separate the total variation in the parts which contributes each source of variation in the experiment. In the case of the random design, separates the variability of treatment. To facilitate education students, it focused on interpreting the results and not developing. It is important to use new technologies as a support to the teaching of the subject, in this document we propose different forms of feedback to the subject as statistical software, specialized web pages, applets, and virtual labs.

In this work an E-Learning course was developed on the platform Dokeos as support for the traditional kinds of design of experiments. In which, the subject of analysis of variance explains in a simple way what is the random design. The Dokeos platform was used because it is a free software based online learning suite and provides all the features that an online learning application needs, from the authorship of courses up to reports.

The objective was to adapt the above mentioned subject to an E-learning model in order (a) optimize the contribution of content, skills, and competencies that students must have, (b) the integration of statistical software in courses to emphasize applications to the real problems as contexts, concepts and methods, (c) the development of interactive materials that facilitate updating and learning by experimentation, (d) the use of a model of continuous assessment that guide and prepare the students in their formation, (e) the participation of the collaborative learning online by assigning projects and activities to be carried out in working groups.

E-learning course helps students for three things. First, to save time, since they have different tools that help to solve real problems. Second, they make use of computer science to understand the themes of the platform and at the same time are at the forefront of technology. On the other hand, it is also transmitted to the students the idea that learning is a continuous process and that it should be done. Third, show students that these tools offered the platform is not important memorizing formulas or perform arithmetic calculations, if not who can concentrate on results more quickly. The third, show that students with these tools offered by the platform is not as important memorizing formulas or perform arithmetic calculations, if not who can concentrate on results more quickly.

Keywords: *E-Learning, analysis of variance, Dokeos.*

1. Introduction

An experimental design is a schematic of how to conduct an experiment. The fundamental objective of the experimental designs is to determine if there is a significant difference between the different treatments of the experiment and if the answer is affirmative, what would be the magnitude of this difference. A second goal of the experimental designs is to verify the existence of a trend derived from the analysis of the data of the experiment. The main difference between experimental designs lies in the way the experimental units are grouped or classified.

The design of experiments began theoretically in 1935 by Sir Ronald A. Fisher, who gave the bases of the theory of Experimental Design and is currently quite developed and amplified. Currently the applications are multiple, especially in research in the natural sciences, engineering, laboratories and almost all areas of the social sciences.

In the course developed, a single factor is considered, the experimental designs used when the objective is compared with more than two treatments than are presented. It may be of interest to compare

three or more machines, several suppliers, four processes, three materials, five doses of a drug, and so on. Many of the comparisons are made based on the completely random design, which is the simplest of all the designs used to compare two or more treatments, since they only consider two sources of variability: the treatments and the random error. The course was conducted for a totally randomized design.

2. Development

The subject of design of experiments is taught in the food engineering degree, the purpose of this course is for students to obtain a better understanding of the subjects of analysis of variance of the subject. This course was developed on the Dokeos platform, under the E-learning methodology, which contains the following sections in each of these topics: Documents, Link, Tasks, Exercises, Chat, Forum and Task mailbox.

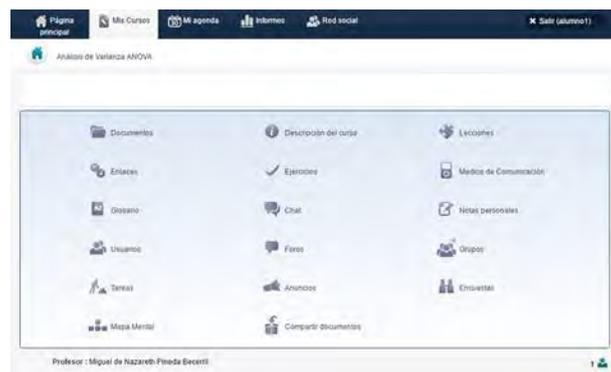
In the platform that was created, there is an Analysis of Variance section and in this, in turn, there are each of the aforementioned sections, Figure 1 shows us the main access to the E-learning course.

Figure 1. Course E-Learning.



When accessing the E-learning course, students will find the menu of available courses, where the topic of Analysis of Variance appears as shown in Figure 2.

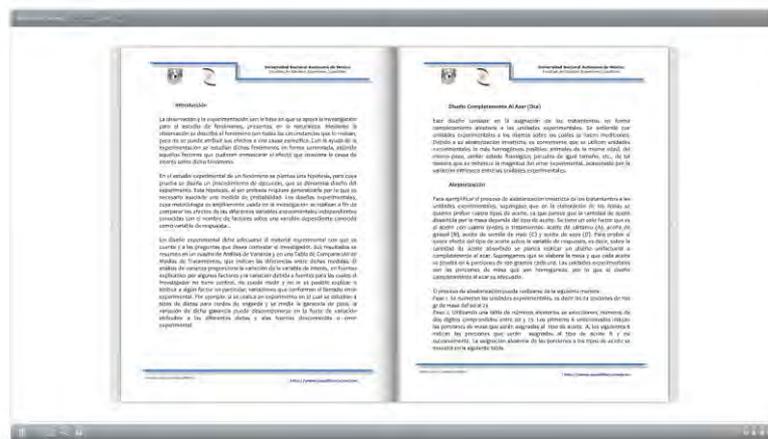
Figure 2. E-learning course menu for analysis of variance topic.



In the E-learning course of Analysis of Variance, the theoretical part of the topics completely randomized design and the tests were developed, but in a different way than they are in textbooks, in order to draw the attention of the students. The idea was to set learning objectives, in such a way that the topic was developed and thus understood more clearly. Based on the above, it is intended to reorient and update the approach with which the study of the aforementioned issues should be approached, awakening the concern to learn and solve the problems and cases raised.

In the theoretical part of the completely random design topics and tests, learning objectives were established, to achieve these objectives, the development of the topics was carried out based on questions and answers. Figure 3 shows us the theoretical part developed for the hypothesis testing section of the E-learning course.

Figure 3. Analysis of variance topic of the E-learning course.



Videos of the aforementioned topics were made, since these are a didactic means that facilitates the discovery of knowledge and the assimilation of the topics. In addition, it can be motivating for students, as the moving image and sound can capture their attention.

These videos have some advantages, since they allow adapting the teacher's speech to the level of understanding of the students or to their situation at a given moment, through their use the participation of the students can be elicited.

On the other hand, the video can also be used fulfilling diverse didactic functions. For example: with an informative, motivational, evaluative or investigative function. Figure 4 shows us the video corresponding to the theme of Design completely at random.

Figure 4. Video of the design theme completely of the E-learning course.

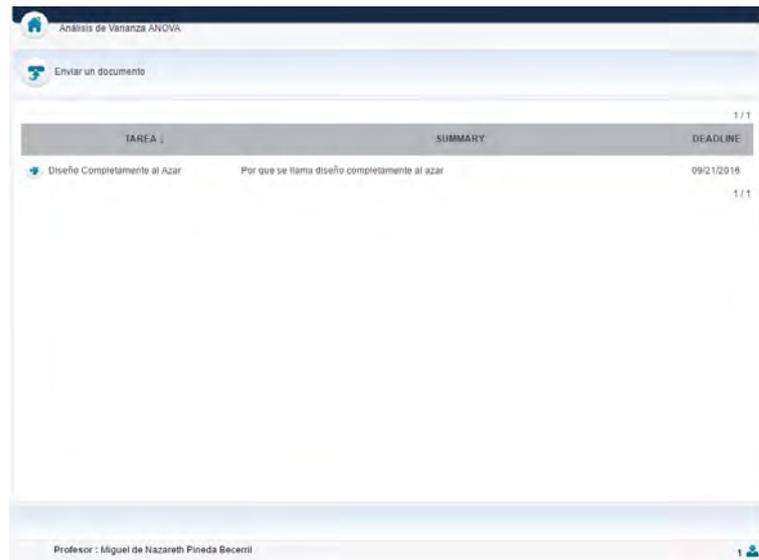


For the topics of completely randomized design and that of tests, application cases and dot com exercises were developed, these exercises are solved with an internet connection. This section provides the student with exercises and case studies that must be solved in an interactive environment, using the resources available on the Internet, in such a way that they can develop them in learning environments that allow them to build knowledge.

To reinforce the students' knowledge of the topics, a part containing applets of the aforementioned topics was developed. These applets (applet) are programs written in Java that serve to "give life" to web pages (interaction in real time, inclusion of animations, sounds), hence its power, Kenneth (2012). Applets serve as a new teaching and learning process that encourages students to search for more active and personalized methodologies for each topic.

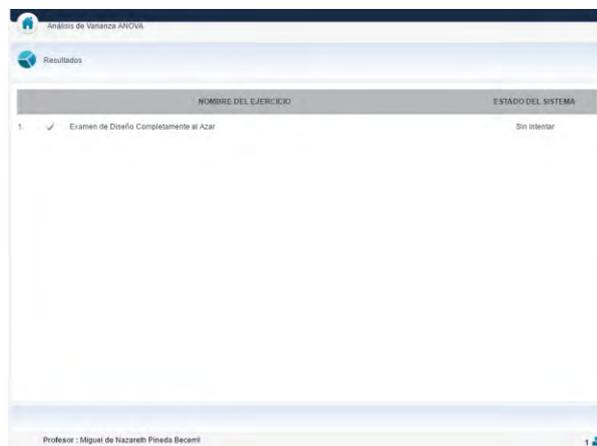
The Task Mailbox was created with the in order to facilitate the exchange of files between the course participants. This section of files can easily send files to one or all students and they in turn can send the teacher of the course and also send files between them. Additionally, submitted files may contain comments; in this way, the teacher can comment on the personal work of a student or the student can inform the teacher that the document sent is perhaps not very clear. Figure 5 shows us the content of the task mailbox for this topic.

Figure 5. Task mailbox.



This tool allowed us to create self-assessment tests, which allowed us to ask any number of questions. For the topics of hypothesis tests for one mean, for two means, for one proportion and for two proportions, questions with different types of answers were developed, such as multiple choice, reasoning and open questions. The purpose of applying the exam is to collect evidence of the degree or magnitude in which the learning of this topic was achieved; since it seeks to achieve the objectives set. In this topic, it is important to know what knowledge the student acquired, what skills or abilities he developed to perform the necessary operations to calculate the different sums of squares of the analysis of variance. Figure 6 shows us the evaluation questions for the completely random design theme.

Figure 6. Evaluation of the hypothesis test topic.

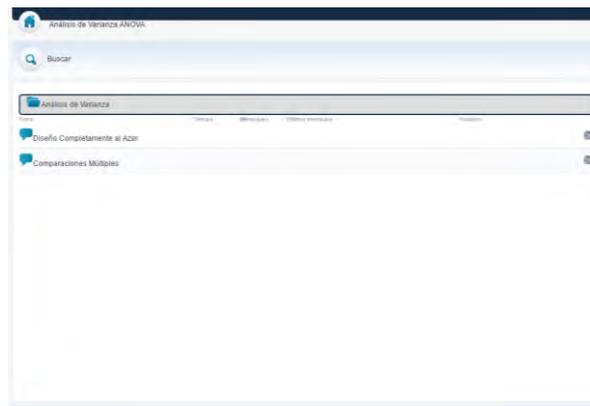


One of the technological tools that favors remote and asynchronous interaction is the Electronic Forum or newsgroup, which allows us to discuss among the different students on the topics of hypothesis testing for one mean, for two means, for a proportion and for two proportions and when to use each of these. This tool has a wide utility; since, if it is used with didactic property, to favor collaborative learning of the probability distribution issues, it allows us to communicate and interact among a group of students in the pursuit of the objectives set out in this topic. Figure 7 shows us what the “Doubts” forum looks like for completely random design topics and multiple comparisons.

One of the technological tools that favors distance and asynchronous interaction is the electronic forum or newsgroup, which allows us the discussion between the different students, on the topics of hypothesis tests for one mean, for two means, for a proportion and for two proportions and also know when to use each of these.

This tool has a wide utility since if it is used with didactic properties, it can favor the collaborative learning of the subjects of probability distribution and it allows us the communication and interaction between a group of students in the search of the objectives raised in this subject.

Figure 7. Us what the "Doubts" forum looks like for completely random design topics and multiple comparisons.



3. Conclusions

We consider that the use of new technologies awakens the teacher's interest in using new strategies for teaching statistics. Since one of the problems that the teacher faces is the monotony of repeating the same contents for many semesters, changing teaching strategies has resulted in the motivation of teachers in such a way that they have revised the contents of the course. material made with renewed enthusiasm. This motivation is an achievement, since, if the teacher manages to stimulate his classroom, he will transmit it to his students, which will contribute to the improvement of teaching.

Through E-Learning courses as support for traditional courses, the teacher faces the challenge of modifying the design of the contents, the tasks and the forms of evaluation to adapt them to the new demands. For their part, students must commit to fulfill their obligations and be an active part in the teaching-learning process and in the evaluation, both individually and in groups (collaborative learning).

To assess multimedia as an "important" teaching-learning strategy, it is necessary to know the benefits they can offer, taking as a reference the traditional education scenario and the current state of virtual education.

References

- Anderson. D. R., & Sweeney, (2011) *Statistics for Business and Economics*, South-Western College Pub; 11.
- Devore, J. (2011) *Probability and Statistics for Engineering and the Sciences*. CENGAGE Learning, 8 edition
- Kenneth, C.L., Laudon, (2012) *Sistemas de Información Gerencial*, Always Learning Pearson, 12 edición.
- Levin, R. I. & Rubin, D.S. (2010). *Estadística para Administración y Economía*. Ed. Pearson Prentice Hall, 7^a. Edición
- McClave, T. & Benson, P. (2010) *Statistics for Business and Economics*, Prentice Hall; 11 edition.
- Triola, M. (2010). *Estadística México*: Pearson Educación 11 edición.

LIFELONG LEARNING AND THE SAFE USE OF COMPLEMENTARY AND ALTERNATIVE MEDICINE

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Abstract

Research has shown the frequent use of complementary and alternative medicine (CAM), its potentialities and risks. Aim: To characterize adults' knowledge and practices of CAM in order to identify the need to develop lifelong learning programs. After obtaining the necessary authorizations, between 1/10-5/12/2021, 115 adults living in Portugal, mostly women with a higher education degree, working full-time, with a monthly income perceived as medium, answered a Google Forms questionnaire on health (self-)care practices (HsCP). Most considered their health as good (44.3%), being satisfied with it (53%). The majority: took some care of their health (60.5%; 28.1% a lot); had no physical (56.1%) or psychological (78.3%) health problem diagnosed by a conventional health care professional. Regarding the extent to which the participants had knowledge of non-conventional health (self-)care practices (NCHsCP), most (39.5%) knew little about it (10.5% had no knowledge). The majority: had already looked for information about NCHsCP (55.8%), was interested in having (more) knowledge about it (77.2%), and had someone close to them who used and/or was using some non-conventional practice - NCP (57%). Only 14.2% had done training in some NCP and 5.3% considered it impossible to reconcile conventional and NCHsCP. The majority (65.8%) stated that knowledge about NCP is important to them as (future) health professionals (not applicable to 26.3%). As for the last time participants performed any HsCP, 30.2% considered it a NCP (19.8% were not sure). In terms of HsCP, 66.7% reported using conventional and NCP. Among those who have ever used any NCP: 47.1% did it with a professional and 34.3% by themselves and with a professional; 45.8% use it rarely; 93.2% had never done it against the recommendation of a (conventional) health professional. Among those regularly (at least once a year) accompanied by one or more conventional health care professionals, 54% had never talked about NCP. Regarding negative experiences with NCP, 89.8% never had any. The minor children of 13.9% had done some NCP (not applicable to 60.2%). Among the health care professionals, 80.2% had no course during their training mentioning NCP; in their professional experience, 64.2% had knowledge of situations in which conventional and NCP were used simultaneously; in the context of their professional activity: 51.9% had recommended, and 40.7% had referred someone to NCP. Even though these preliminary results are not worrying, they suggest adults living in Portugal would greatly benefit from lifelong learning programs focusing on the potentialities and risks of CAM.

Keywords: *Alternative therapies, complementary medicine, health care, self-care, health knowledge, attitudes, practice.*

1. Introduction

Nowadays, there is a considerable volume of available information, for researchers, healthcare professionals and the general population, regarding what can be termed "Complementary and Alternative Medicine" or CAM. Nevertheless, the denomination, definition and correct use of the terms "complementary", "alternative" and "non-conventional", among other, are controversial, with no consensus on the concept of CAM, probably due to the high diversity and heterogeneity of practices included in it (Aguilar Júnior & Costa, 2011; Dipierri, 2004; Meneses, 2018, 2021; Neto, Faria, & Figueiredo, 2009; Nogales-Gaete, 2004).

According to the World Health Organization (WHO, n.d.),

The terms “complementary medicine” or “alternative medicine” refer to a broad set of health care practices that are not part of that country’s own tradition or conventional medicine and are not fully integrated into the dominant health-care system. They are used interchangeably with traditional medicine in some countries.

In mid-2017, WHO’s Traditional and Complementary Medicine unit was renamed Traditional, Complementary and Integrative Medicine (TCI), but the 2019 WHO global report is on T&CM - Traditional and Complementary Medicine (WHO, 2019).

In Portugal, where the legislation on the subject started in 2003 and was expanded in 2013 (WHO, 2019), the terminology in use is different. According to the National Health Service (Serviço Nacional de Saúde, n.d.),

Non-Conventional Therapeutics (NCT) are those practices based on philosophical approaches different than conventional medicine and apply specific diagnostic processes and therapeutics of their own.

The following professions are recognized as Non-Conventional Therapeutics: acupuncture, homeopathy, osteopathy, Chinese traditional medicine, naturopathy, herbalism and chiropractic (Law n. 71/2013, 2 September).

Even though difficulties begin as early as the phase of concept delimitation, research has shown the frequent use of CAM, its correlates, potentialities and risks (e.g., Aguiar Júnior & Costa, 2011; cf. Dipierri, 2004; Meneses, 2018, 2021; cf. Neto et al., 2009; Nogales-Gaete, 2004; WHO, 2013, 2019).

In individuals older than 18 years, Neto et al. (2009), for instance, reported that use of CAM involving costs (e.g., homeopathy, acupuncture, chiropractics, techniques of relaxation/ meditation, massage) was of 8.93% in the general population and of 13.6 % among those with health problem; when all modalities were included, it was of 70.0%. Based on their findings, the authors argued that access of those with less income and education could increase the use of the modalities that involve costs.

The high use rates are not limited to adults. In fact, among patients from 0 to 18 years of age, Aguiar Júnior and Costa (2011) found that 63.5% were using or had used CAM in the treatment of atopic dermatitis and 29.4% used CAM due to indication of friends and/or relatives. Considering previous data, the authors defended that health care professionals should routinely question patients about the use of CAM as drug interactions and worsening of the health condition may occur.

This is extremely pertinent when: T&CM is used by at least 80% of the Member States across all WHO regions, with more than 90% of Member States in the Eastern Mediterranean, South-East Asia and Western Pacific regions reporting its use; and a minority of Member States (16 out of 61; Portugal was not one of those) reported there was a consumer education project or program for self-health care using T&CM, which “reinforces the need for policy development, appropriate laws and regulations, safety and monitoring systems, and integration of T&CM products, practices and practitioners into health systems” (WHO, 2019, p. 45).

Unfortunately, the 2019 WHO global report reveals that, even though T&CM practices are used by Portugal’s population, the percentages of use are not available and the number of practitioners is unknown (WHO, 2019).

This may be particularly relevant during the COVID-19 pandemic, since “patients and members of public across the world are known to be relying on self-care practices including the use of Complementary and Alternative Medicines (CAM) for COVID-19 prevention and symptoms relief” and/or treatment, and many governments have supported the use of CAM in COVID-19 (Paudyal, Sun, Hussain, Abutaleb, & Hedima, 2022, p. 2524).

In India traditional medicines and household treatment strategies are very important and easily available, making unsupervised use simple, even when there is insufficient scientific evidence on efficacy and safety (Charan et al., 2021). The Ministry of AYUSH (Ayurveda, Yoga, and Naturopathy, Unani, Siddha, and Homeopathy), Government of India established an interdisciplinary AYUSH research and development task force and guidelines for AYUSH clinical studies in COVID-19 to stimulate research of several traditional drugs on COVID-19 (Government of India, 2020., cited in Charan et al., 2021). In this context, a study was conducted at an Isolation center, where asymptomatic COVID-19 patients were admitted and discharged after 10 days if no symptoms developed during this period (Charan et al., 2021).

Between one to two months after discharge, researchers contacted these patients on the telephone and asked about the use of CAM products or home remedies before, during, or after the discharge from the center (Charan et al., 2021). Out of the 495 participants who responded, 74.1% had not used any CAM product or home remedies while 25.8% had used 161 CAM products and home remedies during the treatment and afterward. Many participants used more than one CAM product or home remedy. Most confirmed taking household preparations of herbs. None were aware of details like the brand or

manufacturer of the products used. None reported any acute or severe side effects while consuming these products.

Nevertheless, in line with Aguiar Júnior and Costa (2011), Charan et al. (2021) stressed that it is essential to guarantee the safety of these interventions on long-term use, since patients with comorbidities can experience an unexpected adverse events due to these products or interactions with ongoing medications, by implementing long-term follow-up studies of recovered patients.

Paudyal et al. (2022) also pointed in the same direction and underscored that research from human clinical trials regarding the effectiveness of CAM in prevention, treatment, or symptom relief in COVID-19 is still limited. They also affirmed that international clinical guidelines do not stimulate healthcare professionals to investigate patients' use of CAM but collecting patients' points of views and experiences of CAM use in COVID-19 are key to future practices, namely healthcare professionals' advice and counseling regarding CAM use.

Jeon et al. (2022) presented an overview of systematic reviews on the effectiveness and safety of CAM interventions for COVID-19 patients for which PubMed, Embase and Cochrane Library were searched from inception to October 2021. They identified 24 systematic reviews: 21 for Traditional Chinese Medicine (TCM) medications, two for vitamin D and one for home-based activity (including exercise, yoga and muscle relaxation techniques). TCM medications showed good results in decreasing the rate of disease progression, time to the resolution of fever and rate of progression to severe COVID-19 cases, but gastric disturbance was a major adverse event. The evidence for other interventions makes it essential to keep on evaluating evidence for the effectiveness of most CAM interventions.

In this context, the aim of the present study is to characterize adults' knowledge and practices of CAM in order to identify the need to develop lifelong learning programs in Portugal.

2. Method

After obtaining all the necessary authorizations, including an Ethics Committee's approval, the study/questionnaire was disseminated through the first author's social media, her institution's Communication Office, and the measure to Support Research in Psychological Health (AISP – medida de Apoio à Investigação em Saúde Psicológica), from the Portuguese Psychologists Association (OPP – Ordem dos Psicólogos Portugueses).

Consequently, between 1/10/2021 and 5/12/2021, 115 adults living in Portugal answered a Google Forms questionnaire on health (self-)care practices (HsCP).

The questionnaire used was developed for this study, based on (inter)national research on the subject and, therefore, was not previously validated.

The participants were mostly Portuguese (95.6% of 114 answers), women (84.2% of 114 answers), single (42.6%) or married/cohabiting (41.7%), with a higher education degree (more than 50%), working full-time (52.2%), with a monthly income perceived as medium (72.7% of 99 answers).

Most participants considered their health as good (44.3%), being satisfied with it (53%). The majority: took some care of their health (60.5%; 28.1% a lot; of 114 answers); had no physical (56.1% of 114 answers) or psychological (78.3%) health problem diagnosed by a conventional healthcare professional.

3. Results

Knowledge/beliefs. Regarding the extent to which the participants had knowledge of non-conventional health (self-)care practices (NCHsCP), most (39.5% of 114 answers) knew little about it (10.5% had no knowledge). The majority: had already looked for information about NCHsCP (55.8% of 113 answers), was interested in having (more) knowledge about it (77.2% of 114 answers), and had someone close to them who used and/or was using some non-conventional practice - NCP (57% of 114 answers). Only 14.2% (of 113 answers) had done training in some NCP and 5.3% (of 113 answers) considered it impossible to reconcile conventional and NCHsCP.

The majority (65.8% of 114 answers) stated that knowledge about NCP is important to them as (future) health professionals (not applicable to 26.3%).

Practices. As for the last time participants performed any HsCP, 30.2% (of 96 answers) considered it a NCP (19.8% were not sure). In terms of HsCP, 66.7% (of 99 answers) reported using conventional and NCP.

Among those who have ever used any NCP: 47.1% (of 70 answers) did it with a professional and 34.3% by themselves and with a professional; 45.8% (of 72 answers) use it rarely; 18.7% (of 75 answers) reported having used it more frequently since the beginning of the pandemic; 93.2% (of 73 answers) had never done it against the recommendation of a (conventional) health professional.

Among those regularly (at least once a year) accompanied by one or more conventional healthcare professionals, 54% (of 100 answers) had never talked about NCP and 15.3% (of 85 answers) reported not informing them when using a NCP. Regarding negative experiences with NCP, 89.8% (of 108 answers) never had any.

The underage children of 13.9% (of 108 answers) had done some NCP (not applicable to 60.2%).

Among the healthcare professionals, 80.2% (of 86 answers) had no course during their training mentioning NCP; in their professional experience, 64.2% (of 81 answers) had knowledge of situations in which conventional and NCP were used simultaneously; in the context of their professional activity: 51.9% (of 81 answers) had recommended, and 40.7% (of 81 answers) had referred someone to NCP.

4. Discussion

It is important to stress that these results have to be analyzed carefully, since the sample is not representative of the adult population living in Portugal and the questionnaire was not previously validated. Considering how and for how long the study/questionnaire was disseminated it is possible that the sample over represents individuals interested in CAM.

Even though these preliminary, non-generalizable, results are not worrying, they suggest adults living in Portugal (and their children) would greatly benefit from lifelong learning programs focusing on the potentialities and risks of CAM or NCHsCP.

In fact, participants reported a limited knowledge of NCHsCP, even though the majority had someone close using it at the moment and/or in the past, was (professionally) interested on the subject and had looked for information before. Their answers regarding the possibility to reconcile conventional and non-conventional practices also suggest they could be interested in enrolling in a learning program.

The data on the sample's practices points in that direction too. It is also in accordance with data presented by Neto et al. (2009), WHO (2019), and Charan et al. (2021), and Aguiar Júnior and Costa (2011), regarding underage children, although the studies are very different, requiring careful comparisons.

In terms of safety, less than 20% (18.6%, $n=13$) admitted to having used a NCP solely by self-administration, 26.4% ($n=19$) to using it very frequently (8.3%) or frequently, 6.8% ($n=5$) to using it against the recommendation of a (conventional) health professional, and 10.2% ($n=11$) to having had a negative experience with NCP. If these values are not alarming they, nonetheless, underscore the need to make individuals more aware of the risks they may be taking when using (some forms of) NCP.

More dangerous are the percentages concerning the communication between participants and their conventional healthcare professionals about NCP. They support the points of view expressed by Aguiar Júnior and Costa (2011) and Paudyal et al. (2022). Therefore, lifelong learning programs could be a useful ally to improve patient-healthcare professional communication and, consequently, patient safety.

This kind of program would also make Portugal integrate the minority of WHO Member States with a consumer education program for self-health care using T&CM (WHO, 2019).

Although less than 20% of participants revealed increasing the frequency of NCP use since the beginning of the pandemic, and the specific NCP in question were not identified, the alerts from Charan et al. (2021), Paudyal et al. (2022) and Jeon et al. (2022) should not be ignored.

Finally, the results also support the relevance of continuous learning programs for healthcare professionals, since the majority's training did not include NCP, but, professionally, they knew of situations in which conventional and NCP were used simultaneously, they had recommended it and many had referred someone to NCP.

5. Conclusions

The participants' answers to a Google Form questionnaire are in line with previous research, suggesting high percentages of individuals interested in and using CAM, even though with limited information regarding CAM. Healthcare professionals were no exception. Therefore, developing lifelong learning programs targeting healthcare professionals and the general population could foster a safer use of CAM and improve the health of individuals living in Portugal, during and after the COVID-19 pandemic.

References

- Aguiar Júnior, N. R., & Costa, I. M. C. (2011). O uso da medicina alternativa ou complementar em crianças com dermatite atópica. The use of alternative or complementary medicine in children with atopic dermatitis. *Anais Brasileiros de Dermatologia*, 86(1), 167-168. doi:10.1590/S0365-05962011000100033
- Charan, J., Bhardwaj, P., Dutta, S., Kaur, R., Bist, S. K., Detha, M. D., Kanchan, T., Yadav, D., Mitra, P., & Sharma, P. (2021). Use of Complementary and Alternative Medicine (CAM) and home remedies by COVID-19 patients: A telephonic survey. *Indian Journal of Clinical Biochemistry*, 36, 108-111. Advance online publication. doi:10.1007/s12291-020-00931-4
- Dipierrri, J. E. (2004). Impacto e integración entre la medicina alternativa y la convencional. Impact and integration between alternative and conventional medicine. *Cuadernos de la Facultad de Humanidades y Ciencias Sociales – Universidad Nacional de Jujuy*, 22, 241-263. Retrieved from <https://www.redalyc.org/pdf/185/18502217.pdf>
- Jeon, S.-R., Kang, J. W., Ang, L., Lee, H. W., Lee, M. S., & Kim, T.-H. (2022). Complementary and alternative medicine (CAM) interventions for COVID-19: An overview of systematic reviews. *Integrative Medicine Research*, 11(3), 100842. doi:10.1016/j.imr.2022.100842
- Meneses, R. F. (2018). Cura reconectiva™: do desconhecimento generalizado à evidência científica e suas implicações. Reconnective healing™: From general ignorance to scientific evidence and its implications. In I. Leal, S. Von Humboldt, C. Ramos, A. F. Valente, & J. P. Ribeiro (Eds.), *12º Congresso Nacional de Psicologia da Saúde – Actas 12th National Congress of Health Psychology – Proceedings* (pp. 721-729). Lisbon, Portugal: Instituto Superior de Psicologia Aplicada. Retrieved from <https://www.sp-ps.pt/site/livros/147>
- Meneses, R. F. (2021). Conflito entre medicina convencional e medicina integrativa Conflict between conventional medicine and integrative medicine. In P. Cunha & A. P. Monteiro (Coords.), *Gestão de conflitos na saúde Conflict management in health* (pp. 101-128). Lisbon, Portugal: Pactor.
- Neto, J. F. R., Faria, A. A., & Figueiredo, M. F. S. (2009). Medicina complementar e alternativa: Utilização pela comunidade de Montes Claros, Minas Gerais. Complementary and alternative medicine: Use by the community of Montes Claros, Minas Gerais. *Revista da Associação Médica Brasileira*, 55(3), 296-301. doi:10.1590/S0104-42302009000300022
- Nogales-Gaete, J. (2004). Complementary and alternative medicine. *Revista Chilena de Neuro-psiquiatria*, 42(4), 243-250. doi:10.4067/S0717-92272004000400001
- Paudyal, V., Sun, S., Hussain, R., Abutaleb, M. H., & Hedima, E. W. (2022). Complementary and alternative medicines use in COVID-19: A global perspective on practice, policy and research. *Research in Social & Administrative Pharmacy*, 18(3), 2524–2528. doi:10.1016/j.sapharm.2021.05.004
- Serviço Nacional de Saúde. (n.d.). *Non-Conventional Therapeutics*. Retrieved April 4, 2022, from <https://www.acss.min-saude.pt/2017/04/19/non-conventional-therapeutics/?lang=pt>
- World Health Organization. (2013). *WHO traditional medicine strategy: 2014-2023*. Retrieved April 4, 2022, from <https://apps.who.int/iris/handle/10665/92455>
- World Health Organization. (2019). *WHO global report on traditional and complementary medicine 2019*. Retrieved April 4, 2022, from <https://apps.who.int/iris/handle/10665/312342>
- World Health Organization. (n.d.). *Traditional, Complementary and Integrative Medicine*. Retrieved April 4, 2022, from https://www.who.int/health-topics/traditional-complementary-and-integrative-medicine#tab=tab_1

TEACHING BASIC QUALITY CONTROL TOOLS BY ANALYZING THE ELECTRICITY SECTOR

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Abstract

There are many formidable and complex worldwide problems which can be analyzed using quality control tools that spark the interest of engineering students because they are currently important problems which impact their lives. Nowadays, there is a very important discussion on the phasing out of fossil fuels and the increment in the use of renewable energy sources to produce electricity. Solar and wind sources have the disadvantage that they are intermittent and on some days there may not be enough electricity produced from them. Therefore, the supply is reduced despite that the demand is constant or even increased during extreme weather conditions. In Mexico, there is a national debate about modifying several constitutional amendments to the Mexican energy reform of 2013 which allowed private generators to take over most of the electricity market. Among the main questions to answer in Mexico are: is it true that generating electricity from renewable energy sources leads to lower prices for the population? In the case of Mexico, why does the government complain about the electricity generation schemes legally allowed for private generators? The students must learn how to use engineering tools to reach the root of these problems and that there is also the need to search for hard data. The issues are so numerous and complex that a large part of the population is confused about who is right. In class the analysis is sketched, the students are very interested, and participate very actively in the discussion. However, the problem is not analyzed completely because of the time constraints. In this paper we show the analysis of these problems using industrial engineering tools. The objective is to answer these questions. An Ishikawa Diagram, a Decision Tree, a Pareto Diagram, a Quality Deployment Function and a reduced Failure Modes and Effects Analysis have been used to answer these questions. The analysis shows that despite the prices for generation of electricity from renewable energy sources the country does not benefit from most of the electricity businesses given to the private sector in Mexico. The quality control tools taught in engineering courses allow to analyze complex problems if used properly with the data needed for the analysis.

Keywords: *Teaching, engineering, tools, electricity.*

1. Introduction

Some of the most important problems society faces are usually very complex and students must learn methodologies to analyze them and sometimes try to solve them. In engineering quality control courses, students learn several basic quality control tools to analyze current problems in industry (Gutierrez & de la Vara, 2013). However, those same tools are useful for other fields of knowledge beyond engineering (Dominguez-Vergara & Dominguez-Perez, 2021). In class, students are asked to analyze some problems and some assignments are given to them so they can practice the use of those tools. In this paper we present an analysis of a very complex issue in Mexico regarding the electric sector of the country, which is partially reviewed in class. The Mexican government is trying to change the Mexican Constitution to reduce the generation of electricity by the private sector. However, some people consider that private generators are needed because they claim that their electricity is cheap and is generated with clean sources. Although most of their generation is using natural gas, while part is by intermittent sources and both are heavily subsidized by the Mexican public company, Comisión Federal de Electricidad (CFE). The issues of the Mexican electric sector are so diverse and important that the Mexican House of Representatives has spent more than one month since the beginning of the year 2022 inviting people against and in favor of the Mexican President's proposed bill to offer their independent analysis to them (Morales, 8 February 2022). In this paper the results of using some quality control tools to clarify and understand some of the issues regarding the proposed bill are presented. That understanding is necessary in order that the Mexican representatives take the right decision in accepting, rejecting, or modifying the initiative and that Mexican citizens understand what it is at stake.

2. Problems of the Mexican public electric company due to private electric companies

CFE reduced its production of electricity from 100% to 38% of the total generated in Mexico from the year 1999 to the year 2021 because the private sector has been gradually generating more electricity. In December of 1992 the Mexican government allowed the participation of private generators called Independent Energy Producers (IEP) and the generation by private companies of electricity for self-supply, against what the Mexican Constitution mandated at that time. In December of 2013 an Energy Reform was promulgated that legalized the IPE and self-supply companies and mandated economic incentives for the generation of clean energy by private companies. In Mexico, the electricity whose generation produces little, or no emission of carbon dioxide (CO₂) is considered clean energy. The 2013 energy reform also mandated to split the public company legally and functionally in several parts and did not allow to make many businesses among them. Supposedly, some of the fragmented parts of the CFE and the private companies would compete among them in the generation of electricity, and that would reduce its price, -that is what the Mexican Government assured- when it was asking for support to approve the 2013 energy reform. However, only 10 companies currently generate the 40% of the total electricity by privates and all of them are transnational companies and the price of electricity increased due to the 2013 energy reform in 35% from the year 2015 to the year 2018. Since the IEP started to produce electricity CFE had to shut down some of its plants because the CFE was required to buy all the electricity produced by the IEP (31% of the total generated in Mexico) in very long-term contracts; so a market of competition is only a fantasy. The self-supply companies produce 12% of the total generated electricity in Mexico. Also, one of the CFE branches is required to buy all or almost all the electricity generated by privates as result of three long-term auctions carried out some years ago (4% of the total electricity generated in the country). Aside from this, there is a daily (short-term) auction in which the electricity that is first dispatched through the transmission network is the one that has the least variable cost (basically the cost of the fuel used to produce the electricity, which is about 0 pesos for wind and photovoltaic solar sources), without considering the fixed costs (for constructing the plants and others) but at the end of each day all participants are paid the price of the most expensive electricity dispatched (which could be 6.50 pesos per kWh for gas turbine with diesel technology). One US dollar is worth 20.50 Mexican pesos. With this order of dispatch based in the increasing variable cost of the electricity, the electricity from solar and wind gets transported first because its variable cost is about zero, but they are paid as if they used the most expensive fossil fuel dispatched in the day, so the propagated low price of clean renewable energy it is just a myth in Mexico. This order of electricity dispatch favors privates and the CFE cannot sell part of its production; however, if the total cost of generation, that is, the levelized cost were considered, the CFE would be favored. All of this has caused that CFE does not produce 45% of its potential (loosing 215000 million pesos yearly) and that it must buy electricity from private companies to comply with the current law (loosing 223000 million pesos yearly). A lot of the 239 private companies with self-supply permits, against the regulations, sell electricity to more than 77000 clients which they misguide as partners. Most of economic incentives to privates, like the Clean Energy Certificates (CEL), are indeed subsidies to private companies, because privates receive them for generating clean energy but not the parts of CFE which produce clean energy with plants constructed before the year of 2014 and then another branch of CFE is required to buy the CEL from the private companies to demonstrate that they provide clean energy to its clients. Since 2014 the CFE has subsidized 6000 million pesos to private companies by buying their CEL. Also, self-supply companies producing clean energy do not pay fair transmission tariffs and have refused to pay more and the CFE must absorb the economic loss, that is, CFE subsidizes the transmission of electricity of those privates. The levelized price of the wind energy kWh by privates is of 1.52 pesos, more expensive than the levelized prices for hydraulic, nuclear, coal, combined cycle, photovoltaic, geothermic and gas turbine technologies, so not all electricity by the private sector is cheap. The proposed energy reform would end the abuses by private companies and would assure a better planning to assure clean and affordable electricity. On top of that, the CFE must provide backup power at its own expense when the private intermittent sources do not produce electricity. The main issues that the Mexican President has exposed in his initiative are shown in Figure 1 using an Ishikawa Diagram. Due to the subsidies to private companies CFE claims that loses more than 490 billion pesos each year.

3. Subsidies from CFE to private electric companies in Mexico

The Decision Tree in Figure 2 shows how the private sector benefits economically from the goal of obtaining electricity from clean and renewable energy sources. The first question used in the Decision Tree is: how do private entities benefit from the goal of generating clean and renewable energy sources in Mexico? The answer is: by supposedly offering that energy at low prices. Then the answer is posed as the

question: how do they benefit by offering that energy at low prices? The answer is: by the 2013 energy reform. The answer is then posed as the question: how do private entities benefit from the 2013 energy reform? The answer is: by obtaining subsidies from CFE ordered by that reform. The answer is then converted to the question: how do privates benefit from the CFE? And then the answers are listed, as well as the identified damages for CFE.

Figure 1. Problems to CFE due to the participation of privates in the Mexican electric sector.

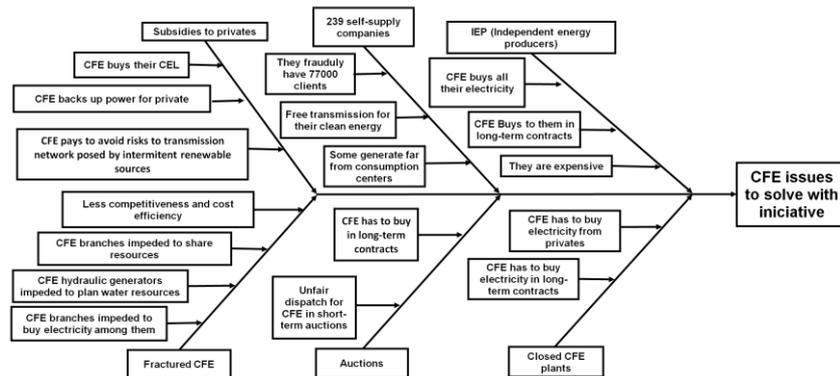
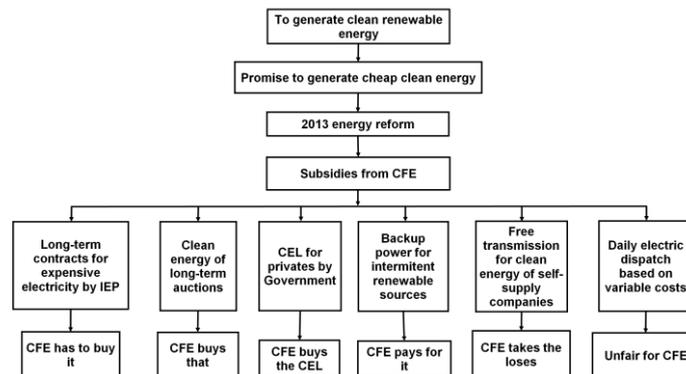


Figure 2. Decision Tree to identify how privates benefit from CFE.



4. Energy sources and requirements for electricity

In Mexico, the main sources of electricity are photovoltaic solar (PV), wind (W), running water (H), earth's heat (G), nuclear (N), natural gas (NG), oil (O), coal (C) and diesel (D). The desirable requirements of the present initiative is that electricity be affordable for all Mexicans, to have low production of CO₂, to not produce damaging contaminants to human health such as nitrogen oxides, sulfur oxides and particle matter (healthy), sporadic outages (continuous), to not produce problems to the transmission network (reliable), and without risks to the physical integrity of people and their assets (safe). In Table 1, an evaluation of the different electricity sources (in the first row) in complying with those requirements (in the first column) is provided using a Quality Deployment Function (Gutierrez & de la Vara, 2013). The priorities of the requirements are given in the second column with numbers from 1 to 6 (being 6 the highest priority). From the third column to the last, marks from 0 to 5, are given to each energy technology according to how each technology complies with each of the requirement of the first column. For example, in assessing how natural gas technology complies with the requirements, it is necessary to consider that nowadays natural gas is about twice as expensive than it was in 2019 but electricity can be produced almost continuously when burned, although CO₂ is emitted.

None of the electrical sources have the highest marks in all the requirements; that is, none is still perfect, which is why a very diverse basket of energy sources is needed in Mexico (and in almost all the countries in the world). This is highlighted in the values of Importance, which is the result of multiplying the value of the priority (the number in the second column) with the impact of the technology on each requirement (the number in the column of each technology). The Relative Importance of the scores is obtained by giving the value of 10 to the technology that has the highest value of Importance and 9 to the one with the second highest value obtained in Importance, and so on.

5. Electricity generation by source and CO2 emissions in Mexico

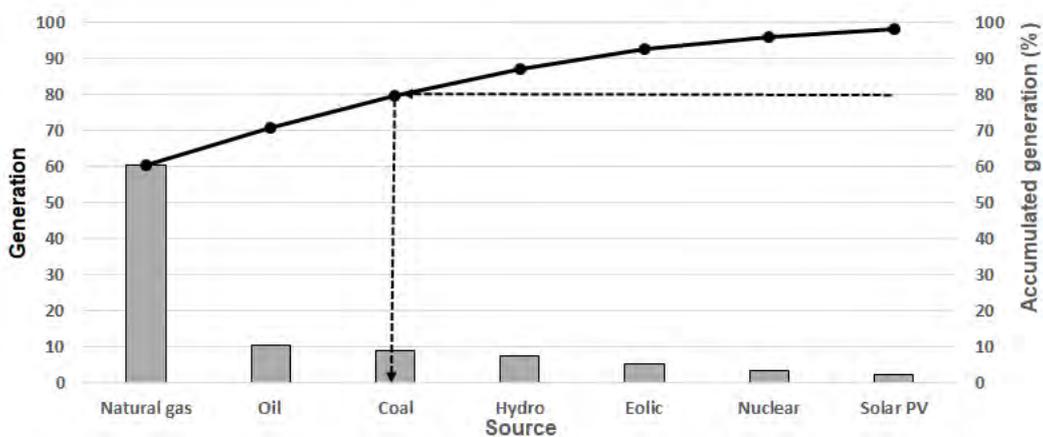
The total amount of clean energy produced in Mexico is of 86 Tera watts (TW) in hydroelectric, geothermal, wind, nuclear, photovoltaic solar, natural gas, oil, coal and diesel plants. Of the total clean energy generated in Mexico 55% is produced by CFE and 45% by private companies. The production of electricity by natural gas is 185 TW. Of the total energy generated with natural gas (using combined cycle turbine plants), 25% is by CFE, and 75% by private companies. The CFE contributes with 44% of the CO2 emissions, while the private ones with 56%. CO2 emissions by the CFE in one year is of 41188686 tons (combined cycle 40%, diesel 12%, fuel oil 21% and coal 28%). CO2 emissions by private entities in one year is of 52464220 tons (combined cycle 95% and diesel 6%).

The data shows that it is not true that private entities generate most of the clean energy in Mexico. On the contrary, the CFE generates most of that energy. Currently, the 38% of the electricity generated by CFE is clean while only 18% of the electricity generated by private entities is clean. The electricity generation in Mexico by source is, natural gas 60.3%, petroleum products 10.4%, coal 9.0%, hydroelectric 7.6%, wind 5.3%, nuclear 3.5%, photovoltaic solar 2.1%, geothermal 1.7%, and other sources 0.2% (Morales, 8 February 2022). This is shown in Figure 3 using a Pareto Diagram. Thus, more than 80% of the electricity is produced by fossil fuels (natural gas, oil, and coal). Some people incorrectly claim that México produces a lot of its electricity using coal, when that is not true. For comparison, the generation of electricity with coal in 2019 was of 66.1% in China, 73.2% in India, 37.5% in the United States and 31.8% in Germany (Bermejo, 17 February 2022).

Table 1. Electricity sources and requirements.

Requirements (below)/ Technology (right)	Priority	PV	W	H	G	N	NG	O	C	D
Affordable	6	4	4	5	4	4	5	5	4	5
Clean (CO2)	3	5	5	5	5	5	4	2	1	1
Healthy	6	5	5	5	5	3	4	2	1	1
Sufficient	3	2	2	3	3	3	4	5	4	4
Continuous	5	0	0	5	5	5	5	5	5	5
Reliable	4	0	0	5	5	5	5	5	5	5
Safe	2	5	4	5	5	4	5	4	4	4
Importance		85	83	139	133	119	133	116	98	104
Relative Importance		4	3	10	9	8	9	7	5	6

Figure 3. Electricity generation by source in Mexico.



6. What could go wrong in the Mexican electric sector?

The question posed in the subtitle is answered using a reduced Failure Modes and Effects Analysis (Dominguez-Vergara & Dominguez-Perez, 2021); that is, taking the main questions which the analysis poses and answer them. The needs are clean, healthy, sufficient, continuous, reliable, and safe

electricity and in order to satisfy them it is necessary to have appropriate electricity sources and a good electricity transmission network which requires not only good planning for the electric sector but also investment to develop it.

Which are the functions, purposes, and requirements? A national electric system which provides clean, healthy, sufficient, continuous, reliable, and safe electricity.

What could be wrong? Inappropriate laws could lead to faulty planning and lack of investment to assure the appropriate electricity generation and reliable, safe, and sufficient transmission network to satisfy the requirements.

How severe is it? Outages and high electricity prices can produce energy poverty, inflation, and social unrest. Large CO₂ emission contributes to climate change. Faulty planning of intermittent electricity sources may cause stress to the transmission network and make it unreliable.

Which are the causes? Private entities seek earnings through subsidies and lobbies to have CFE destroyed (by fracturing it and making it to pay subsidies to them) and bad planning for the national electric system, as documented in the many generation permits for intermittent sources (far more than the needed demand) far from consumption centers.

How often does the failure occur? As often as laws are the result of lobbying by privates and the corruption of decision makers (as it is alleged it was the way the 2013 energy reform passed).

How could it be prevented or detected? Enacting good laws through informed decision makers (in the Mexican congress) and stake holders (the population, industry, and social sector).

What can be done? Making laws that assure planning and financing for the electric system, avoiding subsidies to privates to assure resources to finance a reliable, safe and sufficient transmission network and enhancing the public company instead.

What indicators will be appropriate? The price of electricity, coverage of electricity in the country, percentage of electricity from clean renewable sources and the advance towards having electricity as a human right.

Who will be the responsible people? The Mexican government responsible for planning, regulating, and controlling the electric sector and in particular the legislative branch to make laws which benefit the developing of the country, strengthening the public company because privates care just about earning for their shareholders. The Mexican government to assure an ordered and gradual energy transition from fossil fuels to clean renewable energy sources and to develop, adopt or adapt technologies to store energy from intermittent sources.

7. Conclusion

Basic quality control tools are useful to analyze complex issues like the ones regarding the Mexican electric system.

References

- Bermejo, E. (17 February 2022). Foro 21, Parlamento abierto Cámara de Diputados. Retrieved February 22, 2022, from: <https://www.diputados.gob.mx/parlamentoreformaelectrica/foros.html>
- Dominguez-Vergara, N., & Dominguez-Perez, D.N. (2021). What works to keep students focused during the COVID-19 pandemic? *EDULEARN 2021 Proceedings*. pp. 2524-2533.
- Gutierrez, R., & de la Vara, R. (2013). *Control estadístico de la calidad y seis sigma*. Cd. de Mexico/Mexico: McGraw-Hill/Interamericana.
- Morales, M. (8 February 2022). Foro 15, Parlamento abierto Cámara de Diputados. Retrieved February 22, 2022, from: <https://www.diputados.gob.mx/parlamentoreformaelectrica/foros.html>

A STUDY ON THE INTERDEPENDENT EXPERIENCE OF COLLEGE STUDENTS PARTICIPATING IN ROLE PLAY-CENTERED COOPERATIVE LEARNING

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Abstract

This study is a qualitative study that explores the interdependence experiences of college students who participated in role play-oriented cooperative learning using case research methods. In the post-COVID-19 learning environment, interaction in a non-face-to-face environment is more emphasized. Therefore, this study attempted to examine specific aspects of how interdependence between learners is practiced in cooperative learning and discover the meaning of interdependence experience through this. Data collection was conducted focusing on class participation observation, in-depth interview, student class review, and reports. As a result of the study, learners' interdependence practice was 'achieved through responsibility', 'clear goal sharing', and 'emotional exchange', and the experience of interdependence was derived as 'becoming a subjective learner', 'improving communication skills', and 'discovering positive meanings of cooperation'. Based on the research results, for effective interaction in non-face-to-face classes, intimacy between teams, clear structuring of classes, expansion of interactions with other teams, and appropriate feedback from instructors were suggested.

Keywords: *Role play, cooperative learning, interdependence, college students.*

1. Introduction

After the COVID-19 Pandemic, society became a hyperconnected society that connects, interacts, and cooperates with each other beyond the limits of space such as home, school, workplace, and cafe, not a specific space. Although the physical environment of learners and teachers is isolated due to social distancing or remote classes, schools are conducting cooperative activities between students using various media. Society emphasizes the importance of cooperation and trust among members to achieve organizational goals, maximize and sustain performance rather than independently superior individuals (Deutsch, 1949). The core competencies necessary for students who will live in the future society are difficult to form only with their own thinking and individual inquiry. Cooperative activities should be activated in which teachers, students, and students share and communicate learning experiences and learning activities with each other to relieve a sense of isolation.

Education should focus not on the transfer of knowledge by unilateral lectures by instructors, but on being able to develop students' potential, and should be a dynamic learning field that can promote students' mutual competencies. Therefore, this study aims to explore in-depth the meaning of interdependence between learners by paying attention to the experiences of college students who participated in role play-oriented cooperative learning. To this end, the researcher participated in the cooperative learning class for 4 months to collect data, and conducted in-depth interviews with 6 students to explore the practical aspects and meanings of interdependence based on their specific experiences. Through this study, it will be possible to clarify the educational meaning of cooperative learning in university education and to find ways to effectively operate cooperative learning.

2. Design

2.1. Role play as cooperative learning

Role play is when learners take on a specific role in a special situation and play their role in a creative, enjoyable, and comfortable environment (Ladious, 1987). Role play can be used as an activity for cooperative learning in that participants work together to solve problems with team members. A study by Kim Dae-yeon and Kim Byung-joo (2018), who studied the improvement of community competency

of elementary school students using role play, revealed that role play had a positive effect in the areas of relationship, mutual reciprocity, empathy, and consideration set as sub-elements of community competency. In particular, students tried to solve problems by cooperating in the process of creating a play rather than a play result, and continued to communicate with others and establish relationships. In addition, Kim Hyun-joo (2018), who studied the use of role plays by college students, confirmed that the process of communication and decision-making in the process of creating a play became a place of practice to lead to integration by forming a consensus. This study shows that in the process of performing role plays, a sense of community is formed through face-to-face interaction and grouping processes, thereby making efforts to develop and solve problems arising from cooperative learning.

2.2. Cooperative learning and interdependence

Cooperative learning is a learning structure that contrasts with competitive learning and individual learning, and does not simply mean that learners learn in groups. In order to become effective cooperative learning, the basic principles of cooperative learning must be reflected. Johnson, Johnson, and Holubec (1993) included positive interdependence, personal responsibility, face-to-face interaction, proper use of social skills, and group processing (grouping process) as basic elements of cooperative learning, while Slavin (1991) suggested positive interdependence and personal accountability. Social interdependence is a branch of theory that explains the understanding of the characteristics of cooperation, competition, and personal effort, where individuals share common goals and see that each individual performance exists when influenced by the actions of others (Deutsch, 1949; Johnson & Johnson, 1989).

Positive interdependence appears in a form that induces positive interaction, with learners replacing each other's behavior in cooperative learning situations, responding positively to each other's effective behavior, and being open to the influence of others (Johnson & Johnson, 2004:109). In order to confirm whether the results of cooperative learning were through interactions based on positive interdependence, it is necessary to examine the interactions between learners. By analyzing the degree of opinions and information exchange between learners within the group and their influence in the communication process, it is possible to confirm whether the achievements obtained from cooperative learning have been derived as a result of interaction.

3. Methods

This study analyzed the cooperative learning experience centered on the performance of role plays of learners who participated in the "Humanities of Multicultural Society and Coexistence," a social studies liberal arts class at I University in the second semester of 2021. Classes consist of video lectures and classes using zoom for 1.5 hours each. Weeks 1-7 will be discussed focusing on the contents of the lecture, and Week 9-14 will be held in the form of writing and presenting role-playing scripts. The role play was set as the theme of Interaction of Various People Living in a Multicultural Society. Among the students who actively participated in the group activities and those with high peer evaluation scores, the researcher randomly selected and commissioned the participants, of which 6 participated. Data collection was conducted through the researcher's observation journal, in-depth interview data (zoom), students' in-depth interviews, mid-term-final reports, role play recorded videos, and role play scripts. In-depth interviews were conducted over 10 days from January 5 to 14, 2022 and were conducted using zoom. The interview contents were organized around group discussion experience, cooperative learning participation experience, prior experience in university cooperative learning, and regret and improvement points for class activities. The collected data were categorized and classified based on theoretical discussions on cooperative learning through three stages of deriving the original statement-semantic description-topic for each study participant. Focusing on how interdependence experienced in the cooperative learning process of group discussions and role plays was specifically practiced, common attributes were found, nomadized under similar topics, and classified into detailed categories. In order to secure the validity of data interpretation, cross-validation of data analysis and interpretation was conducted twice on three Ph.D. programs and professors specializing in qualitative research who are studying college student participation experiences.

4. Discussion

The patterns and meanings of the practice of interdependence of six college students who participated in cooperative learning based on role play are as follows. The practice of interdependence was derived from three central meanings: 'performance of responsible roles', 'sharing clear goals', and 'positive emotional exchange'. The meaning of interdependence experience based on the aspect of interdependence practice was found to be 'becoming a subjective learner', 'improving communication

skills', and 'discovering a positive meaning of cooperation'.

1. Practice patterns of interdependence

1) Performing a responsible role

Research participants valued 'responsibility' in cooperative learning. In 'Performing Responsible Roles', learning contents were prepared before class through data sharing and role-playing topics were understood. In addition, they tried to contribute by fulfilling their personal responsibilities by studying the voice and gestures of their role and finding social issues related to this and immersing themselves in the role.

2) Sharing clear goals

The characteristic of the group that successfully performed the role play is that it shares a 'clear goal' among team members. In order for cooperative learning to be effective, group goal setting is important (Johnson & Johnson, 2004), and there must be incentives, and for research participants, 'good grades' soon became a shared goal and incentive. They say, "I thought successful results were directly related to good performance, and I focused on this." In addition, it was evaluated that their active participation and cooperation of the members played a key role in producing good results.

3) Positive emotional exchange

Factors promoting interaction between team members were found to be 'friendliness' through praise and encouragement among team members and contact other than class time. Since role play is an activity that requires more interaction between team members, students responded emotionally by sending praise and encouragement for individual roles, and this emotional exchange expanded to trust in team members. The study participants continued to meet and perform tasks using zoom. The research participant's words, "I enjoyed my assignment without knowing the passage of time," show that emotional exchange between team members is an important factor in effectively conducting cooperative learning.

2. Meaning of interdependence experience

1) Becoming an independent learner

Participants in the study participated in learning independently through in-depth exploration of the subject, preparation of class materials, and search for current events related to role-playing topics. In addition, students emphasized the boundaries of 'free rides', but applied this rule more strictly to themselves, not to team members. "Everyone is working hard, but I didn't want to be someone on the team," shows the learners' mindset well.

2) Improve communication skills.

"My communication skills improved in the process of coordinating opinions by expressing my opinion and listening to other people's opinions". A clear and democratic communication method between group members is an essential element for forming an effective group. Participants in the study presented their opinions in the process of selecting discussion topics, organizing contents, writing and revising scripts, and sharing roles, and communicated in various ways, including accepting team members' opinions, presenting objections, and providing feedback.

3) Finding the positive meaning of collaboration.

For the pre-class study participants, 'conflict' was perceived as a problematic situation to be avoided without harmony. However, through cooperative learning, learners experienced that the 'conflict' caused by 'difference' can be resolved through 'diversity recognition' and 'mutual respect'. It served as an opportunity to expand the spectrum of perceptions of various thoughts, values, and attitudes among team members, which could shift 'cooperation' from the stereotype that it was uncomfortable and cumbersome to a positive meaning of 'enough attractive activity'.

5. Conclusion

Is this study applicable to cooperative learning of college students in an educational field where personal and competitive learning is overheated? A positive practice case is presented to the question about. This study can find the significance of the study in that it confirmed the practicality of cooperative learning in online classes and derived the educational significance of cooperative learning by specifically exploring how college students interact in a full online class environment.

Based on the research results, the following suggestions are made. First, emotional intimacy between team members becomes an important factor in promoting cooperative learning. Therefore, it is necessary to prepare a plan to reduce the burden on learners by presenting class activities that can form intimacy between team members at the beginning of class. Second, it was confirmed that students can set clear goals and specifically participate in cooperative learning when the class is structured. Learning activities for each week and presentation of clear evaluation guidelines are required. Third, activities that promote interaction with other teams should be carried out. This will be an opportunity to evaluate their activities more objectively and at the same time enable exchanges and cooperation with more diverse

learners. Fourth, instructors can positively lead learners' learning through feedback. Therefore, it is necessary to promote learners' interactions through appropriate feedback, fair evaluation, and active interest.

References

- Deutsch, M. (1949). A Theory of cooperation and competition, *Human Relation*, 2, 129-152.
- Johnson, D. W., Johnson, R. T., & Holubec, E. J. (1993). *Cooperation in the classroom* (6th ed.). Edina, MN: Interaction Book Company.
- Johnson, S., & Johnson, D.W. (1989). *Cooperation and competition: Theory and research*. Edina, MN: Interaction Book Company.
- Johnson, D. W & Johnson, P. (2004). *Joining Together: Group Theory and Group Skills*, 8/E. Participatory Learners for Cooperative Learning, 8th. Park In-woo, Choi Jeong-im, Lee Jae-kyung. Seoul: Academy Press.
- Kim. D. Y., Kim. B. J. (2018). The Effects of Drama Education Program for Elementary Students' Community Competency within Arts-Flower Seeds School Initiative, *Journal of Korea Association for Drama/Theatre and Education*, 10:2, 25-42.
- Kim. H. J. (2018). A Case Study on Leadership Program based on Drama Education. *Journal of Korea Association for Drama/Theatre and Education*, 10(2), 43-64.
- Ladousse, G. P(1987), *Role Play*. Oxford: Oxford University Press.
- Slavin, R. E. (1991). Synthesis of research o cooperative learning. *Educational Leadership*, 48(5), 71-82.

NARRATIVE INQUIRY ON THE SUBJECTIVITY CHANGE PROCESS OF LIFELONG LEARNERS IN PSYCHOLOGY

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Abstract

The interest in psychology in lifelong learning is increasing. So, how does psychology as lifelong learning actually affect lifelong learners? This paper analyzes the process of subjectivity change of a psychology lifelong learner as a method of narrative inquiry according to Lacan's subject theory that puts the purpose of psychology in subjectivity change. The participant is a English teacher who first encountered psychology in college and have been living as a psychology lifelong learner for more than 20 years. Through psychology learning, she was able to understand and accept her husband, who had a different personality from herself, to be able to care for her child's own career path, and to reconcile with her mother who had been fighting for her life. It is possible to form the self-subjective self, not the self as the approval and imitation of the other, and to move from the divided subject to the integrated subject. This study is meaningful in that it can show the effects of psychology as lifelong learning qualitatively and help design psychological lifelong learning.

Keywords: *Lifelong learning, psychology, subjectivity, narrative inquiry, Lacan.*

1. Introduction

Korean society is interested in psychology of non-specialists. In the monthly bestseller selection of Kyobo Bookstore, Youngpoong Bookstore and YES24 during 2021, psychology-related books remained within the top 10. Based on non-literary, it rises and falls to the top three. The public interest in publications and books shows the public's demand for psychology in lifelong learning. So, how does this psychological lifelong learning affect learners?

The founder of psychoanalysis, S. Freud, wrote in his book, "The Psychopathology of Daily Life" that without constant self-reflection for a lifetime, he would be led by unconsciousness and development and progress cannot be created in his life" (S. Freud, Lee Han-woo, 1998:120~138). The analytic psychologist Jung saw that psychological learning that finds oneself should be educated through all life to achieve self-realization and individualization (Kim Young-hee and Choi Hang-seok, 2003:79). Psychoanalyst Lacan says that the analytical dialogue used by psychoanalysts should be available to all subjects as well as analysts, and has held weekly seminars for everyone over 27 years, including experts and non-experts (J. Lacan, Maeng Jeong-hyun, 2016:14). Eric Byrne, the founder of the transactional analysis, argued that lifelong psychological education should be conducted because the self-state changes until the day of death (I. Stewart, 1992: 89). If the research of psychoanalysts and psychologists are true, the process of change in individualization and subjectification will be revealed to lifelong learners in psychology.

This researcher investigated the narrative of a lifelong learners in psychology qualitatively, and studied how psychology influenced the life of the participant and what changes occurred to the subjectivity of the participant through the lifelong psychology learning. Through this process, two research questions were set up as follows.

Research Question 1. What did the participant experience through lifelong psychology learning?
Research Question 2: How did the lifelong psychology learning of the participant affect the change of subjectivity of the participant?

2. Subjectivity and lifelong psychology learning

Subjectivity is a concept that measures who is in the position of the actor or the master of the act as an action. Subjectivity for Descartes is related to the power of thought. In order to convince oneself of the subjectivity, the confidence as a thoughtful being must be repeated (B. Fink, Lee Sung-min, 2010:93).

But Lacan believes that the internalized self-image and the structure of discourse to hide and avoid should be analyzed to secure the subjectivity (B. Fink, Lee Sung-min, 2010:81~89). So he denied Descartes' proposition, saying, "I exist in places that do not think, and I think in places that do not exist." According to Lacan, the subjectivity opposite to self-thinking can be revealed in the individual's life because the desire of others and others constitutes the subjectivity in the internalized self-image and discourse. Lacan called this form of subject a divided subject in the sense of subject revealed by the other (B. Finkzer, Lee Sung-min, 2010:95~97). In other words, being subjective means collecting the gaze and sound of the other in the internalized self-image and discourse and changing it into self-image and discourse by oneself. Being subjected is nothing more than crossing the desire of the other, which is like fantasy, and facing his own pleasure (B. Fink, Lee Sung-min, 2010:103~132).

The internalized other has already occupied a considerable part of the subject over the years or decades. If being subjective is the work of peeling off the deeply internalized others, it is not possible within a short learning period or analysis period. As Jung or Lacan says, subjectification is not a work that goes on for months or years, but a work that goes on throughout life.

3. Research method

3.1. Narrative inquiry

The purpose of this study is to reveal the meaning of the change of subjectivity in the learning process of a lifelong learner in psychology by exploring the narrative of the research participant. For this purpose, the narrative inquiry method of Cresswell(2007) was used. Cresswell saw narrative as a chronologically connected event as an utterance or record, and narrative inquiry was seen as the result of mutual research of 'telling and re-telling' by collecting events that occurred to the participant and reconstructing them into a single story. In order to draw the results of the mutual research, the narrative inquiry process of the seven stages was set up. The seven steps for the narrative inquiry of this study are as follows.

One-step: Phenomenon Settings - The Meaning and Effect of Psychology as Lifelong Learning on the Subjectivity.

Two-step: Research participant selection - Psychology lifelong learner.

Three-step: Data Collection - In-depth Interview Transcripts and Study Participants' Learning Materials and Diary.

Four-step: Reinterpretation by the researcher - Preparation of the first narrative record.

Five-step: Interview of Research Participant on the First Records - Reinterpreting by Research Participant and Researcher.

Six-step Writing Text – Writing a paper in a secondary record.

Seven-step Confirming Facts and Accuracy – Consent of Study participant on the Completed Paper.

3.2. Research participant and data collection

The Participant was recruited through open recruitment of Community psychology research institute. The first research participant was selected. The selected research participant were 40-year-old women, whose occupation was an English instructor, her parents were alive, had a married younger brother and a sister, and had a husband and a high school student daughter.

The data are the transcripts of in-depth interviews, the study records of the participant, and the diary contents about learning. The learning diary and the learning record were submitted by selecting only the part that the research participant wanted, and the in-depth interview was conducted three times for 1 hour ~ 1 hour and 30 minutes. The questions of the interview are as follows.

1. What is the opportunity to study psychology?
2. What did you think of yourself in your twenties?
3. What kind of dream did you have in your twenties and why did you have that dream?
4. What are the changes that have occurred in learning psychology?
5. How did your thoughts change in your thirties?
6. What was the process of achieving the dream? What was the change?
7. Why do you still study psychology?
8. What did you think of yourself in your 40s?
9. What dreams do you have in your 40s? What do you think of them?
10. How did your thoughts about yourself change?

3.3. Data analysis

Narrative discourse analysis was used as an analysis method to re-tell the narrative of the participant. Narrative discourse analysis is an analysis method that reinterprets the story the participant interpret her own experiences by focusing on the organizational principles of stories such as 'Why do you say that way?' (Kim Young-soon and Chung Kyung-hee, 2018:229). This is an easy analysis method to show contextual causality about the behavior or purpose that appeared in the discourse of the participant. Through narrative discourse analysis, the concept of subjectivity of Lacan was applied to retelling the narrative of the participant. The narrative was composed by distinguishing the gaze and voice of the other in the internalized self-image and desire, and re-telling the influence of psychology study on the internalized self-image and desire. The researcher constructs narratives and reinterprets them with the participant, focusing on changes in internalized self-image and desire, and confirms the factuality and accuracy of the written text.

4. Research result

4.1. Ask for her mother

The mother of the research participant never read or wrote because she had never attended school, but she managed a restaurant with excellent cooking skills and raised funds for the father's business. The strong ability to maintain her livelihood and sincerity made the poor family wealthy. Although they supported the research participant economically, there was no consideration or compromise, and it was directive and violent. Even after the participant became adult, the mother's attitude did not change, and the wound continued. She provided a place to live for her mother and father, but her mother did not appreciate it. The participants were able to live a stable social life thanks to their mother's economic support, but her anger was accumulated due to the damage of her mother's fluoride and violence, and she were dissatisfied with her mother's lack of emotional communication with the participant. The participant thought that she was subjective women because she had a socially recognized job, but while studying psychology, she realized that she lost her subjectivity in front of her mother and she is filled with anger and dissatisfaction. The fundamental problems that are not empathized by the mother and family are not solved and all energy is used to receive social recognition. The participant expressed her dissatisfaction with her mother and asked her mother to stay in her heart. She demanded that her mother apologize for the violence and that her mother should thank her for giving the house to live. The mother initially refused, but the participant demanded each time they met without ending at once, and later it became natural for the mother to apologize and express gratitude. The participant and mother are in good relationship and the participant can talk to her mother freely. Subjectivity was not in social status but in behavior.

4.2. Tell her brother and sister in heart

The participant has one younger brother and one younger sister. Her brother went into business with a debt of 60,000 dollar. Debtors visited the research participant's house to find their younger brother, and she paid the brother's money for her younger brother. Her brother appeared in three years, but he did not thank her even though he knew that she had paid his money, and he lived as if nothing had happened. And her sister stole the card of the participant and used 20,000 dollars. She stopped the card, and it was clear that her sister was doing it, but she could not ask because her sister was gone. Her sister showed up with a man to marry a few months later and the participant could not ask, "Did you steal my card?" The participants were unhappy, but she could not get the money back to her and could not say about unfairness. Each time she met siblings, the complaints flowed into irritability and instructions, and the participant acted instructively to her younger siblings as if their mother had done it to the participant. Her relationship with her younger siblings has become worse and worse. The participant found that she was unable to ask her siblings because of their social responsibility for the family economy as the head of the family, and because of the fear that asking their siblings about money might break their relationship. The identity of the eldest daughter suppressed the subjectivity of the individual. The participant who learned this talked to her siblings about money and her emotion and received an apology from her younger siblings. They have a good relationship because her uncomfortable mind disappears.

4.3. Understand her husband and daughter

The participants consider work important, use energy for social success, and have diligent and obsessive lifestyles. But her husband is free, and he is lazy, considering his family more important than his work. Her daughter is free and lazy, like her husband. The participants were always disapproved of the lazy family, and the house was not a resting place but a place to nag. However, while studying psychology, the participant found that she was successful, one-centered, and had some

obsessive-compulsive symptoms. And she also learned that subjectivity should be mutually subjective because she knew that she was not the only one with subjectivity, but that her husband and daughter had subjectivity. So, she accepted the other and recognized the subjectivity of the other, and she were influenced by other' subjectivity and influenced by expressing self-subjectivity. Now, the participants have learned how to enjoy leisure time and think about her home more important than work.

5. Conclusion

The participant was subduing self-subjectivity to the other's gaze and voice, saying, "She must succeed socially, she cannot ask adults and seniors, and she should be responsible for the economy of the family." So She couldn't ask for an apology for her mother's violence and She was not told to thank her siblings for their debts. And She judged her husband and daughter's personality according to herself. However, by studying psychology, she cherished her subjectivity rather than the Confucian culture created by Korean society, and became able to make her voice beyond the gaze of the other who was bound by herself. As a result, she was able to break down the walls of her mother and sisters, husband and daughter, which were blocked by social gaze, and enter into intersubjective relationships.

This study has the advantage of interviewing one research participant in depth to see the process of subjectivity change of a psychology lifelong learner in depth, but it has the disadvantage that it can't be generalized because there is only one case. Based on this qualitative study, it is necessary to carry out quantitative research on the same subject, and it is expected that the environment in which psychology lifelong learning can be universalized will be created.

References

- Baek, S. (2017). *Anthropology of Lacan: Seminar 7*. Seoul: Wigo.
- Baek, S. (2020). *Political science of Lacan: Seminar 11*. Seoul: Editus.
- Calum N. (2013). *Breaking the text: An introduction to Lacanian discourse analysis*. Edinburgh: Edinburgh Napier University.
- Donald A. R. (1990). *The Voice of the Past Oral History*. Oxford: Oxford University Press.
- Donald A. R. (1995). *Doing Oral History*. Oxford: Oxford University Press.
- Fink, B. (2007). *Fundamentals of Psychoanalytic Technique: A Lacanian Approach for Practitioners*. New York: Norton.
- Frederick J. S. (1982) *Popular Memory Group, Popular Memory: Theory, Politics, Method, Making Histories*. Minnesota: University of Minnesota Press.
- Hong, J.-K. (2007). *Hegel's Dialectic of Lordship and Bondage, and Lacan*. *The Journal of Contemporary Psychoanalysis*, 9(2). 109-145.
- Kareen R. M., & Stephen R. F. (2000). *The Subject of Lacan: A Lacanian Reader for Psychologists*. State university of New York Press.
- Kim, Y.-M. (2006). Heidegger/Lacan. *The Journal of Contemporary Psychoanalysis*, 8(2), 67-94.
- Kobayashi Y. (2017). *Une Psychose Lacanienne*. Seoul: Editus.
- Lacan, J. (1988, [1964]). *The Seminar Book XI: The Four Fundamental Concepts of Psychoanalysis*. trans. Alan Sheridan New York: Norton.
- Lacan, J. (2006, [1960]). *Subversion of the subject and dialectic of desire in the Freudian Unconscious*. trans. By Bruce Fink. New York: Norton.
- Lacan, J. (2006, [1966]). *On the subject who is finally in question*. trans. By Bruce Fink. New York: Norton.
- Lee, Hun-jin (1999). *Exploratory Study on the Cause of Paranoia*. *Korean Journal of Clinical Psychology*, 18(1), 1-15.
- Maeng, J. (2020). *Black magic of melancholy*. Seoul: Checdam.
- Park, Mun-suk·Hyun, Myung-ho (2020). *The Effects of Loneliness on Paranoia*. *Stress study*, 28(2). 84-89.
- Park, C.-B.:H., & Jun-ki (2007). *Lacan's clinical philosophy and the politics of the psychoanalysis*. *The Journal of Contemporary Psychoanalysis*, 9(2). 109-145.

ALTERNATIVE EDUCATIONAL ACTIVITIES TO ENHANCE YOUTH'S PARTICIPATION IN SOCIAL INNOVATION IN HIGHER EDUCATION: THE CASE STUDY OF "ACTIVE CITIZENS" PROGRAM BY BRITISH COUNCIL IN A VIETNAMESE UNIVERSITY

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Abstract

The paper will provide the overview and practices of embedding social innovation into higher education through extra-curriculum activities in Vietnamese universities. The paper argues that the educational experiences provided by "Active Citizens" program can provide the youth necessary global skills, mindset and hand-on experiences to engage youth to social innovation through their social action projects. The study also recognizes that most challenging issue in carrying out this kind of program is to sustain students' engagement and their active investment in their initiatives. The study also sees great potentials for enhanced partnerships among university-community in terms of both professional and financial support for student's projects. Finally, there are discussions on embedding social innovation into Vietnamese universities to serve for higher education's third mission.

Keywords: *Social innovation, active citizens, higher education, social engagement, global citizenship education.*

1. Higher education and their third mission

There is an increasing interest in how universities will meet the needs of society and regional contribution alongside their traditional teaching and research missions (Sánchez-Barrioluengo & Benneworth, 2018). The university's third mission of community services are widely referred as tech-transfer and for tackling various sustainability challenges through the emerging partnerships and collaboration between academia, industry, government and civil society (Trencher et al, 2013). In this paper, we will focus on the different ways university perform their third mission, concentrating on embedding social innovation into higher education institutions by examining the case study of "Active Citizens" program conducted in one university in Vietnam in 2019 and 2021. The paper argues that the educational experiences by "Active Citizens" program can provide the youth necessary global skills, mindset and hand-on experiences to engage into social innovation through their social action projects. Then, there are discussions on embedding social innovation into university's training activities.

First of all, the concept "social innovation" in this paper is defined as a socially innovative practices that delivers socially just outcomes (Benneworth & Cunha, 2015, p.514). To some extent, this can challenge universities in terms of the desirable outcomes which are socially desirable, not universities' core missions, nor necessarily things that universities do very well. Hence, there exists the tensions from increasing pressures on universities to prioritize individual institutional success (private benefits) over wider public benefits (Robinson & Green, 2011).

Second, the paper argues that social innovation can be examined through university's social engagement activities. Melody Barnes & Paul Schmitz (2016) claims that the university's social engagement is less visible as a government policy and different universities have various program to perform this role such as programs aiming at reducing inequality in society in Chilean universities, support activities for vulnerable students in South African or at Ontario university programs in terms of support programs for indigenous students (Maassen et al, 2019). University's community engagement is not as strongly institutionalized as their knowledge transfer and is organized in a more scattered and fragmented ways. Consequently, universities have a limited capacity for further developing and professionalizing their third mission strategies and activities. There is a gap between the activities that universities undertake to strengthen their relationship with society, and the visibility, understanding and recognition of these activities among the wider audience (Melody Barnes & Paul Schmitz, 2016). Further, due to the lack of funding opportunities for the universities to social engagement both at national funding policy, there is continuous criticism on universities that their 'third mission' strategies and activities are insufficient until now (Melody Barnes & Paul Schmitz, 2016).

However, the common characteristic among in performing university's social engagement is the focus on student engagement, stimulating students to engage in community development and environmental protection. Universities have become increasingly interested in incorporating civic engagement into educational experiences at university life. for enhancing leadership skills and creating socially responsible global citizens in which extra-curricular civic engagement has the most impact (Whitley & Yoder, 2015). Accordingly, Global Citizenship Education can be seen as dominant type of educational experiences to enhance the youth's participation local and global issues. The "World-class Teaching" project funded by European Aid, has identified the importance of youth-led learning is to encourage the young people's participation and engagement in global themes and issues and youth-lead learning can be conducted at schools/universities through both formal and non-formal academic activities. Addressing the university's embedding social innovation into their training activities, in this paper, we will focus on the educational experiences provided by the partnership between university-community through extra-curriculum activities.

2. Practices of embedding social innovation into higher education institutions

The partnerships of university-industry-community range from research& social engagement paradigms such as participatory research & action research, technology transfer, transdisciplinary, cooperative extension programs for local and community development, service learning (application of educational programs to extra-curriculum activities to tackle localized real-real problems), regional development, living laboratories (evaluating real-life experiments and social intervention) (Trencher et al, 2013). In some Asia contexts presented in the table 1 below, we can also see the different ways social innovation are being embedded into higher education institutions (HEIs):

Table 1. Country higher education ecosystems for social innovation (SIHE, 2020, p. 35).

Country	Publications	Modules/ Courses	Community engagement	Key features
Vietnam	148	77	42	•Moderate government support • Strong research & curricula • Moderate international collaboration • Poor corporate social responsibility (CSR) engagement
Malaysia	55	64	47	•Moderate government support • Moderate research • Strong curricula • Moderate international collaboration • Moderate CSR engagement
Indonesia	89	15	22	• Low-level of government support • Moderate research • Poor curricula • Poor international collaboration • Strong CSR engagement
Philippines	50	73	62	• Low-level of government support • Poor research • Strong curricula • Poor international collaboration • Poor CSR engagement
Korea	70	40	24	• High-level of government support • Very strong research & curricula • Strong international collaboration • Strong CSR engagement

This regional study shows that teaching social innovation is mainly embedded into undergraduate and non-accredited courses with strong focus on research & curricula. However, this study does not provide analysis of social innovation embedded to non-credited training programs and of the bottom-up initiatives at Vietnamese universities. Consequently, "Active Citizens- Start-up Ring" program, conducted by the University of Social Sciences and Humanities, Vietnam National University, Ho Chi Minh city (USSH) in 2019 and 2021, will be examined to support the argument that such extra-curriculum activities can be considered as one of alternative educational activities to enhance youth's participation in social innovation in through their activities in higher education.

3. Social innovation in higher education institutions in Vietnam

The country report of Social Innovation and Higher Education Landscape (SIHE, 2020) states that higher education sector in Vietnam is in the early stage of supporting social innovation through their focus on social innovation and social entrepreneurship research, teaching, community engagement activities and the emergence research centers and hubs/incubators within universities to support the growth of the innovation ecosystem. Programs and competitions are organized to raise awareness and provide training to young people interested in social innovation and social entrepreneurship by research centers (most notably are the Centre for Social Innovation and Entrepreneurship (CSIE); and the Centre for Economic Development Studies at Vietnam National University, Saigon Innovation Hub) and by international organizations like the British Council (Vietnam Youth for Social Innovation), and UNDP (Social Innovation Camp and Summit). Importantly, social innovation and entrepreneurship are integrated into academic curriculum and other extracurricular activities in which experiential learning and service learning are used to design teaching and learning activities. The main goals of these activities are involving students on real-life cases/experiences for raising students' awareness on social issues, social responsibility and entrepreneurial inspiration, as a means of building socially entrepreneurial behavior and the sustainability agenda (Tran and Doan, 2015).

In addition, social innovation at HEIs in Vietnam is strongly guided by the Ministry of Education and Training (MOET) and national government agenda, namely Project 1665 and Project 844. Upon the implementation of Project 1665 (which lasts until 2025, aiming to encourage/support youth entrepreneurship and social entrepreneurship), universities have quickly introduced social innovation and entrepreneurship into university's activities. Other key project related to building ecosystem to support more university's engagement into social innovation and entrepreneurship is Project 844 which is introduced to (1) Promoting and supporting the formation and development of fast-growing businesses based on exploitation of intellectual property, technology, and new business models, (2) Providing the legal system to support innovative start-ups, (3) Setting up the National Innovation Startup Portal, (4) Supporting 800 projects, 200 start-up businesses with a total value of about VND 2,000 billion.

4. The case study of “Active Citizens” program at the university of social sciences and humanities, Vietnam National University (USSH)

Being guided by national agenda by the Ministry of Education and Training (MOET), Project 1665 and supported by two donors (AUF and British Council), the USSH conducted the project “*Building ecosystem to promote the spirit of entrepreneurship and social innovation among students at Vietnamese universities*” and organized the program “*Active Citizens –Start-up Ring*”. The selected students of this program are expected to be equipped with necessary knowledge, interpersonal/professional skills, experiences towards addressing current social needs/problems through their social projects or start-up project. The program aims to provide the training for young social leaders and identify necessary conditions to promote the support system of entrepreneurship and social innovation at university.

Using the framework of the global program “Active Citizens” (a program connecting 1,408 partner organizations in 78 countries who have trained 10,960 facilitators who have empowered 323,719 Active Citizens to launch 13,586 social action projects since 2009), the USSH's program is also dedicated to promote community-led social development through building trust within and between communities and across key stakeholders, motivating community members to take responsibility for their social needs whilst training them the knowledge, skill (strategic thinking and increased employability, communication skill), real-life experiences and networks needed to be able to address 21st century challenges effectively (Active Citizens Toolkit, 202, p.11). The participants are expected to generate confidence, value for fairness, social justice, difference, understanding of local and broader communities and to have a strong sense of local culture and identity in established local network (social, professional, religious).

Upon the program “*Active Citizens –Start-up Ring*” launched (we named it differently to match it with the university's strategic plan on promoting social innovation and entrepreneurship), there are 198 participants (133 in 2019 and 65 in 2021) and 99 students (77 in 2019 and 21 in 2021) from 17 universities located in Ho Chi Minh city were selected to enter to the 4-day training program “Active Citizens – Start-up Ring” organized at our campus. After 4-day intensive training program, students are offered mentoring and coaching to support them in implementing their projects. Other training courses, talk shows, seminars, start-up camps (offline camp in 2021 in Bidoup, Dalat and online camp in 2022) to provide them more exposure to social/start-up projects. Based on the survey (as mandatory part of the students' applications), majority of participants are first-year year students (33.1%) and second-year students (33.8%) in which 80% of them have had volunteering experiences. With regards to the reasons why they participate in our program and what they have learnt and would apply in their study and projects, the study gets the following key responses from 198 participants and 99 selected students. Here are the ones with highest votes:

Table 2. Student's feedback on their motivation of participating to Active Citizens –Start-up Ring” Program.

What kind of changes they want to see in their community	What do they expect from the program	What do they learn most and will apply into their study and projects (selected students)
Quality of environment	Personal development (To understand their identity and improve their knowledge, skills and experiences)	Design thinking and Lean Canvas
Quality education and equal access to education for all	Skills development	Learning Journey
Young people's lifestyle	To connect with friends, coach and mentor to turn their ideas into projects	Me and identity (Module 1)
Social responsibility	Understanding of entrepreneurship and social action projects	Listening at three levels and asking questions (Module 2)
Safe food	To be a good citizen with social responsibility and high spirit of community engagement	Talk shows with invited guest speakers
The social recognition of gender equality and LGBT community	To be able to change their mindset and views on the social issues in the community	What they have learnt through group discussions and educational experiences (experiential learning)
Other social issues such as: mental health care, sustainable tourism development.	To be able to get grants/funding for their projects (start-up projects and social action projects).	Project planning and how to write action plan

With post-training surveys, students agree that the program provide the students with necessary global skills, mindset and hand-on experiences to engage them into social action and fully be aware of social issues/problems, active citizens and social responsibility. Majority of student's suggestions post training focuses on the following issues: (1) how to get grants for their projects, (2) to have more intensive trainings on project management and other interested topics, (3) to have more mentoring and coaching for project implementation phase.

In our sharing sessions of "Start-up Ring" camp in January, 2021 and "Start-up Ring" online camp in October, 2021, students show their dedications to successfully carry out the proposed social projects/start-up projects and claim that they have got confidence and adequate understandings and skills in working with people from different communities. They also claim that learning experiences, supportive learning environment and great classmates are their main motivations to sustain their engagement in their challenging and demanding journey. In addition, in 2021, we used diary as part of reflection activities (the program was organized in online format due to pandemic Covid 19 in Ho Chi Minh city), students are requested to reflect on what they learned after each week by using 3-2-1 principle (3 things they have learnt, 2 things they like most and 1 thing they will apply into their study/work/project). To some extent, the data collected in 2019 and 2021 shares the strong consistence on students' feedback on their educational experiences and suggestions as analyzed above.

Experiential learning and service learning are also translated into teaching and learning activities of this 4-day intensive training program, and service learning are more concentrated on post-training activities when students are in the stage turning their ideas into action projects. From our conducted surveys and sharing sessions, students claim that experiential learning and service learning is likely to provide them trust, safe environment to raise their voices and to find the knowledge/skills more practical and related to their projects' implementation. However, we did not get the whole story of students' perceptions on differences between traditional teaching methods and experiential learning in delivering such knowledge related to social issues, social innovation and entrepreneurship.

5. Discussion

In this paper, the practices of embedding social innovation into higher education are examined through extra-curriculum activities by analyzing the case of "Active Citizens – Start-up Ring" program carried at the USSH. The paper argues that this kind of educational experiences can provide the students with necessary global skills, mindset and hand-on experiences to engage youth to social innovation through their action projects.

From our observations, surveys and sharing session, the study also recognizes that most challenging issue in carrying out this kind of program is to sustain students' engagement and their active investment in their initiatives, the activity, place, group, organization, or outcome at the initial stage after they complete the training phase. True youth engagement harnesses youth's interests and energy for a larger purpose and community development offers a definitive platform for youth engagement (Robinson & Green, 2011). Hence, university-community partnerships, the strong partnership of university, NGOs, civil society and industry will create platform to support students during their first steps in social engagement right at the time they are at university. In this aspect, we have seen great potentials for enhanced partnerships among university-community in terms of both professional and financial support of Head of Start-up companies, Founders of Social Projects, NGOs and other civil agents in boosting youth's social responsibility and contribution to sustainable development through community-engaged actions.

As for the implications for enhancing the effectiveness of this kind of educational practices, we suggest that there is more focus on mentoring and coaching phase once student's action projects submitted. Not all selected students can submit their action projects after completing the training, around 30% of students claims that they find their interests in addressing social issues or embracing start-up ideas but they were not ready to take action after training or even after sending their action plans for getting seed funding and approval. Consequently, it is argued here that mentoring and coaching phase is a crucial stage to sustain the ready-to-take action students to complete certain parts of their proposed action plans. From the initial success of "Active Citizens- Start-up Ring" program organized at our university and at 16 other universities around Vietnam, we find that this kind of education experience is very significant to get student engage to social innovation and entrepreneurship right at the first years of their university life, resulting in profound understanding of their personal interest, career path and social responsibility. For these reasons, our teams plan to turn this extra-curriculum program into compulsory/selective courses for students at General Education (mostly for first year students) to have more investments from HEIs and from university's academic strengths in promoting university-industry-community partnerships. More importantly, the larger number of students who are well trained and dedicated to the likelihood of and

sustainable growth of their hometown through their innovation and actions will become quality human resources for Vietnam growth socially and economically.

Further, based on the feedback of students it is advisable to apply service learning, experiential learning into university courses because students understand more about the outcomes of each teaching session by experiencing the real situations (through toolkits) and applying what they learn through community activities post training sessions and during the project implementation. At the first step, our study suggests that modules of internships can be upgraded and updated learning outcomes through the application of service learning and experiential learning. Learning with active engagement can be alternative educational practices for work-based courses, extra-curriculum activities and volunteering programs to integrate social innovation and social engagement across disciplines offered at university.

As presented in the Table 1 above, different countries have different interpretations and implementations of the way they are embedding social innovation and social engagement into university's formal and non-formal activities to effectively perform their third mission. Being a bottom-up initiative and a pilot project, we do not have systematically support network within the university Faculty/Department in embedding social innovation and social engagement into courses and non-formal activities, eventually the outcomes of this program are not well communicated to all leaders of Faculty/Department. That is because social innovation and entrepreneurship are mainly seen from the lens of university' knowledge and technology transfer activities while rich sources of students with great potentials of innovation, entrepreneurship and social responsibility are not being explored yet. Hence, we also suggest that social engagement activities should be addressed at universities' formal management, governance and organization structures and at Faculty/Department's strategic plan as part of the university's training activities for the sake of more engaged actions by students.

References

- Active Citizens facilitator's toolkit - British Council (2017-2018). https://www.britishcouncil.org/sites/default/files/active_citizens_global_toolkit_2017-18.pdf
- Bender, G. (2008). Exploring conceptual models for community engagement at higher education institutions in South Africa. *Perspectives in Education*, 26 (1).
- Bringle R., Games, R. & Malloy E (1999). *Colleges and universities as citizens*. Needham Heights, VA: Allyn and Bacon.
- Benneworth P. & Cunha, J. (2015) "Universities' contributions to social innovation: reflections in theory & practice", *European Journal of Innovation Management*, 18(4), 508 – 527.
- Jerry W. Robinson, Jr., Gary Paul Green (2011). *Introduction to Community Development Theory, Practice, and Service-Learning*. SAGE
- Decree 1884. <http://dean844.most.gov.vn/>
- Melody Barnes & Paul Schmitz (2016). *Community Engagement Matters (Now More Than Ever)*. Stanford Social Innovation Review. Spring 2016.
- Peter Maassen, Zacharias Andreadakis, Magnus Gulbrandsen, and Bjørn Stensake (2019). *The Place of Universities in Society*.
- Project 1665. <https://dean1665.vn/>
- Tran, D.D., Doan, X.H. (2016). From social responsibility to social enterprises and education at universities. International conference of Social Enterprise in Vietnam: The roles of higher education and research institution.
- Trencher, G., Yarime, M., McCormick, K. B., Doll, C. N. H., & Kraines, S. B. (2013). Beyond the third mission: Exploring the emerging university function of co-creation for sustainability. *Science and Public Policy*, 41(2), 151–179.
- Sánchez-Barrioluengo, M., & Benneworth, P. (2018). Is the entrepreneurial university also regionally engaged? Analysing the influence of university's structural configuration on third mission performance. *Technological Forecasting and Social Change*.
- Social Innovation and Higher Education Landscape Regional Report. SIHE (2020) https://www.britishcouncil.id/sites/default/files/sihe_-_regional_report_-_final.pdf
- Social Innovation and Higher Education Landscape Country Report. SIHE (2020). https://www.britishcouncil.vn/sites/default/files/sihe_-_country_report_-_vietnam_final_0.pdf
- Whitley, C. T., & Yoder, S. D. (2015). Developing social responsibility and political engagement: Assessing the aggregate impacts of university civic engagement on associated attitudes and behaviors. *Education, Citizenship and Social Justice*, 10(3), 217–233.

ENGLISH SECOND LANGUAGE LEARNERS' CHALLENGES IN COMPREHENDING PHYSICAL SCIENCES CONCEPTS

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Abstract

Physical Sciences is a complex subject with many abstract concepts. This complexity is magnified by the learners' lack of the linguistic capacity to comprehend the concepts and engage actively in the teaching and learning process. Previous studies have alluded to the fact that science is a language on its own, which therefore makes it even more difficult for learners whose home language is different from the medium of learning and teaching. Previous research indicated that learners who are English second language speakers perform poorly in Physical Sciences because the majority of learners particularly from townships and rural areas are only exposed to English in the classroom, and once they get out of the classroom, they start communicating in their home languages. It is against this background that the current study sought to determine challenges English second language speakers face in comprehending Physical Sciences concepts. In a quantitative and qualitative methodology, five grade 12 Physical Sciences teachers and 51 learners in their Physical Sciences classrooms were randomly selected from public schools in Johannesburg. To establish English second language learners' challenges in comprehending Physical Sciences concepts, a questionnaire was administered to the selected learners. The teachers were interviewed using a structured interview schedule to explore how they assisted English second language learners to overcome language challenges when learning Physical Sciences. Quantitative data was analysed and descriptive statistics were obtained and a regression analysis was done to find the correlation between these learners' marks in the subject English First Additional Language and their Physical Sciences marks. Qualitative data from teachers' interviews were analysed using content analysis. Findings from the learner questionnaire showed that 78% of the learners indicated that language plays an important role in them understanding high school Physical Sciences concepts and as such they failed to meaningfully understand the Physical Sciences terminologies and jargon used for each specific topic. They also indicated that they perform badly in Physical Sciences assessments as they struggle to engage in meaningful classroom discussions due to their poor proficiency in English, the medium of instruction. The analysis showed a positive correlation between learners marks in English as a subject and their Physical Sciences marks. Amongst others teachers indicated that they mostly used code switching as a strategy to assist learners understand concepts. The findings have implications on South African education policy makers to consider the use of home languages in teaching and learning.

Keywords: *Code switching, English second language, language challenges, physical sciences.*

1. Introduction

Scientific language is not understood by everyone because it is not the same as the language used in everyday communication. Sullenger (2005) posits that some of the things that contribute to the difficulty in learning the scientific language is the childhood language that has already being imputed into the learner's minds. Indeed there are words in science that do not mean the same thing when communicated in the learners' home languages, which learners have come to understand as the right meanings. This difference complicates the process of teaching and learning science considering that the teacher needs to be aware of those different meanings and should find a way of eliciting those misconceptions in learners before introducing the new knowledge. These language challenges have been attributed to the poor performance of South African (SA) learners in science for example there has been a drop in the pass rate of Physical Sciences from 75.5 % in 2019 to 65.8% in 2020 (Bhaw & Kriek, 2020). Of note is that learners in Physical Sciences subject perform poorly compared to other subjects due to the complex language used in the subject, which is technical and very academic. Though there are other contributing factors towards poor performance in Physical Sciences, language has been found to be one of the many causes (Department of Basic Education, 2020).

1.1. Problem statement

Language is a central factor to all learning (Rollnick, 1998). In South Africa, English is the language of learning and teaching (LoLT) despite it being a second or third language to most learners (Fook & Gurnam, 2015). Because of the lack in proficiency in the LoLT learners in SA continue to disappoint in performance at school level in both science and mathematics (Gudula, 2017) despite the nation grappling with the shortage of skills in science such as engineering. As a Physical Sciences teacher, the first author of the current study noted how his students struggled to understand the technical expressions used in the topic mechanics where terms such as ‘a body at rest’ or ‘uniform motion’, are used. Learners have developed their own understanding different from the scientific meaning (Sullenger, 2005). The argument is how can science, literacy and language be linked in the classrooms (Boyle, Rizzo, & Jonte, 2020). In concurrence as early as 1998, Rollnick indicated that the learner’s success in learning science is dependent on the knowledge of learning English language. In the SA context, most learners from township or rural schools are only exposed to English when they are in the classrooms and once outside, they immediately switch to their home languages, which leave them with little exposure to the LoLT (Probyn, 2006). To compound the problem, some teachers teach science and mathematics using their own home languages (Mokiwa & Msila, 2013; Motloun, Mavuru & McNaught, 2021) yet examinations are conducted in the LoLT.

1.2. Purpose of study

The study sought to answer two research questions: What are English second language learners’ challenges in comprehending Physical Sciences concepts? and how do teachers assist learners who are English second language speakers to overcome the language challenges when learning Physical Sciences concepts?

2. Literature review

Learning science is the same as learning a foreign language (Henderson & Wellington, 1998). The language of science is difficult to the learners because they lack the appropriate vocabulary to express themselves when communicating or writing science (Sullenger, 2005). Because of its academic nature, Derewianka (2014) argues that all learners whether second or first speakers of the English language need a lot of scaffolding in the science classrooms, which Lo, Lin, and Cheung (2018) and Motloun et al. (2021) indicated could be difficult for teachers who are English second language speakers to implement. As such, learners fail to bridge the gap from everyday language to scientific language and to acquire the cognitive academic language proficiency required for learning and meaningful engagement with the curriculum (Probyn, 2006).

Learners face a myriad of challenges when they learn science in a language different from their home language. These challenges include the obvious ones which are failure to comprehend words as well as spelling and pronouncing the scientific terms and processes (Henderson & Wellington, 1998). It therefore means that in tests or examinations, learners grapple with understanding both the content being asked and let alone the instructions which guide them on how to answer the asked questions. Because when speaking in a particular language, one communicates the traditions, customs, morals and values of the people who own that language (Masondo, 2013), one of the challenges is that science then becomes divorced from the culture of the learners which in a way demotivates them to continue studying science or to strive to perform better in the subject. Because of these challenges, some learners may be disadvantaged as a result of the lack of cognitive academic language proficiency and Mavuru and Ramnarain (2020) lamented when they said, “In this context, English prevails as a language of access and power for the majority of Black learners particularly in township and rural schools, who lack English language proficiency to fully engage with curriculum in the classroom” (p. 2473).

Teachers have been found using code switching as a strategy to help learners understand science concepts (Meyer & Crawford, 2011), which among other problems Nomlomo (2010) indicated could be challenging task in a class of learners from diverse linguistic backgrounds. Some teachers have utilised transliteration which Mphahlele (2004) described as a method where one learner fluent in both the home language and English helps by interpreting and explaining to other learners during the teaching and learning process. Such a practice has however been viewed as propagating misconceptions, confusion and misunderstandings in the science classrooms (Msimanga & Lelliot, 2014).

3. Methodology

For this study both qualitative and quantitative methods were used. Using random sampling technique (Patton, 2002) five grade 12 Physical Sciences teachers and 51 learners in their Physical Sciences classes were randomly selected from five public high schools in Johannesburg. A 5-point Likert scale questionnaire was administered to all the selected learners to establish the learners’ challenges in

comprehending Physical Sciences concepts since they were all English second language speakers. These learners did English First Additional Language as a subject and for the current study their test scores obtained from term 2 end of term tests were also analysed and compared to the Physical Sciences term 2 test scores. Each of the five teachers were interviewed once using a semi-structured interview schedule to explore how they assisted English second language learners to overcome language challenges when learning Physical Sciences.

Quantitative data from questionnaires was analysed and descriptive statistics were obtained. A regression analysis was done to find the correlation between these learners' marks in the subject English First Additional Language and their Physical Sciences marks. Qualitative data from teachers' interviews was subjected to content analysis (Bowen, 2009) where categories on the different strategies teachers used to mitigate language challenges were obtained.

4. Research findings

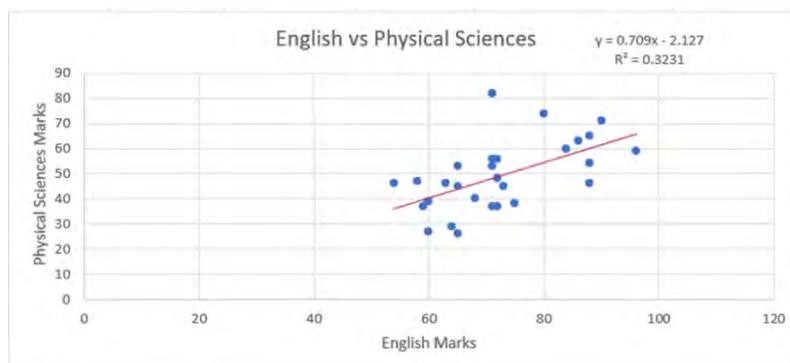
From the analysis of the interview data, it showed that most of the teachers did not assess the suitability of the teaching strategies they employed in reducing the language challenges learners face in the Physical Sciences classroom. As such, their choice of teaching strategies had no regard for teaching learners for understanding of the concepts. This is so because no meaningful response was given to the question: What influences your choice of the teaching method and activities? One would have expected that teachers could have raised the complexity of the topic, engagement of learners, and the need to scaffold learning to ensure learner understanding. The teachers did not regard the mitigation of language challenges in the Physical Sciences classroom as their responsibility but rather they insisted that it was the responsibility of the English teacher not science teacher to equip learners with skills to discern meaning from the Physical Sciences text and also make sure that learners acquire cognitive academic language proficiency. None of the interviewed teachers indicated that they may have language challenges themselves which could impact negatively on how they explain Physical Sciences concepts to the learners. This was despite that the researcher could deduce that some of the teachers were not articulate during the interviews showing their lack of fluency in English.

Two of the teachers suggested that the problem with learners' poor performance in Physical Sciences emanated from learners' failure to understand the concepts and did not directly attribute it to language. One of the teachers however pointed out that the content of English taught at high school was not relatable to the Physical Sciences in the sense that it was taught in a general manner to cater for all the subjects. The teacher's argument was that the teaching was not specialised to include science, technology, engineering and mathematics (STEM) jargon. In this case the teacher advocated for the teaching of English specific to learners who study STEM subjects.

When asked about the possibility of introducing home language in the teaching of Physical Sciences to solve the problem of learners' failure to understand, explain or even write scientific terms, all the interviewed teachers did not believe that introducing home languages as the language of learning and teaching of science would be a good development. They believed that learners would be disadvantaged and the South African education standard would be considered lower at international level. The teachers suggested that the government should rather introduce a subject called English for Physical Sciences where in this class learners would be taught the scientific jargon concurrently with the Physical Sciences as another subject.

From the 51 learners who took part in the survey, 78% believed that language plays an important role in understanding of high school Physical Sciences and that those that do not understand English and the Physical Sciences jargon, would not perform well in Physical Sciences examinations. To check the validity of these learners' assertion, a scatter plot was drawn (Figure 1) to show the relationship between the learners' scores in an English test and their scores in the Physical Sciences test scores.

Figure 1. Scatter plot of the English vs Physical Sciences marks for grade 12 learners.



The graph shows that there was a positive relationship between these marks indicating that the learners that performed well in English were most likely to perform well in Physical Sciences and the reverse is true. An explanation to this trend could be that if learners understand English, then they do not find it difficult to read the material that is written in English, while those that do not understand English, struggle with understanding the concepts written in English. An equation for the trend line was obtained as $y = 0.709x - 2.127$ and the coefficient determination $R^2 = 0.3231$. Linear regression analysis was done on these learners' marks to determine the relationship between learners' performance in Physical Sciences and English from a quantitative perspective. The coefficient determination and the trend line equation match. For the sake of regression analysis, the confidence level of 95% was used as a default in excel.

Based on the learners' responses in the survey teachers seemed not to understand English enough to explain the concepts meaningfully when teaching Physical Sciences. The majority of the learners (65%) indicated that teachers tend to use their home languages more often to explain concepts in the classrooms which made the learners understand Physical Sciences concepts much better. Some of the learners (47%) however indicated that the use of home languages tends to bring confusion and elements of being marginalised when a teacher explains the concepts in a home language different from that of particular group of learners. The findings also revealed that, while learners prefer that teachers explain the concepts in their home languages, 14.6% even preferred that their study materials be written and printed in their home languages. Most of the learners that participated in this study, indicated that the reason they performed poorly in Physical Sciences in the previous grades was because they could not participate in class discussions due to language challenges. The reason learners could not participate was that they were not confident to make discussion in English and 22% believed they could have performed better had they participated in class discussions. As such 43% of the learners indicated that if they had grasped terminology of the content from lower grades, they could have performed better in the subject at the higher grades.

In the interviews the teachers indicated that because of language barrier the learners' parents, siblings or guardians do not understand English as such most learners do not get any help on the activities they are tasked to do at home. On the other hand only 4.3% of the learners indicated that they get help from their parent/guardians or siblings when doing home work. The majority of the learners (78.1%) believed that if their learning materials were presented in their home language, they could have been helped at home. On the other hand the teachers felt that because of the diversity in languages in South Africa, it becomes difficult to officially teach using learners' home languages, the reason they attributed to the ineffectiveness of code switching in the classrooms.

5. Discussion

The findings of the study showed that learners who are English second language speakers struggled to access Physical Sciences concepts due to their lack of academic language proficiency. The learners viewed English as an impediment in their learning which confirms previous studies such as Ferreira (2011), Mavuru and Ramnarain (2020) and Motlounge et al. (2021) who inferred that in such contexts English prevails as a language of access and power for the majority of English second language speakers. This is evident in that there were learners who pointed out that had their learning materials been written in their home languages, they could have performed much better and also got help from their siblings, parents or guardians at home. Of concern is the lack of opportunities to learn or be taught on how to master the complex terminologies associated with STEM subjects even from lower grades. To this Derewianka (2014) called for the need for teachers to extensively scaffold when teaching science to learners, which Lo, Lin, and Cheung (2018) and Motlounge et al. (2021) indicate could be problematic because the teachers are also English second language speakers whose proficiency in the LoLT is also questionable. Though some learners and the teachers were opposed to the use of home languages in the teaching and learning of Physical Sciences, previous studies (e.g. Farmer & Anthonissen, 2010) found that SA learners taught in their home language (Afrikaans), performed much better than those taught in English, a second language.

6. Conclusion and implications

The paper reports on a study to determine challenges English second language speakers face in comprehending Physical Sciences concepts. Important issues were raised which show that both learners and teachers who are English second language speakers face challenges in learning and teaching Physical Sciences in English (respectively). An important issue that arose from the study is that teachers tend to trivialise the difficulty their learners face in the classrooms when they struggle to understand scientific

concepts and processes due to lack of academic language proficiency. As a result of this downplay, they do not make meaningful efforts to scaffold the learning process when teaching.

Whilst the study would not suggest a drastic change by advocating for the teaching of STEM subjects in learners' home languages, it however brings out the need to develop teachers' proficiency in the language of learning and teaching. This has implications on both pre-service and in-service teacher professional development providers to incorporate language aspects when teaching science. In particular the teachers advocated for a special subject, English for STEM subjects, which has curriculum implications. Such a subject would equip learners with the linguistic capacity to comprehend Physical Sciences concepts easily and could improve the learners' performance in examinations.

References

- Bhaw, N., & Kriek, J. (2020). The alignment of the Grade 12 physics examination with the CAPS curriculum:(November 2014--March 2018). *South African Journal of Education*, 40(1), 1-9. <https://doi.org/0.15700/saje.v40n1a1676>
- Boyle, S., Rizzo, K. L., & Jonte, C. T. (2020). Reducing language barriers in science for students with special educational needs. *Asia-Pacific Science Education*, 364 - 387.
- Bowen, G. (2009). Document analysis as a qualitative research method. *Qualitative Research Journal*, 9(2), 27–40.
- Department of Basic Education (2020). *National Senior certificate 2019 Diagnostic Report*. Pretoria: Department of Basic Education.
- Farmer, J., & Anthonissen, C. (2010). Transitions and translations from Afrikaans to English in schools of the Helderberg area. *Stellenbosch Papers in Linguistics*, 1-23.
- Fook, C. Y. & Gurnam, K. S. (2015). Investigating learning challenges faced by students in higher education. *Procedia-social and Behavioural Sciences*, 186, 604-612.
- Gudula, Z. (2017). The influence of language on the teaching and learning of Natural Sciences in Grade 7. *gudula2017influence*.
- Henderson, J. & Wellington, J. (1998). Lowering the language barrier in learning and teaching science. *School Science Review*, 79, 35-46.
- Lo, Y. Y., Lin, A. M. Y., & Cheung, T. C. L. (2018). Supporting English-as-a-foreign-language (EFL) learners' science literacy development in CLIL: A genre-based approach. In K.-S. Tang & K. Danielsson (Eds.), *Global developments in literacy research in science education* (pp. 79–96). Switzerland: Springer International Publishing.
- Mavuru, L. & Ramnarain, U. (2020). Language affordances and pedagogical challenges in multilingual grade 9 Natural Sciences classrooms in South Africa. *International Journal of Science Education*, 42(14), 2472-2492. <https://doi.org/10.1080/09500693.2019.1655177>
- Meyer, X., & Crawford, B. A. (2011). Teaching science as a cultural way of knowing: Merging authentic inquiry nature of science, and multicultural strategies. *Cultural Studies of Science Education*. <https://doi.org/10.1007/s11422-011-9318-6>
- Mokiwa, H. O., & Msila, V. (2013). Teachers' conceptions of teaching physical science in the medium of English: A case study. *International Journal of Educational Sciences*, 5(1), 55-62.
- Motloung, A.N., Mavuru, L. & McNaught, C. (2021). Teachers' beliefs and practices when teaching life sciences using their second language [Special issue]. *South African Journal of Education*, 41(S1), 1-15 Art. #2005. <https://doi.org/10.15700/saje.v41ns1a2005>
- Mphahlele, M. C. (2004). The transliteration principle: Is this the best procedure in African language lexicography and terminology? *Lexikos*, 14, 339–348. <https://doi.org/10.5788/14-0-698>
- Msimanga, A. & Lelliot, A. (2014). Talking science in multilingual contexts in South Africa: Possibilities and challenges for engagement in learners' home languages in high school classrooms. *International Journal of Science Education*, 36(7),1159–1183. <https://doi.org/10.1080/09500693.2013.851427>
- Nomlomo, V. (2010). Classroom interaction: Turn-taking as a pedagogical strategy. *Per Linguam*, 26(2), 50–66.
- Probyn, M. (2006). Language and learning science in South Africa. *Language and education*, 20(5), 391-414.
- Rollnick, M. (1998). The influence of language on the second language teaching and learning of science. In *Socio-cultural Perspectives on Science Education* (pp. 121 - 137). Springer.
- Sullenger, K. (2005). Fostering higher levels of scientific literacy. Confronting potential barriers to science understanding. *University of New Brunswick, New Brunswick*.

USE OF ASSESSMENT FORMS TO EMBED SOCIAL JUSTICE PRINCIPLES THROUGH DIGITAL PLATFORMS IN HIGHER EDUCATION IN SOUTH AFRICA

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Abstract

This paper seeks to examine the extent to which assessment embed social justice principles in affording students with different learning abilities equal and fair opportunities to develop their intellectual abilities and remove ignorance. The aim was to establish if forms of assessment recognised principles of fairness and equity to build students' capacity to think critically and to make meaningful decisions that contribute towards a just social order. The study adopted a mixed method approach. Semi-structured interviews were used to enlist eight academic staff views on the matter. Data obtained from interviews were systematically sorted and categorised into common themes. A structured questionnaire was distributed and responded to by twenty students and data obtained from the instrument were analysed statistically. The study found out that some forms of assessment developed students' abilities by promoting a balanced, and equal opportunities. The acquisition of social justice principles enhanced learners' ability to think critically and to challenge social injustices and challenges that threatens their right to human dignity, development by instituting social change. The findings also demonstrate the importance of recognising students' learning styles and abilities through using forms of assessment in a balanced and fair manner. This study concludes that students' success after pedagogic encounters depended on balancing forms of assessment and developing their analytical thinking abilities. Such methodological skills and knowledge enable them to eliminate ignorance and social inequities. The study provides further insights regarding the use of assessment to cater for diverse students' aptitudes to advance humanity. It can be concluded that assessment creates critical thinkers who challenge practices and policies that threaten human dignity and perpetuate inequalities.

Keywords: *Assessment, digital platforms, equal opportunities, students learning abilities, social justice principles.*

1. Introduction

Communities that experienced insufficient knowledge are faced with social imbalances deterring social justice principles to be realised. Ignorance and lack of powerful knowledge (Young, 2013) led to erroneous endorsement of decisions that eroded freedom, equality and limited human development in certain countries (Rawls, 1971). Whilst Bhui (2016) points to historical social and political events which manifested into unjust social inequalities and unequal distribution of resources particularly the development of human capabilities. Young (2013) points to social injustices that disregarded human rights principles deterring the acquisition of powerful knowledge. According to Young (2013) epistemic knowledge referred as powerful knowledge is accessed and distributed in universities gives people power and the ability to think critically. Arguably, assessment as the driver of learning should embed social justice principles by using fair measures that reaches out to all students. Young and Muller (2013) indicate that knowledge that matters gives people the power to enter complex debates that challenge social limitations and stifle innovation. Arguably, assessment that is geared towards knowledge that matters (Young, 2013) needs to be used to deepen the ideals of freedom, power, and equality (Ruger, 2010). Higher education institutions being grounded in the cultivation of democratic citizenship, thus have the obligation to promote emancipatory values (Rawls, 1971) by developing all students in a fair and balanced manner. Assessment being used in various institutions of learning, and cuts across all faculties and programmes need to be administered in cognisance of principles of equity and fairness to prepare students to attain social power Garret-Rucks, 2016. Arguably, Alvarez (2019) alludes to the relationship between social justice, teaching, learning and assessment which impact on just development of students' capabilities. However, other forms

of assessment used in digital platforms do not adequately unearth students' capabilities to enable them to construct liberated spaces, that preserve human dignity, social values and counteract exploitation practices (OECD, 2013). Since educational institutions are perceived as instruments for social justice, assessment as the key component in the acquisition of knowledge and skills needs to develop students' capabilities to enable them to ascend academic and social positions that correspond to their aptitudes, regardless of their family's wealth, background, or social belonging (OECD, 2013).

2. Theoretical framework

Rawls (1971) place emphasises on the principle of equality as a key component of social justice whilst Reisch (2014) perceives social justice theory as a combination of many theoretical groundings. This paper is grounded in social justice principles to uncover some of the overlooked aspects of lived experiences eminent in people social spaces which reveals ignorance and power in deliberations (Rawls, 1971). The claim is that people who do not possess knowledge and methodical rules, operate from a limited view of justice because they enter deliberations out of ignorance which deprives them of their social rights (Rawls (1971).

3. Literature review

3.1. Equity and social justice and Equity

Nussbaum (2011) points out to that the idea that there are deep seated social inequities that can best be addressed by developing certain levels of thinking. Since theories of justice are perceived as very diverse, assessment is expected to afford students with different abilities, a fair opportunity of epistemic success described by Rohs and Ganz (2015) as an opportunity to access power. Plural grounds encompassing equal and fair opportunities for students with different learning styles and abilities beyond political social situations (Sen, 2009) should be created through assessment. As elucidated by (Young, 2013) challenges of poverty which perpetuate inequalities and social disorder should not only be tackled by the state but, it should be a shared responsibility that needs everyone's contribution particularly those with knowledge that gives power. Assessment in driving learning is thus critical towards realising social justice principles regarding what and how students learn in a manner which elicit critical consciousness (Ndlovu-Gatsheni, 2018).

3.2. The concept of learning and assessment

Boud and Falchikov (2007) state that assessment, rather than teaching, has a major influence on students' learning. To that effect, assessment should trigger debates that deepen knowledge and promote social justice principles by providing all students with different potentials equal opportunities to develop (Hayward, Simpson and Spencer, 2005). Although digital platforms are seen as presenting various opportunities for assessing students' learning abilities (Anderson, 2008). However, other forms of assessment do not adequately develop students' abilities. In educational settings where assessment is used to develop intellectual capabilities, assessment can bring a synergy between the idealist world and the real social world by developing capabilities that enables critical judgement to challenge social inequalities (Nussbaum, 2011). Educational institutions being perceived as engines for social justice are thus expected to provide education which enables society to ascend academic and social positions that correspond to their aptitudes, regardless of their family's wealth, background, or social belonging (OECD, 2013).

4. Aim of the study

The aim was to investigate how forms of assessment commit to fairness and equality espoused in principles of social justice by affording all students the opportunity to develop different abilities.

4.1. Research questions

1. Are principles of social justice embedded in forms of assessment?
2. How effective are forms in developing students' critical thinking abilities?

4.2. Research objectives

1. To find out the extent to which forms assessment embeds principles of social justice.
2. To establish the effectiveness of forms of assessment in developing students' critical thinking abilities.

5. Methodology

5.1. Research design

This study adopted a mixed method approach to collect data to bring about rich data an objective element to the findings. The quantitative, non-experimental information about students' responses on how assessment embeds social justice principles were collected by means of a 4-point Likert scale and analysed statistically whilst participants were interviewed using semi structured questions that were transcribed and manually coded into themes (Patton 2015; Denzin & Lincoln 2012, Du Plooy et al., 2014). Permission to conduct the interviews was sought from the institution concerned.

5.2. Sample and sampling

The study sample was limited to selected cases which might impact significantly on the phenomenon under investigation (Awang & Noryanti Muhammad, 2012). 20 respondents were provided with quantitative questionnaires which consisted of 10 questions about digitally administered assessment whilst 8 staff members were interviewed using an interview schedule.

5.3. Methods

A 4-point Likert scale analysed statistically was used to obtain quantitative data whilst qualitative data was collected by the researcher using semi-structured questions to obtain data about ways in assessment encompasses forms of assessment (Merriam & Tisdell, 2016).

5.4. Data analysis

Data obtained through the Likert scale were analysed statistically whilst qualitative data obtained from participants were recorded, transcribed, and analysed systematically from content into codes, patterns and emerging themes were analysed using content analysis (Saldana, 2016).

6. Findings

6.1. Responses from a questionnaire

Presented from statements 1-10

+ Statement 1: prefer digital or sit in administered assessment

60% of respondents strongly preferred digital assessment whilst, 40% preferred sit in.

+Statement 2: preference of short/multiple choice to essay/or a combination type questions

30% preferred essay type questions, 60% preferred a balance of the two whilst 10% preferred short multiple questions.

+ Statement 3: A balance between essay and short questions embeds principles of fairness and equity

80% strongly agreed whilst 20% disagreed.

+Statement 4: assessment should embed social justice principles

90% of the respondents strongly agreed whilst 10% disagreed

+ Statement 5: Forms of assessment can cultivate students' capacity to deal with social challenges

A relatively high number of 80% of the respondents strongly agreed to the statement, 20% agreed whilst 10% disagreed to the statement

+Statement 6: Some forms of assessment prepare students to recognise unjust practices

80% of the respondents strongly and 10% disagreed.

+Statement 7: Assessment should develop social consciousness amongst students

60% of the respondents strongly agreed, 20% agreed, 10% disagreed.

Statement 8: Students act unjustly by plagiarising during digital assessment

50% agreed whilst 50% strongly disagreed.

+Statement 9: Assessment needs to relate real social injustices challenges

80% strongly agreed, 10% disagreed.

-Statement 10: Forms of assessment' have the ability to liberate minds

40% agreed 50% disagreed whilst 10% strongly disagreed.

6.2. Findings emerging from qualitative data

The following themes emerged from analysing participants' responses on interviews

- ✚ Analytical capabilities are developed through assessment
- ✚ Assessment embeds the capacity towards challenging social injustices.
- ✚ Balanced forms assessment maintains principles of fairness and equity.

7. Discussion of the findings

The findings have revealed the importance of assessment in the process of realising students' capabilities, whether it is administered digitally or physically. The element of objectivity, in reducing students' copying and unethical conduct has been cited as some of the advantages of multiple-choice or short questions and a flaw in the administration of essay type questions. Participants in favour of case studies and essay type questions were of the belief that such questions stimulate creative and analytical thinking which prepare students to challenge social unjust practices and thus embed social justice principles. Others indicated that case studies, briefs and essay type questions carry more weight in terms of developing capabilities that contribute towards enhancing social justice principles. Whilst others reflected on the use of both forms of assessment which include both short questions, essay type or case studies as a way of embracing a just balanced form of assessment to reach out to all students and develop diverse capabilities particularly critical thinking abilities. As corroborated by (Young, 2013; Ndlovu-Gatsheni, 2018) the development of high intellectual levels of thinking not only gives power but it awakens social consciousness. Since most of the participants indicated that case studies/briefs/essays are effective forms of assessment in building students' capabilities to prepare them to act responsibly in the civic space by engaging in deliberations that enable them to acquire power and equality. Essay type questions and case studies were also reported as being able to link content to real life contexts effectively and in that way eliciting social justice principles.

8. Conclusion

Assessment has a direct contribution in shaping the society for the better. Therefore, it needs be administered in a just manner which resonate with social justice principles to unearth different abilities amongst students who come from different socio-economic backgrounds. Furthermore, social justice principles are to be determined on how facilitators' professional judgements are transformed in using assessment as an enabler for unearthing students' potentials and bring social awareness. Students also have the responsibility of using digital assessment in an ethical manner to develop their thinking abilities that will give the power of engaging from a position of power. As a result, forms of assessment need to consider epistemological, pedagogic and social justice implications in developing citizens who will use their intellectual' capabilities to challenges unjust practices.

9. Implications

The implication is that both forms of assessment are important. However, some technological innovations need to be implemented to curb students' copying and unethical conduct. The vision of justice encompasses accountability as a balancing act for all participants involved in assessment which implies that both facilitators and students should consider prepares students to uphold social justice principles.

References

- American Society for Public Administrators. (2013). Code of ethics. Retrieved from <https://www.aspanet.org/ASPA/About-ASPA/Code-of-Ethics/ASPA/Code-ofEthics/Code-of-Ethics.aspx?hkey=feba3e2-a9dc-4fc8-a686-3446513a4533>
- Anderson, T. (2008). Towards a theory of online learning. In T. Anderson & F. Elloumi (Eds.), *Theory and practice of online learning* (2nd ed., pp. 45–74). Edmonton, Canada: AU Press.
- Alvarez, B., (2019, Jan. 22). Why social justice in school matters. *NEA Today*.
- Bhui, K.S. (2016). Discrimination, poor mental health, and mental illness. *International Review of Psychiatry*. [Epub ahead of print].

- Boud, D., and N. Falchikov. 2007. "Introduction: Assessment for the Longer Term." In *Rethinking Assessment in Higher Education: Learning for the Longer Term*, edited by D. Boud and N. Falchikov, 3–25. Abingdon: Routledge.
- Du Plooy-Cilliers, F., Davis, C. and Bezuidenhout, R. 2014. *Research Matters*. Claremont: Juta and Company.
- Elliot, Norbert, "A Theory of Ethics for Writing Assessment," *Journal of Writing Assessment* no. 1(2): New York, NY: Lang.
- Gooden, S. (2015). From Equality to Social Equity. In M. Guy & M. Rubin (Eds.), *Public Administration Evolving: From Foundations to the Future* (p. 211-232). New York: Routledge.
- Hayward, L., Simpson, M. and Spencer, E. 2005. *Assessment is for Learning: exploring programme success*, Edinburgh: Scottish Executive Education Department.
- Ndlovu-Gatsheni, S. 2018. *Epistemic freedom in Africa: Deprovincialization and decolonisation*. Routledge, London.
- Nussbaum, M.C. (2011). *Creating capabilities: The human development approach*. Cambridge, Massachusetts: The Belknap Press of Harvard University Press.
- OECD. (2013). *PISA 2012 Results: Excellence through Equity: Giving Every Student the Chance to Succeed*, Vol. II. Paris: OECD Publishing. [accessed Feb 2, 2022].
- Rawls, J. 1971. *A theory of justice*. Harvard UP.
- Reisch, M. 2014. *Routledge International Handbook of Social Justice*.
- Rohs, M and Ganz, M. 2015. MOOCs and the claim of education for all: A disillusion by empirical data. *International Review of Research in Open and Distance Learning*, 16(6).
- Ruger, J.P. (2010). *Health and social justice*. NY: Oxford University Press.
- Young, I. 2013. *Responsibility for Justice*. Oxford UP.
- Young, M. 2013. Overcoming the crisis in curriculum theory: A knowledge-based approach. *Journal of Curriculum Studies*, 45(2): 101-118.
- Young, M. & Muller, J. 2013. On the powers of powerful knowledge. *Review of Education*, 1(3): 229-250.

DESCRIPTIVE JUDGMENT IN ITALIAN PRIMARY SCHOOL EVALUATION

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Abstract

The pandemic situation has made it clear the limit of evaluation through decimal vote. It draws a measuring and classificatory logic. To overcome these limits, the Ministerial Order 172/2020 has introduced new procedure of students' assessment: descriptive judgment. It replaces the decimal mark with an assessment through "learning level" that allow to monitor the evolutionary process of the student (Castoldi, 2021). Furthermore, the fundamental characteristics of descriptive judgment are: transparency and clarity. Therefore, it is necessary to involve pupils in the assessment process and provide them with continuous feedback on the progress made.

The descriptive judgment also has negative aspects: it creates a gap between the disciplinary judgment and the judgment expressed based on the competence certification model. It does not pay attention to the peculiarities of the different disciplines: a single criterion is used for the evaluation without consider the differences between the various subject areas. Finally, the Ministerial Order introduced this change only in primary school and consequently a fracture is created with the lower secondary school.

Despite the negative aspects, descriptive judgment represents a way that goes beyond simple performance but allows you to focus on the learning process from the perspective of lifelong learning.

Keywords: *Evaluation, competence, descriptive judgment, learning process, primary school.*

1. Introduction

The social, cultural, and regulatory changes that have occurred over time have also brought with them changes in the evaluation systems within school institutions.

What does it mean to evaluate? Beeby states that "evaluation consists in the systematic collection and interpretation of data and leads, as an integral part of the process, to a value judgment aimed at action" (Beeby, 1997, pp. 68-78). Assessing, therefore, means expressing a value judgment that orients to action and change compared to an initial situation. As Dewey stated, "any conduct that is not blindly impulsive, or a mechanical routine, seems to involve assessments" (Dewey, 1939, p. 2). Evaluation is, therefore, a process proper to individuals and that involves changes on several levels, namely personal, relational, and social. In the school context, "evaluation is a complex phenomenon that is not reduced to a single moment but accompanies the entire educational process and is a substantial part of it" (Falcinelli, 2014, pp. 69-80). From this, we understand that evaluation involves the idea of process: it is appropriate, in fact, to talk about evaluation process. The latter requires conscious choices and careful planning that defines objectives and criteria always in relation to the specific context in which it must fall. In addition, it is necessary to consider that the evaluation process has consequences in the student's education.

These consequences are both in terms of resource reorganization and as an unpredictable response in the student's motivation: he may feel encouraged or discouraged by the judgment received and this may involve a change in the modalities of both relating to the teacher and approaching new activities and verifications. School evaluation cannot be reduced to a simple measurement of the achievement of results: it is not a comparison between what the teachers design and what the students achieve. Scriven was the first author to propose a distinction between the concept of summation and formative evaluation. The first has a control function, the second, on the other hand, responds to a logic of development. These two logics are, in turn, the basis of two main approaches to educational evaluation, namely the quantitative-experimental model and the qualitative-hermeneutic model. These two models, as well as the two logics on which they are based, are not in opposition to each other but must both be used in a complementarity perspective. Already in 1955 Visalberghi in his work *Measurement and evaluation in the educational process* proposes a distinction between the two concepts affirming the need for their

coexistence: measurement (quantitative moment) and evaluation (qualitative moment) must be considered as two moments in the same process that ends with the attribution of a value judgment. When we talk about evaluation, reference is made to two closely interdependent and interlinked stages of the audit: measurement and evaluation proper (Vertecchi, 1993). The first step favours a quantitative approach and consists in obtaining data according to criteria of certainty; then, we proceed to the interpretation and qualitative description of the data established according to the criteria made explicit (Notti, 2010). The evaluation also begins to consider the process and not only the product: this implies the impossibility of an exclusive reference to measurement and description, and an opening to the negotiation of meanings. The focus changes: from the measurement of the final product through the assessment of the students' learning (assessment of learning), to the monitoring in progress and, therefore, to the assessment for learning (assessment for learning). The data collected are aimed at informing both students and teachers to stimulate reflections on the processes activated (living processes) (Galliani, 2019; Stiggins, 2002). The purpose of the evaluation is not only to assess learners' learning, but also to regulate the teaching activity. This is because the evaluation allows teachers both to identify the difficulties of the students and to receive useful feedback to understand the modalities and timing of a possible improvement to be made to the educational project.

The evaluation becomes a moment that also questions the work of the teacher as well as a time when you know. Specifically, the formative evaluation does not limit itself to verifying the performance of the students (a fundamental moment of the teaching-learning process), but also looks at the process in a broader way. It does not only refer to the final goal but also to the path taken to reach that result. An evaluation activity can be considered formative if the student performance is interpreted and used by teachers and students to make decisions on the next steps in the educational path to be more effective than the decisions that would be taken in the absence of a formative evaluation (Black & Wiliam, 2009).

2. Discussion

Over the years, in Italy, the evaluation systems used in school contexts have created many debates, especially in primary school, we have witnessed periodic alternations, in reference to the various reforms, between grades and judgments. Until the mid-70s, the evaluation of the students' profit and behavior had a mainly terminal role and served to ascertain whether the students had adapted to the training itinerary, where the protagonist was the teacher who transmitted the knowledge in a passive way. "The evaluative moment was limited to judging the path taken and penalized those who were not in tune with it" (Bonazza, 2020, p. 41). The evaluation of the students was communicated in the report cards with a grade in tenths, without giving details on the matter. The school system was rigid and gave importance to the final product achieved. A break with the "traditional school" occurred with the approval of Law 517/77, which shifted attention to the learning process it considered: the motivation, participation, and cognitive styles of learners. This reform introduced the quarterly cards, where the evaluation was expressed through descriptive adjectives (excellent, distinct, good...). In addition, teachers had to formulate a personalized description of the profit of each student in the different disciplines, without however using analytical "grids" with indicators that established common parameters to better explain the variables considered. From 1992 to 1996, a five-level system expressed by the first five letters of the alphabet (A, B, C, D and E) was introduced to express the assessment of learning, each of which would describe what constitute the knowledge, skills and competences acquired. Subsequently, the Moratti reform of 2003 provided for the abolition of letters and made it known that the evaluation of pupils' learning in the individual disciplines had to be expressed in tenths in relation to the objectives, descriptors and indicators set by the specific disciplinary groups articulated according to general criteria in disciplinary evaluation grids. Subsequently, with the Gelmini reform of 2008, the evaluation of learning in primary school was periodic and annual and the certification of the skills acquired was carried out through the attribution of grades expressed in tenths accompanied by an analytical judgment on the level of global maturation reached by the student. With the current Law n. 107/2015 of the "Good School", the grades in tenths are confirmed and it is emphasized that "the evaluation has essentially educational purposes [...] it has as its object the learning process, the learning outcomes, the behavior and the overall academic performance of the pupils" (p. 4). Today, the pandemic experience makes evident the limits of evaluation through the decimal grade that recalls a measuring and classifying evaluative logic through which to manage the expression of the intermediate and final evaluative judgment. This logic, in fact, is based on a wrong concept, since "there is the juxtaposition between the judgment attributed to the single performance and the level of learning globally achieved by the student" (Castoldi, 2021, pp.101-102), therefore it does not aim to make the student aware of the quality criteria of the educational activity to guide his subsequent efforts.

For this reason, the Ministerial Ordinance of 4 December 2020 N. 172, established that the previous primary school evaluation system, based on the numerical grade expressed in tenths, has been superseded by a new system that, according to the legislation, ensures greater "transparency and clarity" (Castoldi, 2021) for a global assessment of the student's learning process and in the expression of a value judgment and in the explication of the paths. The innovations introduced by the law concern the periodic and final evaluation in primary school which is expressed with descriptive judgments based on four levels of learning (advanced, intermediate, basic, in the process of first acquisition) (Guidelines, 2020, p.4), reported in the evaluation document, through which "the evaluation of students is increasingly transparent and consistent with the learning path of each one" (p. 2). These judgments allow to analyze the level of learning of the students no longer referred to the individual disciplines, but to the learning objectives that each discipline has included in the annual design, in line with what is included in the institute curriculum and in line with the National Indications, as regards the disciplinary objectives and the goals for the development of Skills. The perspective is that of assessment for learning, which is not considered a simple "measurement" of learning but has a fundamental training function since the information collected is also used to adapt teaching to the concrete educational needs of pupils and their learning styles, modifying the activities according to what has been observed and starting from what can be valued (Guidelines, 2020, p. 1). This new approach to evaluation not only highlights the judgment given to the students but allows to act to promote and improve learning through a constant interaction with the student through evaluative feedback useful for improving and modifying the didactic project. The teachers in the annual design indicate the individual learning objectives and through periodic and final evaluation, determine the level of acquisition for each student. Then, the teachers choose among the objectives those that best represent the manifestations of learning that can be examined for each discipline. Subsequently, the levels, defined based of the four dimensions that allow learning (the autonomy of the pupil, the type of situation, the resources mobilized, continuity), allow to elaborate a well-articulated descriptive judgment, highlighting the results obtained and the areas for improvement. This judgment is reported in the Evaluation Document, (Guidelines, 2020, p. 6). where the results of the training course, detected *in itinere*, of each student are present, through the detailed description of the behaviors and manifestations of learning. The aim is to enhance the students' learning, highlighting their strengths with actions of gratification and enhancement and those on which to intervene with the recovery to achieve the acquisition of the established objectives and enhance the learning that each student has developed considering their own characteristics and its uniqueness.

The descriptive judgment is not limited to the simple summation of the results obtained on individual evaluation activities but reflects the complexity of the learning process consisting of many useful elements to detect the level of acquisition by the student that is achieved with the use of various tools in relation to the objectives and learning situations.

3. Conclusions

In educational contexts and academia, the issuance of the "Guidelines for the formulation of descriptive judgments in the periodic and final evaluation in primary school" (MIUR Ordinance no. 172 of 4 December 2020) started a debate aimed to understand their impact on the pedagogical and docimological level, but also their applicability (Perla, 2021; Puricelli, 2021). In fact, with this article we followed the goal of reflecting on some elements related to educational evaluation, starting from a presentation of the theoretical and regulatory framework of reference. Now, we intend to focus on the critical aspects and on the interesting aspects of educational evaluation through the formulation of descriptive judgment, as well as offering improvement suggestions for its application. This reflection is based on a consideration: the school responds to educational and training purposes. Consequently, evaluation, an essential moment of the training process, must necessarily respond to a formative function, although it is less considered than the summative and certification functions (Grion & Restiglian, 2019). In this sense, teachers should design evaluation processes that are effective and supportive for learning, definitively overcoming the consequences of the era of testing and the measurement myth in favor of "formative evaluation" (Trincherò, 2018).

Based on these considerations, the critical and interesting points of educational evaluation through descriptive judgments emerge. Regarding interesting points, numerous research from the late 1990s emphasize the link between a system based on the grades attribution and the motivation in learning. The motivation in learning is strongly undermined by the mechanisms that use competitive criteria, based on the position of an individual respect to the performance of others. Therefore, descriptive judgment could avoid this drift and stimulate pupils' interest and curiosity towards learning contents (Earl, 2003). Again, descriptive judgment offers a rich and varied image to educational evaluation. We must consider that qualitative expressions allow us to formulate judgments on the base of the necessary and essential

differences between the learning realized by the various pupils. Therefore, if the static image of the number does not represent the heterogeneity of the learning profiles, the descriptive judgment also opens to the recognition of the relationship between different learning profiles and the use of different evaluation tools. In fact, the Guidelines list different types of tools, all <<equal value for the purpose of elaborating descriptive judgment (for example individual interviews; observation; [...] verification tests; authentic tasks)>> (MIUR Ordinance No. 172 of 4 December 2020, p. 9).

While the issue of the Guidelines represents a novelty to welcome with some enthusiasm, some critical issues must not be overlooked. According to the viewpoint of teachers and school leaders, but also thinking of parents involved in communicating the results of their children, the first critical element is the timing of the issue of the law. It was issued late in the school year when the annual plans of each teacher were already outlined. Consequently, an internal contradiction emerges in the document, where we read that the evaluation must be "consistent with the educational offer of educational institutions" (p.2). A second critical element is that in the Guidelines we read that the evaluation must be <<[...] consistent with the National Guidelines for the nursery school curriculum and the first cycle of education of 2012>> (p. 2), while they are aimed exclusively at primary school. A third level of criticality concerns the proposal to use the term "objective", preferring it to the term "competence". The risk of using the term "objective" is that it is erroneously referred to the perspective of didactic planning of the 1970s, when the objective was the unit of measurement of didactic action (Tammaro, 2011). Otherwise, the Guidelines refer to the unit of measurement to understand the learning achieved by the pupils. Therefore, we are referring to didactic planning and no longer to programming. A final critical element relates to the ambiguity of the role of pupils in the evaluation processes. In fact, if the literature offers a lot of evidence in scientific support of the need to involve them in the evaluation processes, because only in this way is evaluation formative, the practice of self-evaluation is still ambiguous (Nicol, 2020). It must be considered that the feedback that the pupil receives on the level of performance achieved is part of the formative evaluation. But external feedback, offered by teachers, classmates or other participants in the educational process is not enough. The self-feedback that the pupil gives to himself is necessary. In this context, pupils' participation and full awareness of the goals to be achieved and the criteria is fundamental. Thus, the assessment results become useful and effective resources to improve learning. So, the need for those who must be evaluated to participate in the construction of the criteria and in the definition of goals and levels.

Based on the critical elements of the ministerial order, the following can be points for improvement the use of the descriptive judgment: prefer a synthetic evaluation of the overall level of learning achieved by the student, avoiding excessive fragmentation and analysis of the evaluation elements; focus explicitly and consciously on a vision of learning as the development of skills, avoiding referring only to the mastery of knowledge and skills; have an evaluative perspective based on learning levels; use an unambiguous evaluative lexicon; focus on the particularities of the various disciplines, avoiding univocal solutions; use an evaluation approach of disciplinary learning that can also be extended to secondary school, avoiding accentuating the cultural divide between the two levels of education (Castoldi, 2021).

References

- Beeby, C.E. (1997). The meaning of evaluation. *Current Issues in Education. Volume Number* (4).
- Black, P.J., & Wiliam, D. (2009). *Developing the theory of formative assessment. Educational Assessment, Evaluation and Accountability*.
- Bonazza V., 2020. *Docimologia. Un'introduzione. Approfondimenti di Benedetto Vertecchi*. Roma: Anicia.
- Castoldi M., 2021. *Valutare gli apprendimenti nella scuola primaria*. Milano: Mondadori Università.
- Dewey, J. (1939). *Theory of valuation*. Chicago: University of Chicago.
- Earl, L. (2003). *Assessment as learning: using classroom assessment to maximize student learning*, Corwin: Thousand Oaks.
- Falcinelli, F. (2014). Categorie e funzioni della valutazione. In L. Galliani (a cura di). *L'agire valutativo* (pp. 69.80). Brescia: La Scuola.
- Galliani, L. (2019). *Tecnologie e valutazione: bio-bibliografia di un intreccio*. Lecce: Pensa MultiMedia
- Grion, V. & Restiglian, E. (a cura di). (2019). *La valutazione fra pari nella scuola. Esperienze di sperimentazione del modello GRiFoVA con alunni e insegnanti*. Trento: Erickson.
- L.107/2015, *Riforma del sistema nazionale di istruzione e formazione e delega per il riordino delle disposizioni legislative vigenti*. Retrieved January 17, 2022 from: <https://www.gazzettaufficiale.it/eli/id/2015/07/15/15G00122/sg>

- Nicol, D. (2020). The power of internal feedback: exploiting natural comparison processes. *Assessment & Evaluation in Higher Education*. Retrieved January 16, 2022 from: <https://www.tandfonline.com/doi/full/10.1080/02602938.2020.1823314?scroll=top&needAccess=true>
- Notti, A. M. (2010). *Valutazione e contesto educativo*. Lecce: Pensa Editore.
- O. Min. 172/2020, *Valutazione periodica e finale degli apprendimenti delle alunne e degli alunni delle classi della scuola primaria*. Retrieved January 16, 2022 from: <https://www.edscuola.eu/wordpress/wp-content/uploads/2020/12/Ordinanza-n.-172-del-4-dicembre-2020.pdf>
- Perla, L. (2021). Il giudizio descrittivo un ossimoro. A proposito delle Linee Guida. *Nuova Secondaria*. Volume Number (6), Page Numbers 15-19.
- Puricelli, E. (2021). Sull'abolizione del voto nella scuola primaria. Per una critica della ragione pedagogica. *Nuova Secondaria Ricerca*. Volume Number (6), Page Numbers 3-33.
- Scriven, M. (1967). The methodology of evaluation. In R. Tyler, R. Gagnè, M. Scriven, *Perspectives of curriculum evaluation, AERA Monograph Series on Curriculum Evaluation, 1*. Chicago: Rand McNally.
- Stiggins, R. (2002). Assessment Crisis: The Absence of Assessment FOR Learning. *Phi Delta Kappan*. Volume Number (83).
- Tammaro, R. (2011). Progettazione, programma e programmazione: modelli operativi a confronto. In A. Marzano & R. Tammaro (a cura di), *Progettazione e organizzazione dei processi formativi* (pp. 113-130). San Cesario di Lecce: Pensa Editore.
- Trincherò, R. (2018). Valutazione formante per l'attivazione cognitiva. Spunti per un uso efficace delle tecnologie per apprendere in classe. *Italian Journal of Educational Technology*. Volume Number (26, 3), Page Numbers 40-55.
- Vertecchi, B. (1993). *Decisione didattica e valutazione*. Firenze: La Nuova Italia.
- Visalberghi, A. (1955). *Misurazione e valutazione nel processo educativo*. Milano: Edizioni di Comunità.

SECONDARY SCHOOL STUDENTS' STUDY AMBITIONS AND PREREQUISITES FOR THE STUDY

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Abstract

The article reports on the results of empirical research, aiming to analyse the relationship between two constructs - aspiration to study and prerequisites for the study - both of which are subjectively assessed by secondary school students themselves. Aspiration to study (possibly also achievement-aspiration) expresses the expected level of performance or positions an individual wants to achieve. Prerequisites for the study then indicate whether an individual has the talent, previous education, will or sufficient motivation to achieve a particular goal or position. In the educational reality, it can be assumed that all four combinations of both constructs can occur, with the worst being the student's distrust of their prerequisites for the study combined with zero effort to be a good student. A questionnaire survey of a group of 907 secondary technical school students in one region of the Czech Republic provides data for categorising students into one of four combination groups and at the same time determining whether the number of students in categories varies with the year of study or field of study. It is not known whether research-based categorisation has previously been performed on these learning success constructs.

Keywords: *Educational aspiration, ambition for study, prerequisites for the study.*

1. Introduction

Educational aspiration reflects educational goals an individual sets for themselves. It is essential as it encourages and energises the individual to achieve them (Fraser, Garg, 2011). However, in the professional community, there is no single and universally accepted definition or common agreement as to what the term means (Quaglia and Cobb 1996). Oxford Dictionary defines aspiration as “hope or ambition of achieving something” (Stevenson, 2010a). Educational aspiration thus refers to one's hope or ambition of achieving something in education. Sometimes, the meaning of aspiration and its synonym expectation, defined as a “strong belief that something will happen or be the case” (Stevenson, 2010b), may be used interchangeably (Hong, 2022). We understand the current state of an individual, characterising mainly their talent, previous education, will or sufficient motivation to achieve a specific educational goal, usually formulated by obtaining a certain degree and field of education. Children's abilities and talents play an essential role in developing their aspirations. Research indicates that children's aspirations are raised when doing well academically. For example, children's ability at age seven was related to their aspirations at age 11, and ability at age 11 was related to aspirations at age 16. At both 11 and 16, children's aspirations were also positively related to their test scores. (Bond, Saunders, 1999, cited in Gutman, Akerman, 2008). These findings suggest that aspirations and ability to influence each other throughout the school years and therefore establishing causality between these two influences is difficult (Gutman, Akerman, 2008). Since we believe that both constructs, i.e. study aspirations and study prerequisites, are formed and modified by the effect of school education and the broader social environment, we strive in this paper to find out the distribution of the secondary school population according to its declared level of both constructs and quantify their intersection in this population.

2. Educational aspiration and study abilities in theory and research

Educational aspiration is a term that can be researched and explained using psychological, pedagogical and sociological theories. From a psychological point of view, we can consider it part of the performance motivation construct that we need to achieve. Students' achievement motivation is an important prerequisite for their engagement, overcoming study difficulties and, ultimately, completing their studies. The motivation to achieve goals leads individuals to pursue work they perceive to be valuable and

prompts them to compete with others (Covington, 2000). This drive may come from an internal or external source. Achievement motivation is intrinsic when interest or enjoyment sparks it in the task itself. It is organic to the person, not a product of external pressure. Achievement motivation can be instead extrinsic when it comes from outside the person. Common sources of extrinsic motivation among students are rewards like good marks or praise from parents and teachers (OECD, 2017).

From a pedagogical point of view, educational aspirations are seen as a characteristic of the learner, which can or even needs to be cultivated educationally. Quaglia and Cobb (1996, 131) believe that "Assuming that students' aspirations can be impacted in some way, and assuming that the best way to go about that is to do so indirectly via changes in whole group aspirations, there are enormous implications for schools (e.g., create an environment which fosters aspirations)". Professionals and volunteers who work closely with young people also have an essential role in helping them to develop and realise their aspirations. Evidence suggests that while increasing aspirations is a worthwhile goal, a national approach will be vital in helping all young people achieve their potential and meet challenging targets (Gutman and Akerman, 2008).

Gutman, Akerman (2008, 15) state that "numerous studies have found that aspirations are significant predictors of young people's educational and occupational attainment. However, there is less evidence concerning the causal nature of these associations in terms of whether aspirations predict later achievement, controlling for other individual and family characteristics. The authors add that "the influence of aspirations on outcomes may also vary according to the young people's characteristics. For certain groups, including females, economically disadvantaged young people and those from ethnic minorities, high aspirations may not necessarily predict higher educational and/or occupational achievement" (p.15). While data on educational aspirations is comparatively easily accessible, there is no common agreement on how the concept should be measured. Most commonly, survey participants are asked to choose between different educational alternatives in response to questions of the following form to collect information on their idealistic and realistic aspirations, for example, "What is the highest level of education you would like to get?" (Trebbels, 2015). In our research, we asked respondents to choose the answer to the question "Do you want to be successful at secondary school?" From the following options: a) definitely yes, b) rather yes, c) I do not know, d) rather not, and e) certainly not.

Study prerequisites are a set of knowledge, (key or transversal) competencies, (cognitive) abilities, talents, study ambitions and study motivations. The breadth of understanding of this concept depends primarily on why we deal with them and for what purpose we define them. That is usually the case in admission procedures at a secondary school or university, which require their transparent operationalisation into an effective tool for measuring them.

For many decades, the SAT (Scholastic Aptitude Test) has been one of the world's most widely used tools for selecting suitable university candidates. The test consists of three parts: reading, math, and writing, or ACT (American College Testing), used by up to 78% of American schools. Predictive validity as an essential feature of these tests expresses their ability to predict future success. Research shows that entrance tests and final exams or secondary school grades have their justification in university admission procedures. For all these predictors, we find studies confirming their ability to predict university achievement or successful completion of studies, and, indeed, the combination of these predictors predicts significantly better than the predictors alone. (Bartáková, Chvál, Martinková, 2018). Since 2015, a uniform entrance examination has been introduced in the Czech Republic for all secondary school study programs ending with a school-leaving examination. It consists of a test in mother tongue and mathematics, and its minimum weight in the admission procedure is 40%. It is criticised, among other things, because it does not work with the cut score. Our research examined study prerequisites in the form of their subjective reflection by interviewed secondary school students using a simple and understandable question "Do you think that you have the prerequisites for the chosen field of study?" Students chose one of the offered variants: a) definitely yes, b) rather yes, c) I don't know, d) rather no, and e) definitely no.

3. Research methodology

The research was carried out within the TAČR project at the Faculty of Education of the University of Ostrava. The data were collected using an author's questionnaire, which contained 29 items (20 closed and nine open or semi-open). Two items and their results are presented in this paper. Data collection was carried out from September 2020 to February 2021 on a deliberately selected research sample of 907 respondents (students of 6 technical secondary schools) in the Moravian-Silesian Region of the Czech Republic. The majority in the research group consisted of boys (884, i.e., 97, 46%), and only 21 (2.32%) respondents were girls. Three quarters (630, i.e., 69.4%) of respondents studied a four-year engineering field completed with a school-leaving examination, only a third of 266 (29.33%) respondents studied another field of study (non-engineering).

4. Results

A positive finding is a significant predominance of students (81.48%) who have ambitions (answers *definitely yes* and *rather yes*) to be successful. A negligible share of 6.78% of students does not have these ambitions (answers *rather no* and *definitely no*). In absolute terms, there are 61 students who, for some reason (perhaps they do not study at the school of their choice), do not intend to aspire to the term "successful student". A particular explanation for this number may be that the secondary school students understood the term in the pursuit of good grades, which may not be of significant value to them at present. Thus, a negative opinion does not necessarily mean this group of students resign to professional knowledge and skills acquisition. More than a tenth of the respondents were unable or unwilling to assess their study ambitions (Table 1).

Table 1. Student expression of ambition to be a successful student.

Quantities	Student answers				
	Definitely yes	Rather yes	I don't know	Rather no	Definitely no
Absolute quantities	405	334	101	47	14
Relative quantity	44.65%	36.82%	11.14%	5.18%	1.54%
Cumulated absolute frequencies	739		101	61	
Cumulated relative frequencies	81.48%		11.14%	6.73%	

However, the result of student evaluations of one's preconditions for studying a selected field at a secondary school turned out to be somewhat surprising because only 60.2% of students subjectively perceive that they have (answers *definitely yes* and *rather yes*) these preconditions. About one in six students (15.77%) believe they do not have the prerequisites to study (answers *certainly no* and *rather no*). Almost a quarter of students chose the answer "I don't know". It might be reasonable to analyse these answers in terms of the year of study (Table 2).

Table 2. Student perception of preconditions for the selected field of study.

Quantities	Student answers				
	Definitely yes	Rather yes	I don't know	Rather no	Definitely no
Absolute quantities	151	395	215	104	39
Relative quantity	16.65%	43.55%	23.70%	11.47%	4.30%
Cumulated absolute frequencies	546		215	143	
Cumulated relative frequencies	60.20%		23.70%	15.77%	

Table 3. Distribution of students according to the subjectively evaluated level of prerequisites for study and the expressed degree of ambition to be a successful student.

	question Q34 - I have ambitions to be a good student	question Q34 - I have no ambition to be a good student	Q34 - I do not know if I have ambitions to be a good student
question Q7 - I have the prerequisites to study	473 students (52.15%)	26 students (2.87%)	46 students (5.07%)
Question Q7 - I have no prerequisites to study	94 students (10.36%)	20 students (2.21%)	27 students (2.98%)
Question Q7 - I don't know if I have the prerequisites to study	169 students (18.63%)	15 students (1.65%)	28 students (3.09%)

Table 3 shows the values for the intersection of the two investigated constructs. Due to the high frequency of "don't know" responses, the initially intended four-field table is processed with nine fields to use all the data obtained. For the first time, it is interesting to note that 52.15% of students believe that they have the prerequisites to study and at the same time want to be a good student. Of those students who believe that they have the prerequisites to study, up to 86.7% of students aspire to be good students. In the whole group, there are 10.36% of students who believe that they do not have the prerequisites to study and at the same time have ambitions to be good students. But the ambition to be a good student also has 66.66% of all those who think they do not have the prerequisites to study. Only a tiny proportion of all students

(2.87%) have no ambition to be a good student, even though they think they have the prerequisites to study. 20 (2.21%) students in the research group, who believe that they do not have the prerequisites to study and do not have the ambition to be a good student, and probably also 28 students who could not assess the level of any of their characteristics, deserve attention and perhaps targeted educational intervention.

The hypothesis expressed the main finding presented in Table 3 in the following wording: "Students who, in their opinion, have the prerequisites to study a selected (technical) field more often declare their ambitions to be a good student than students lacking (not) these prerequisites. Therefore, the values given in Table 4 allow this hypothesis to be accepted.

Table 4. Statistical significance of the distribution of students according to the subjectively evaluated level of preconditions for study and the expressed degree of ambition to be a successful student.

Pearson's chi-square = 32,720221		degree of freedom = 4		significance p= 0,0136285E-4	
Question 7		question Q34 - I have ambitions to be a good student	question Q34 - I have no ambition to be a good student	Q34 - I do not know if I have ambitions to be a good student	Line totals
I have the prerequisites to study		473(446,682)	26(37,021)	46(61,297)	545
I have no prerequisites to study		94(115,563)	20(9,578)	27(15,859)	141
I don't know if I have the prerequisites to study		169(173,755)	15(14,401)	28(23,844)	212
Column totals		736	61	101	898

It was thus proved that there is a statistically significant difference in declaring ambitions to be a good student among students with different self-assessments of their prerequisites to study the field.

5. Discussion and conclusions

Although there is a growing interest in researching study aspirations, more attention is paid to their racial, gender or socio-economic factors (Behjoo, 2013, Hong, 2022) or their relationship to educational outcomes (Gutman and Akerman, 2008). Aspiration is the variable that acquires values based on the subjective perception of one's study, learning or career desires and/or ideas. The second variables are then objectively measurable or categorical variables (age, gender, race, socio-economic status of the respondent's family). In the case of our research, both variables were based on respondents' subjectively perceived and evaluated personal characteristics, and the results of other research are not available for comparison with the results we present. The partial results of the study are that 81.48% of the total number of students admit the ambition to be a successful student, 60.2% of students subjectively perceive that they have the prerequisites to study the field. More than half of students (52.15%) also state that they are ambitious to study successfully and consider that they have the appropriate study prerequisites. The difference in declaring ambitions to be a good student among students with different self-esteem prerequisites for studying the field failed to prove statistical significance.

References

- Bartáková, I., Chvál, M. & Martinková, P. (2018). Predikční validita zkoušek zakončujících středoškolské vzdělávání a přijímacích testů na vysoké školy. *Pedagogika*, 68(1), 66–85. [Bartáková, I., Chvál, M. & Martinková, P. (2018). Predictive validity of high school graduation exams and university entrance tests. *Pedagogy*, 68 (1), 66–85.]
- Behjoo, B. M. (2013). The educational aspirations of ELT students for higher education. *Procedia - Social and Behavioral Sciences* 70, 1062–1069.
- Covington, M.V. (2000). Goal theory, motivation, and school achievement: An integrative review. *Annual Review of Psychology*, 51(1), 171-200.
- Fraser, M. & Garg, R. (2011). Educational Aspirations. In: Levesque R.J.R. (eds) *Encyclopedia of Adolescence*. Springer, New York, NY. https://doi.org/10.1007/978-1-4419-1695-2_147
- Gutman, L. M. & Akerman, R. (2008). *Determinants of aspirations*. London: Centre for Research on the Wider Benefits of Learning Institute of Education.
- Hong, Y. (2022) *The Educational Hopes and Ambitions of Left-Behind Children in Rural China. An Ethnographic Case Study*. Abingdon, Oxon, New York: Routledge.

- Charvát, M., Viktorová, L. a kol. (2014). *Tvorba, administrace a analýza testů studijních předpokladů*. Olomouc: Univerzita Palackého. [Charvát, M., Viktorová, L. et al. (2014). *Creation, administration and analysis of tests of study prerequisites*. Olomouc: Palacký University.]
- Chawla, M. (2018). A Study of Educational Aspirations of Secondary School Students in relation to their Achievement Scores. *International Journal of Research in Social Sciences*, 8(4).
- Chen, X. & Hesketh, T. (2021). Educational Aspirations and Expectations of Adolescents in Rural China: Determinants, Mental Health, and Academic Outcomes. *Int. J. Environ. Res. Public Health*, 18, 11524.
- OECD (2017). PISA 2015 results (Volume III): Students' well-being, PISA, OECD Publishing, Paris.
- Quaglia, R. J. & Cobb, C. D. (1996). Toward a Theory of Student Aspirations. *Journal of Research in Rural Education*, 12(3), 127-132.
- Stevenson, V. (ed.) (2010a). *Oxford Dictionary of English* (3 ed). <https://www.oxfordreference.com/search?q=aspiration&searchBtn=Search&isQuickSearch=true>
- Stevenson, V. (ed.) (2010b). *Oxford Dictionary of English* (3 ed). <https://www.oxfordreference.com/search?q=expectation&searchBtn=Search&isQuickSearch=true>
- Šmídová, I., Janoušková, K. & Katrňák, T. (2008). Faktory podmiňující vzdělanostní aspirace a vzdělanostní segregaci dívek a chlapců v českém vzdělávacím systému. [Šmídová, I., Janoušková, K. & Katrňák, T. (2008). Factors behind the educational aspirations and educational segregation of girls and boys in the Czech education system). *Czech Sociological Review*, 44(1), 23-53.

USING A LEARNER-BASED ACTIVITY APPROACH IN DEVELOPING SCIENCE TEACHERS' READINESS IN INQUIRY-BASED LEARNING

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Abstract

The South African science curriculum expects secondary school teachers to adjust their ways of teaching to include inquiry-based learning that endorses learner-based activities. The learner-based activities refer to the processes of learning by doing where learners are not passive, but are rather encouraged to actively participate in their own learning experiences. This paper is necessitated by the limited literature that exists within the South African context about inquiry-based learning, which reveals that the implementation of learner-based activities continues to be a challenge for many teachers, especially in rural schools. Hence, during the teacher training program, the Physical Science teachers were engaged in various learner-based practical activities which involved problem-solving, which is a crucial component of inquiry based learning. This paper therefore drew from the constructivist theory (Vygotsky,1975; Piaget,1980) as lens to answer the leading research question which asks: "To what extent are the science teachers demonstrating readiness of the use of inquiry-based learning in their classrooms after participating in the training program?". Thus, a mixed method design was adopted where data was collected using as well as pre and post questionnaires to establish the Physical Sciences in-service teachers' beliefs and experiences towards their readiness in implementing inquiry-based learning in their classrooms after the teacher development program in one of the education circuit in rural Kwa-Zulu Natal province, in South Africa. The findings of this study indicates that the in-service teachers in this district had an impactful experience which positively shifted their attitudes towards their readiness of the use of inquiry based learning when teaching Physical Sciences.

Keywords: *Inquiry based learning, in-service teachers, constructivist theory, learner-based activity, community of practice.*

1. Introduction

The South African schooling curriculum has had a long history of changes in the past two decades which have all placed different expectations on science teachers' pedagogical practices. For example, the current curriculum used across all nine provinces in no-fee paying schools of South Africa known as Curriculum Assessment Policy Statement (CAPS) has a strong focus on Inquiry Based Learning (IBL) which is stipulated under specific aim two. Generally, specific aim two seeks to serve as a guiding tool for science teachers on how best to develop important skills amongst their learners such as scientific processing and scientific reasoning, which are all globally regarded as core skills for a scientific literate citizen (Mokiwa, 2014; DBE, 2011). Although, there is growing advocacy on IBL, teachers in South Africa still struggle to implement this approach due to various factors (e.g., lack of time, infrastructure, resources, and knowledge). Within the South African context, schools are categorized into five quantiles, which is a ranking system that was adopted by the Department of Education from the Apartheid system to categorize schools based on their socio-economic factors (Hall, Leatt & Rosa,2009). Quantile one to three schools are no-fee-paying schools that are usually located within impoverished areas, while quantile four to five are private schools, usually in affluent areas of the country. This study was conducted at the district of Zululand, where most of the schools are classified as quantile one. In one of the few studies that was conducted by Ramnarain and Hlatshwayo (2018) in similar schooling context within the Mpumalanga province found out that although the Physical Science teachers had a positive view and acknowledged the benefits of the use of IBL in their classrooms, they however did not know where they will begin with its implementation. The study further revealed that the Physical Science teachers' difficulties of the use of IBL in their classrooms was presented by numerous factors such as lack of resources and infrastructure. Hence, this study used a learner-based activity approach during a teacher training program to develop science teachers'

readiness in inquiry-based learning. The first phase of the program was interested in understanding the type of beliefs that the science teachers in the Zululand district held about the use of IBL in their classrooms and it was guided by the following research question:

- What are the physical science teachers' beliefs about the implementations of IBL in their classrooms in the Zululand district?

2. Defining IBL

IBL is a widely researched area across various disciplines (see: NGSCC Lead States, 2013; National research Council, 2012). However, as revealed by the studies of Ramnarain and Hlatshwayo (2018) as well as that of Ramnarain (2016) it is revealed that the field of IBL is relatively a new field in the South African context. The concept of IBL refers to an approach that involves 'learning-by-doing' and it is grounded within the constructivist ideologies of T&L. IBL in its nature has an active approach learning where learners are provided with opportunities to investigate problems, search for solutions, make observations and answer questions, hence its significance within science classrooms. The vast research conducted within the field has provided numerous benefits that are associated with the use of IBL in science classrooms which involve but not limited to:

- Helping students make their own connections of the presented content
- Build students problem solving, comprehension, critical thinking skills and cognition.

Essentially IBL is a pedagogy which best enables students to experience the processes of knowledge creation and the key attributes are learning stimulated by inquiry, a student-centred approach, a move to self-directed learning, and an active learning approach. That is why this study used the learner-based activity approach which positioned the teachers to assume learner roles during the training, so they could be provided with first-hand experience that would enable them to see IBL in practice and its benefits.

3. The impact of teachers Beliefs on the use of IBL

This paper was interested in understanding science teachers' beliefs that are associated with the use of IBL in the Zululand district, North of Kwa-Zulu Natal province. Calderhead (1996) defines beliefs as "suppositions, commitments, and ideologies that teachers have about their students learning of the subject matter" (p.715). Beliefs are considered to be an important of area to be researched, especially in IBL because they influence teachers pedagogical reasoning and instructional practices (Sikko, Lyngved, & Pepin, 2012). As further exemplified by Binns and Popp (2013) If a teachers' core belief is inconsistent with IBL pedagogies, they may serve as a barrier for teachers when employing inquiry as a T&L strategy in their classrooms (Binns & Popp, 2013). Hence, Ramnarain, Nampota and Schuster (2016) explain that the way in which teachers teach is usually embedded by their belief systems. That is why this study used the learner-based activity approach during a teacher training program to develop science teachers' readiness in inquiry-based learning.

4. Method

This paper adopted a quantitative survey approach (Creswell, 2014). The questionnaires comprised of different items that were administered to the Physical Sciences teachers on the first day of the workshop in the rural district of Zululand, Kwa-Zulu Natal, South Africa. Twenty-three Physical Sciences teachers responded to the questionnaire, and the teaching experience of these teachers in the profession ranged from a few years to more than 25 years. All the teachers were from the poorly resourced school with no laboratories and with many learners per class. A Science Curriculum Implementation Questionnaire (SCIQ) adapted version was used (Lewthwaite, 2001), which is currently referred to as the Scientific Inquiry Implementation Questionnaire (SIIQ). The SCIQ was used to evaluate factors influencing science program delivery at schools in Australia, New Zealand and Canada and in other numerous research publications such as (Lewthwaite 2004, 2005; Ramnarain, 2016). SCIQ has forty-nine-item, and in this study only fifteen items were used. The items are statements to which teachers respond to on a 5-point Likert scale that ranges from 1 (strongly disagree) to 5 (strongly agree). Given that Ramnarain (2016) used the same instrument within South Africa, it was therefore not necessary to conduct a piloting study. The descriptive statistics, i.e. mean scores and standard deviations, were computed to identify general trends in their beliefs for each item.

5. Data analysis and findings

The mean scores were computed to identify the general trends in responses for each the items, and standard deviations were computed to determine the degree of consistency amongst the teacher's responses. The results were grouped according to each item, and table 1 shows the means for each item, that were used to document the types of beliefs that science teachers have about IBL, thus determining their readiness of use of IBL in their science classrooms.

Table 1. The overall means and SD for each item

Statements	Mean scores	Standard dev
IBL takes up too much of my teaching time	4,09	0,83
It is difficult to maintain control of learners during IBL	3,26	0,94
I prefer my learners to <i>design</i> their own inquiries	3,48	0,83
IBL helps my learners to develop experimental process skills	3,87	0,74
My head of department supports the way in which teaching is done in my class	3,61	0,87
The purpose of doing an inquiry is to confirm theory	3,74	0,94
I feel confident teaching lessons where learners do science inquiries	3,87	0,74
Science inquiry activities are difficult to manage	3,09	1,02
The management of my school could do more to support me in implementing the inquiry-based approach to practical work	3,78	0,98
I borrow apparatus from other schools	3,57	1,01
The lesson time allocated is adequate for my learners to do practical work/Inquiry activities	2,52	1,31
My learners take a lot of time to settle down before starting with the inquiry activities	3,35	1,05
When I need lab equipment and chemicals the management of my school makes funds available for the purchase of these	2,61	1,28
With the new curriculum, I now include more practical activities in my teaching	3,09	1,06
My learners are well behaved when they are doing practical work	3,35	0,87
Overall scores	3,42	1,07

The overall findings were (M=3,42; SD=1,07) which revealed that teachers who attended this workshop had a positive belief about IBL. Although that is the case, the results still showed that the physical science teachers that participated in this study also had a belief that IBL takes up too much of their teaching time (M=4,09; SD=0,83), a number of them do not believe that school management is willing to purchase lab equipment and chemicals (M=2,61; SD=1,28), and majority of them do not believe there is enough time for learners to do practical work/inquiry activities (M=2,52; SD=1,31). These results were consistent with those of Ramnarain and Hlatshwayo (2018)'s that despite the positive beliefs that science teachers have about IBL, they still are less positive in implementing the IBL approach in their classrooms because of resource-related issues such no laboratory facilities and T&L materials to mention a few.

The results were then groups in terms of their teaching experience to further establish the science teachers' beliefs about IBL as shown in Table 2. This was done as means of tracing whether or not the number of teaching experience had any influences in the physical science teachers' beliefs about implementing IBL in their practices.

Table 2. Mean score in terms of teaching experience.

Years of teaching	# of teachers	Mean score	Standard deviation
0- 5	6	3,30	1,14
6-15	12	3,52	1,05
16-25	2	3,37	0,98
< 25	3	3,27	1,04

The findings in table 2 further illustrated that physical science teachers that were between 6-15 years of teaching experience had a stronger belief towards IBL compared to other groups. Therefore, the findings of this study show that the rural Zululand district Physical Sciences teachers had a strong belief about IBL as the mean scores were above the value of 3.

6. Discussion of results and conclusion

To respond to the research question ‘What are the Zululand District Physical Sciences teachers’ beliefs about inquiry-based learning?’ The findings show that the sampled Physical Sciences teachers from the Zululand district displayed a strong belief in inquiry-based learning ($M=3.46$). This is a noteworthy finding since the CAPS documents advocate the implementation of IBL at school. The findings of this study are in line with (Ramnarain et al., 2018), that teachers from the rural district of Mpumalanga had a positive attitude towards inquiry in the teaching and learning of Physical Sciences and recognise the benefits of inquiry, such as addressing learner motivation and supporting learners in the understanding of abstract science concepts. Based on these findings, it is recommended that future research should be pursued in investigating whether or not these teachers adopted IBL in their classrooms, and what kind of support do they still require if any to sustain the use of IBL in their practices.

References

- Binns IC & Popp S 2013. Learning to teach science through inquiry: Experiences of preservice teachers. *Electronic Journal of Science Education*, 17(1):1–24. Available at <http://ejse.southwestern.edu/article/view/11346/81> 16. Accessed 24 November 2017.
- Calderhead, J. (1996). *Teachers: Beliefs and knowledge*.
- Creswell JW 2014. *Research design: Qualitative, quantitative, and mixed methods approach* (4th ed). Thousand Oaks, CA: Sage.
- Department of Basic Education 2011b. National Curriculum Statement Grades R-12, 11 September. From <http://www.education.gov.za> (Retrieved on 4 June 2012). [Google Scholar]
- Hall, K., Leatt, A., & Rosa, S. (2009). *The Means to Live. Targeting poverty alleviation to realise children's rights*.
- Lewthwaite, B.E (2001). The development, validation and application of a primary science curriculum implementation questionnaire. Unpublished ScEdD Thesis, Curtin University of Technology, Perth. <http://adt.curtin.edu.au/theses/available/adt-WCU20030717.155648/>
- Lewthwaite, B.E. (2004). “Are you saying I’m to blame?” Exploring the Influence of a Principal on Elementary Science Delivery. *Research in Science Education*, 34, 137-152.
- Mokiwa, H. O. (2014). Exploring the teaching of Physical Science through inquiry. *International Journal of Educational sciences*, 7(1), 21-27.
- National Research Council. (2012). *Discipline-based education research: Understanding and improving learning in undergraduate science and education*. Washington, DC: National Academies Press.
- NGSS Lead States. (2013). *Next Generation Science Standards: For states, by states*. Washington, DC: The National Academies Press.
- Ramnarain U, Nampota D & Schuster D 2016. The spectrum of pedagogical orientations of Malawian and South African physical science teachers towards inquiry. *African Journal of Research in Mathematics, Science and Technology Education*, 20(2):119–130.
- Ramnarain, U. (2016), Understanding the influence of intrinsic and extrinsic factors on inquiry-based science education at township schools in South Africa. *Journal of Research in Science Teaching*, 53(4), 598-619.
- Ramnarain, U., & Hlatshwayo, M. (2018). Teacher beliefs and attitudes about inquiry-based learning in a rural school district in South Africa. *South African Journal of Education*, 38 (1), 1-10
- Sikko SA, Lyngved R & Pepin B 2012. Working with Mathematics and Science teachers on inquiry based learning (IBL) approaches: Teacher beliefs. *Acta Didactica Norge*, 6(1): Art. 17. Available at https://pure.tue.nl/ws/files/3761879/376033125007_90.pdf. Accessed 14 November 2017.

INFLUENCE OF PARENTS' EDUCATION AND PROFESSION ON SELF-ASSESSMENT OF SECONDARY SCHOOL STUDENTS' PREREQUISITES FOR STUDYING

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Abstract

The study is based on the concept of prerequisites for the study, which can be identified and assessed by established assessment tools or subjectively perceived and experienced at the entrance to education and throughout it. The subjective self-assessment of assumptions can be a source of self-confidence, self-efficacy, and proper study motivation, but on the other hand, the cause of study failure and drop-out. The empirical research aimed to determine whether parents' level of education and their profession influences the subjective evaluation of students' prerequisites for secondary school studies. Hypotheses assuming the statistical significance of the relationship between parents' level of education, profession, and subjectively determined level of prerequisites for the study were verified using the data acquired from the answers of 900 respondents who participated in the research. The influences of several moderating variables, i.e., gender, students' age, a field of study, and parent's gender, are also monitored in a more detailed analysis. Research findings can provide a basis for targeted planning and student-friendly strategies to prevent academic failure.

Keywords: *Education, profession of parents, student, self-assessment, prerequisites for the study.*

1. Introduction

Students' transition from primary to secondary education is a crucial stage in life in terms of later future career, and professional growth. The professional community seeks answers to questions such as "What factors influence a student's choice of a particular secondary school?" or "What is the role of the family in the selection of vocational education?" The results of the society-wide discussion point to the fact that the student's decision for the future profession after completing primary education is an important factor influencing their further satisfaction in the personal and professional field.

2. Career and career decision-making for secondary school studies

Super (1980, p. 282) defined the term career as "a combination and sequence of roles played by an individual throughout their life." Pedagogical Dictionary defines education path as "the path of an individual through different levels and types of schools throughout their life" (Průcha, Walterová, Mareš, 2009, p. 363). Zehringrová (2017, p. 3) states that the period of an individual's transition from ending childhood to late adolescence is a time when "pupils are forced to gradually adopt the norms and responsibilities of the adult world during adolescence." Vágnerová (2012, p. 367) regards 15-year-olds as individuals in a "period of search and reassessment when the individual has to cope with change, achieve an acceptable social status and develop a subjectively satisfying, more mature form of self-identity." Educational systems usually create organisational and personnel conditions for career counselling. According to Gatsby Foundation (quoted by Brabec, Kreislová, Zábranová, undated), it aims to show all young people (regardless of their social and family background) that there are many opportunities, helps to make the right decisions and build a path to a satisfying professional life.

3. Factors influencing the choice of secondary school

Factors influencing the student's choice of a technically oriented secondary school field and the choice of their future profession include genetic preconditions (e.g. inherited traits in connection with the specifics of the individual's brain) as well as the family, school, extracurricular environment and their diverse cultures.

The supporting family is a factor helping to shape the growth of self-confidence, responsibility, independence, healthy motivation and development of potential abilities, skills, competencies of the adolescent, influences their fundamental, lifelong values. Rabusicova et al. (2003), in an effort to identify the roles and types of parents in relation to school, found that cooperating parents (social partners) who are interested in children and school but do not have excessive demands on children are evaluated positively. On the contrary, parents without interest in children and their activities at school but overly interested in school issues are evaluated negatively as not cooperating and inadequately active. An interesting finding was that the factor of "parents as social partners" is very clearly defined, but in reality, it includes only a tiny percentage of parents. Pulišová (2016) found that dissatisfied parents who only "silently" complain to other parents and acquaintances and demonstrate dissatisfaction with the school only by their behaviour are perceived as problematic. Vincent and Martin (2000) pointed out a particular influence of parents (as individuals) in connection with parents' relations with schools and the so-called role of parents' discussion forums. However, the orientation of adolescents towards future occupations is also influenced by the environment and the people an individual spends free time with. The institutional level of adolescent socialisation is represented by targeted activities or unintended influences of specific organisations, i.e., school institutions, through which the individual opens their way to the profession. Several other factors can complicate or positively support the processes of technically oriented professional socialisation in adolescents. New trends and requirements for education in connection with the training of individuals for employment during the 4th Industrial Revolution (characterised by robotisation, automation and digitisation) also play a role in the selection of technical education. Roe and Lunneborg (1990) pointed out the relationship between a specific area of interest and work activities leading to a professional decision.

4. Research on career maturity before starting career education

Career maturity can be viewed from many aspects. Super (1955) defined career maturity as the maturity of an individual in individual developmental stages. Babarovič and Šverko (2016) confirmed that career maturity increases with increasing age. Katrňák (2006) monitored the factors influencing the creation of educational aspirations and found that students from nuclear families have higher educational ambitions on average. Creed, Prideaux, Patton (2005) focused on longitudinal career aspects of the 8th and 10th-year students, and their findings note that "women were more and more undecided, although still undecided men were more satisfied and used maladaptive strategies more frequently than women (p. 397). Otto (2000) examined the attitudes and behaviours of 362 secondary school students toward their career development and parents' assistance in career decision making. He found that students turned to mothers for help. Knotková (2019) investigated the relationship between the father's care and its influence on the child's choice of occupation and the relationship between individuals (parents and non-parents) helping children with the occupational choice.

5. Research methodology

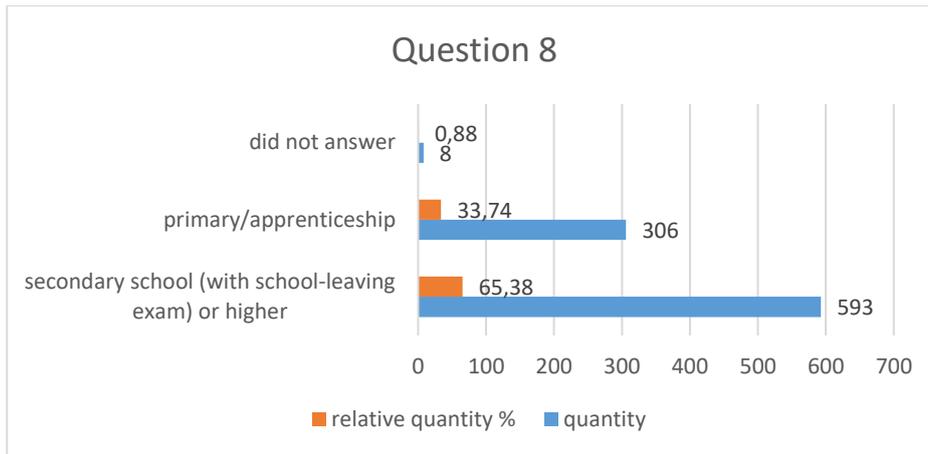
The research was carried out within the TAČR project at the Faculty of Education of the University of Ostrava. The data were collected using an author's questionnaire, which contained 29 items (20 closed and nine open or semi-open). Five items and their results are presented in this paper. Data collection was carried out from September 2020 to February 2021 on a deliberately selected research sample of 907 respondents (students of 6 technical secondary schools) in the Moravian-Silesian Region of the Czech Republic. The majority in the research group consisted of boys (884, i.e., 97.46%), and only 21 (2.32%) respondents were girls. Three quarters (630, i.e., 69.40%) of respondents studied a four-year engineering field completed with a school-leaving examination, only a third of 266 (29.33%) respondents studied another field of study (non-engineering).

6. Results

Question 7: "Do you think that you have the prerequisites for the selected (technical) profession?" More than half (545, 60.09%) of the respondents answered that they think they have the prerequisites for the selected (technical) profession, 358 (39.47%) respondents answered they do not think (or do not know) they have the prerequisites for the chosen (technical) profession and four respondents did not answer (0.44%).

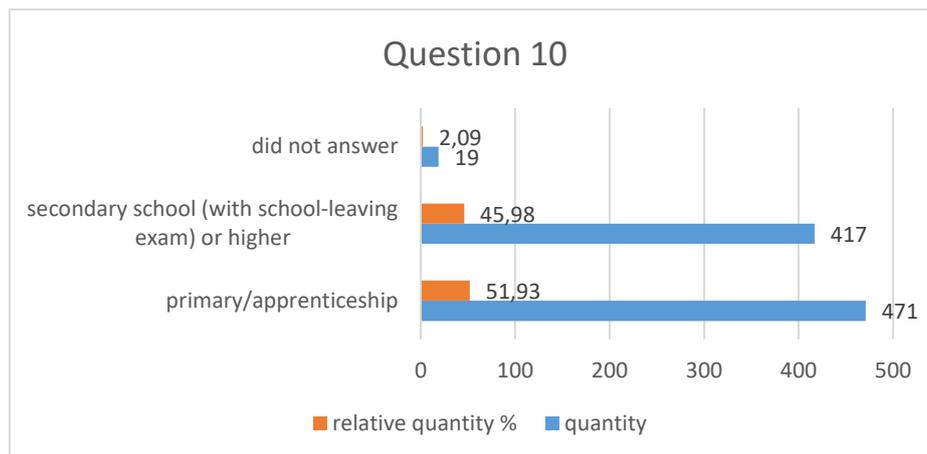
Question 8: "Your mother's education level is: (primary, apprenticeship - no school-leaving examination, secondary with the school-leaving examination, higher vocational and university examination)." The answers: more than half of respondents (593, 65.38%) stated that their mother's education level is a secondary school with a school-leaving examination and higher, and a third of respondents (306, 33.74%) answered that their mother's highest educational attainment is primary or secondary without a school-leaving examination (apprenticeship).

Graph 1. Mother's education level.



Students' answers to item 10: "Your father's education level is: (primary, apprenticeship - no school-leaving examination, secondary with the school-leaving examination, higher vocational and university)" it was found that more than half of the respondents (471, 51.93%) have a father with a secondary school diploma or other higher education and 417 (45.98%) respondents have a father with a primary or secondary education without a school-leaving examination.

Graph 2. Father's education level.



The research also focused on finding out the relationships between selected variables - subjectively assessed preconditions for study, education of both parents, gender of students and field of study.

Hypothesis H1 expressed the relationship between subjectively assessed preconditions for study and mother's education as follows: "Students who think that they have preconditions for the selected profession more frequently have a mother with a high school diploma or higher than students who do not think so."

Table 1. Detected and expected frequencies to H1.

Pearson's chi-square = 2,946447 degree of freedom = 1 significance p= 0,086067			
Question 7	Question 8 (secondary education with school-leaving exam or higher)	Question 8 (primary/apprenticeship)	Line totals
yes	370 (358,11)	172 (183,89)	542
no / I don't know	222 (233,89)	132 (120,11)	354
Column totals	592	304	896

As the calculated chi-square value is less than the test criterion value and the significance value is greater than the selected significance level of 0.05, no statistically significant relationship was confirmed between the examined variables. The formulated hypothesis was not confirmed. Thus, it cannot be concluded that the self-assessment of study prerequisites is related to the education of students' mothers.

Hypothesis H2 expressed the relationship between subjectively assessed preconditions for study and father's education as follows: "Students who think they have preconditions for the selected profession more frequently have fathers with a high school diploma or higher than students who do not think so."

Table 2. Detected and expected frequencies to H2.

Pearson's chi-square = 0,723316 degree of freedom = 1 significance p= 0,395058			
Question 7	Question 10 (secondary education with school-leaving exam or higher)	Question 10 (primary/apprenticeship)	Line totals
yes	289 (282,81)	243 (249,19)	532
no / I don't know	182 (188,19)	172 (165,81)	354
Column totals	471	415	886

Since the calculated chi-square value is less than the test criterion value and the significance value is greater than the chosen significance level of 0.05, no statistically significant relationship was confirmed between the examined variables. The formulated hypothesis was not confirmed. Thus, it cannot be assumed that the self-assessment of study prerequisites is related to the education of students' fathers.

In hypothesis H3, the relationship between subjectively assessed assumptions about the study and the student's gender was assumed. "Students-boys more frequently think that they have the prerequisites to study at a technical secondary school than students-girls."

Table 3. Detected and expected frequencies to H3.

Pearson's chi-square = 0,087602 degree of freedom = 1 significance p= 0,767248			
Question 1	Question 7 (yes)	Question 7 (no / I don't know)	Line totals
boy	531 (530,34)	349 (349,66)	880
girl	12 (12,66)	9 (8,34)	21
Column totals	543	358	901

Since the calculated chi-square value is less than the test criterion value and the significance value is greater than the chosen significance level of 0.05, no statistically significant relationship was found between the students' gender and the self-assessment of study prerequisites. The formulated hypothesis was not confirmed. Thus, self-evaluation of study prerequisites is not related to gender.

Hypothesis H4 assumed a connection between subjectively evaluated prerequisites for study and the field focus of secondary school studies: "Students of engineering specialisation more frequently think they have prerequisites for study than students of other specialisation". Since the calculated chi-square value was less than the test criterion and the significance value was greater than the chosen significance level of 0.05, no statistically significant relationship was demonstrated between self-assessment of study prerequisites and study focus. The formulated hypothesis was not confirmed. The self-evaluation of prerequisites for the study is thus not related to the field of study.

7. Discussion and conclusions

The fundamental conclusions of the research survey are:

1. More than half of the respondents think they have the selected (technical) study prerequisites.
2. More than half of the respondents have a mother with a secondary school diploma or higher education.
3. More than half of the respondents have a father with a secondary school diploma or higher education.
4. None of the four research hypotheses has been validated, and thus:
 - a. It cannot be confirmed that the self-assessment of study prerequisites is related to the education of students' mothers.

b. It cannot be assumed that the self-assessment of study prerequisites is related to the education of students' fathers.

c. Self-evaluation of study prerequisites is not related to the student's gender.

d. Self-evaluation of study prerequisites is not related to the field of study.

Zehring's research findings (2017, p. 67) showed that the pupils' decisions about their secondary school were made mainly by themselves, without significantly adapting to their parents' wishes or the pressure of the environment. The children were most influenced by their parents, more by their mothers than by their fathers." 69). Furthermore, this research showed that "children from families with lower socioeconomic status, including lower levels of parental education, have lower ambitions for higher education" (p. 69).

References

- Babarovič, T. & Šverko, I. (2016). Vocational Development in Adolescence: Career Construction, Career Decision-Making Difficulties and Career Adaptability of Croatian High School Students. *Primenjena Psihologija*, 9(4), 429-448. DOI: 10.19090/pp.2016.4.429-448.
- Brabec, J., Kreislová, B., Zábranová, L. (nedatováno). *Jak efektivně zavést kariérové poradenství do škol*. Výstup projektu Vzděláním k úspěchu bez bariér řešeného v letech 2017-2020. [Brabec, J., Kreislová, B., Zábranová, L. (undated). *How to effectively implement career guidance in schools*. Output of the project Education for Success without Barriers solved in the years 2017-2020.]
- Creed, P., Prideaux, L.-A., & Patton, W. (2005). Antecedents and consequences of career decisional states in adolescence. *Journal of Vocational Behavior*, 67(3), 397-412. DOI: 10.1016/j.jvb.2004.08.008
- Katrnák, T. (2006). Faktory podmiňující vzdělanostní aspirace žáků devátých tříd základních škol v České republice. In Matějů, P.; Straková, J. et al.: *Nerovné šance na vzdělání: Vzdělanostní nerovnosti v České republice*. Praha: Academia, 173-193. ISBN 80-200-1400-4. [Katrnák, T. (2006). Factors determining the educational aspirations of ninth-graders of primary schools in the Czech Republic. In Matějů, P.; Straková, J. et al.: *Unequal Opportunities for Education: Educational Inequalities in the Czech Republic*. Prague: Academia, 173-193. ISBN 80-200-1400-4.]
- Knotková, P. (2019). *Vliv rodičů na výběr povolání dítěte*. [Bakalářská práce]. Brno: Masarykova univerzita, Filozofická fakulta. Vedoucí práce: Millová, K. [Knotková, P. (2019). *Influence of parents on the choice of child's profession*. [Bachelor thesis]. Brno: Masaryk University, Faculty of Arts. Supervisor: Millová, K.]
- Otto, L.B. (2000). Youth Perspectives on Parental Career Influence. *Journal of Career Development*, 27(2), 111-118. DOI: 10.1177/089484530002700205.
- Průcha, J., Walterová, E. & Mareš, J. (2009). *Pedagogický slovník*. Praha: Portál. ISBN 978-80-7367-647-6. Průcha, J., Walterová, E. & Mareš, J. (2009). *Pedagogical dictionary*. Prague: Portal. ISBN 978-80-7367-647-6.
- Pulišová, K. (2016). Neklape nám to: učitelé a rodiče žáků prvního stupně základních škol a jejich problémové vztahy. *Studia Paedagogica*, 21(3), 167-182. DOI: 10.5817/SP2016.39. [Pulisova, K. (2016). It does not suit us: teachers and parents of primary school pupils and their problematic relationships. *Studia Paedagogica*, 21 (3), 167-182. DOI: 10.5817 / SP2016.39.]
- Rabušicová, M., Čiháček, V., Emmerová, K. & Šedřová, K. (2003). Role rodičů ve vztahu ke škole – empirická zjištění. *Pedagogika*, 53(3), 309-328. [Rabušicová, M., Čiháček, V., Emmerová, K. & Šedřová, K. (2003). The role of parents in relation to school - empirical findings. *Pedagogy*, 53 (3), 309-328.]
- Roe, A., & Lunneborg, P. W. (1990). Personality development and career choice. In D. Brown & L. Brooks, *Career choice and development: Applying contemporary theories to practice*, 68-101. Jossey-Bass.
- Super, D. E. (1955). Dimensions and measurement of vocational maturity. *Teachers College Record*, 57(3), 151-163. DOI: 10.1177/016146815505700306.
- Super, D. E. (1980). A life-span, life-space approach to career development. *Journal of vocational behavior*, 16(3), 282-298.
- Vágnerová, M. (2012). *Vývojová psychologie: dětství a dospívání*. Praha: Nakladatelství Karolinum. ISBN 978-80-246-2153-1. [Vágnerová, M. (2012). *Developmental psychology: childhood and adolescence*. Prague: Karolinum Publishing House. ISBN 978-80-246-2153-1.]
- Vincent, C. & Martin, J. (2000) School-based parents' groups - a politics of voice and representation? *Journal of Education Policy*, 15(5), 459-480. DOI: 10.1080/026809300750001649
- Zehringová, A. (2017). *Faktory ovlivňující volbu další vzdělávací dráhy žáků deváté třídy ZŠ*. [Diplomová práce]. Praha: Univerzita Karlova, Filozofická fakulta. Vedoucí práce: Komárková T. [Zehring, A. (2017). *Factors influencing the choice of further educational path of ninth grade elementary school students*. [Thesis]. Prague: Charles University, Faculty of Arts. Supervisor: Komárková T.]

A STUDY ON STUDENT AGENCY OF COLLEGE STUDENTS WHO PARTICIPATED IN NON-FACE-TO-FACE CLASSES

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Abstract

The purpose of this study is to look at the student as agency who leads the class, and to examine the experience of mutual communication as agency. For this purpose, 4 students who took the social education and major compulsory classes at University A in South Korea were selected as research participants. In order to increase the coherence of the research purpose, in addition to the interview data, the class impressions and midterm and final test assignments written by the students were supplemented. The research results according to this study are as follows. First, the non-face-to-face discussion class allowed students to experience both fear and unfamiliarity from the non-face-to-face environment at the same time. In particular, the non-face-to-face environment made people hesitate about how to communicate. Second, group discussion improved communication between theory and reality by analyzing textbooks based on class theory and sharing the analysis results among students. Third, field trip facilitated the connection between online and offline, allowing them to look back on their own world of life and build confidence as a future teacher. The following are the suggestions accordingly. First, it should promote interaction with students and teachers. Second, the class should provide various connections outside the class. Third, strong motivation for class is required. This study does not suggest a universal law of student agency in that it only targeted students from the College of Education of A University in Korea. However, it is meaningful in that by exploring the process of developing student agency, it gave hints on what direction to take in the future.

Keywords: *Non-face-to-face classes, student agency, qualitative study, college student, South Korea.*

1. Introduction

The COVID-19 pandemic has changed the way we live around the world. In particular, with the advent of the era of untact, which means non-contact, a paradigm shift is taking place rapidly. In particular, the field with the most significant change in daily life is the education field. Although Korean studies on non-face-to-face classes have been steadily conducted, existing studies mainly show that teachers or schools need to reconsider their class satisfaction through improving the class environment, the necessity of interaction between instructors and learners, and the need for active class participation by learners. In other words, this study can be said to be an early stage study to respond to the rapid change in the educational environment caused by COVID-19, and has limitations in that students cannot be actively treated as subjects of education.

The student needs to be viewed as a subject that can change through interaction, not just accepting the environment as the subject of education (Lee, Seung-min, Min, Deok-gi & Shim, Gyu-nam, 2013; Choi, Sun-ju, 2020). In this regard, this study aims to view students as agency who can lead the class, and to examine experiences of mutual communication as agency. However, this study has limitations in that it is a social education and major class at a specific university in Korea along with the special context of COVID-19. Nevertheless, it is different from previous studies in that it discusses students as agency in the class. Accordingly, the research question of this study is “How is the experience of student agency of college students who participated in non-face-to-face classes?”

2. Background

2.1. Non-face-to-face classes

During the COVID-19 period, non-face-to-face classes were one of the surest ways to deal with academic deficits. Korean studies on non-face-to-face classes mainly focus on the current status and current status of classes (Kim, Yun-Min, 2020; Lee, Heon-Soo, 2020), and satisfaction and perception of classes (Kim, Dong-hun, Jiang, Ting & Zhu, Yong-jun, 2021; Oh, Seung-Min, 2021; Song, Sue-Yeon,

Kim, Hank-young, 2020; Lee, So-min, Kim, Kyung-lee, 2021), Exploring professors and classroom environments (Choi, Dong-Yeon, Kim Ji-Un, 2021), student experience (Song, Eun-hwa, Kim, Myeung-chan & Im, Seon-mi, 2021; Jun, Joo-ram, Choi, Kyoung, 2021; Cho, Seung-hui, 2021; Choi, Ra-young, 2021; Choi, Hyeon-Sil, 2021), etc. have been the focus of research.

The preceding research is meaningful in that it suggests a direction for improving non-face-to-face classes by examining the various levels of students' experiences in non-face-to-face classes. However, it is necessary to remember that students are not just objects of experience in the classroom environment, but the subject of education that creates experiences (Lee, Seung-min, Min, Deok-gi & Shim, Gyu-nam, 2013; Choi, Sun-ju, 2020). Thus, in this study, based on the recognition that the student is the subject of education, we want to examine what kind of experiences students have and what kind of experiences they create in non-face-to-face learning. Through these attempts, we intend to overcome the limitations of previous studies and suggest implications for student's agency in non-face-to-face classes.

2.2. Student agency

The discussion on the *Agency* has been developed in various ways. Bandura (1982) defined agency as the ability to act according to an individual's sense of self-efficacy in a complex context from a sociocognitive perspective. Emirbayer and Mische (1998: 973) argued that the temporal factor should be considered in understanding agency. Considering the orientation (past) of the action and the possibility of the action (the future), it was considered that the present agency appears. Ahearn (2001: 112) emphasized the socio-environmental aspect of agency and defined it as "socioculturally mediated behavioral ability". Biesta and Tegger (2006) also defined agency as the ability to act and achieve in 'specific circumstances'. On the other hand, Burkitt (2016) emphasized the process of interaction between actors and stated that no person can be a complete agency or a complete conformer at the moment of interaction. In his view, agency is a concept that can be defined based on reflection and reflection.

Student agency is influenced by autonomous goal setting, interaction with various contexts, and peer and peer relationships (Arnold, Clarke, 2014; Klemenčič, 2015; OECD, 2021). It was revealed that the dispositional dimension, the motivational dimension, and the social context dimension are complexly intertwined. Learner agency is often used interchangeably with student autonomy, which needs to be clearly distinguished. The main difference between the two concepts lies in "consideration of the effects of complex social formation" (Abrams, 1999, p. 825). While the necessity of self-directed learning (Little, 1991) is mainly proposed as an alternative to maximizing student autonomy, student agency is a complex combination of orientation and possibility, individual temperamental dimension, and recognition of social structure. should be considered (Ahearn, 2001; Arnold & Clarke, 2014; Lindgren & McDaniel, 2012). Thus, student agency can be defined as a complex and multi-layered concept that requires consideration of individual aspects as well as external aspects of environmental context and interaction with teachers and other students.

3. Methods

3.1. Research design

In this study, a qualitative study was conducted to examine how the student agency behavior appears in the subject studies who participated in non-face-to-face classes. The study participants were selected from 4 students who are taking the major compulsory classes in the Department of Social Education, A University in South Korea¹. Students participating in this class have a clear sense of purpose as social studies teachers. Thus, it was judged that it was a context in which student agency could appear well, and the students of the relevant class were selected as the research participants. The individual characteristics of the research participants are illustrated in the Table 1.

Table 1. Individual characteristics of the research participants.

No.	Gender	Age	Year of admission	Major
1	Male	21	2020	social education
2	Female	21	2020	social education
3	Female	21	2020	social education
4	Female	21	2020	social education

¹Based on cultural anthropology, this class was operated non-face-to-face (zoom) for a total of 16 weeks from September to December 2021. Instructors provide theoretical lectures in real time, and students conduct team discussions with reference to class materials and theory lectures conducted in advance. The midterm exam was replaced with a field trip report. Field trip is to select a site for each student in the area where they live, conduct direct data research, interviews, etc., and develop research activities in the field of social studies. Before Corona 19, face-to-face classes were operated in the form of selecting a field to visit near the school by group, but they were conducted individually considering the difficulty of group classes. Students can use the online class management site to download class materials, upload assignments, and send and receive questions and answers.

After reviewing the class participation observation log written by the researcher, the research participants selected students who were deemed appropriate as the research participants and confirmed their intention to participate in the research. In order to comply with research ethics, a consent form for research participation was drawn up, and a predetermined case fee was paid.

3.2. Data collection and analysis

In this study, data were collected from various angles to enhance the consistency of the research purpose. First, in the first week's class orientation, it was informed that research could be conducted in relation to this class, and consent was obtained from the students. In order to collect data according to the purpose of the research, the class participation observation log prepared by the researcher, the class impressions prepared by the students before the end of each class, alternative assignments for the mid-term exam, and answers for the final exam were used. In addition, interviews were conducted with some students to ensure the students' vivid voices.

Individual interviews were conducted using semi-structured questionnaires. The main questions were about access to information about classes, experiences of non-face-to-face classes, experiences of discussion classes and field trips, mutual communication between instructors and students, and personal changes before and after class. After the individual interview, the transcripts were reviewed and additional questions were judged to be necessary, so a written interview was conducted using a structured questionnaire. The main questions are: *Why did you want to become a social studies teacher? What you think are important and most memorable discussions in the discussion class? The positive and negative aspects of the field trip, What you learned from the field trip, and what to do when you hire a teacher in the future?*

The collected data was analyzed within the case in the form of open coding, and then the student agency was described through analysis between cases. In addition, in order to secure the validity and reliability of the research, the research results were regularly discussed with the co-researcher at least once a week, and the results of discussions held at regular seminars were reflected in the paper.

4. Results

As a result of the study, there were three themes: *meet with class*, *group discussion: connection between theory and reality*, and *field trip: connection between online and offline*.

4.1. Meet with class

The study participants were experiencing the fear of the discussion class and the unfamiliarity of the non-face-to-face environment at the same time. In particular, as non-face-to-face classes started due to Corona 19 at the same time as admission, they expressed a sense of pressure about how to interact with students and professors. In particular, this class was “a burdensome class” (Participant 2's 9/1/2021 class review) in that the discussion class required active interaction between students. Also, when interacting with the instructor, he ponders how his image will be received in non-face-to-face situations.

Since it was online, we had to conduct a discussion without knowing each other so well, so I think there were a lot of cases where we spent time looking out for each other. -Interview with Participant 2

I really don't know if it's just me because I got the Corona class number at the same time I enrolled, but I think it was unfamiliar or very uncomfortable, or rather, there were few things like that. In my case, I started non-face-to-face from the beginning, so there is no comparison... - Interview with Participant 3

It's a little bit, but it's still going on non-face-to-face, and I met professors face-to-face like this and didn't do it, so I think it's a little difficult to ask a question first or something like that. In a non-face-to-face delivery situation, there may be other errors in delivery, so I think I hardly thought of asking. -Interview with Participant 4

4.2. Group discussion: connection between theory and reality

By interacting with students in group discussion, understanding the curriculum in general, and comparing each task, it becomes “an opportunity to instill a new experience” (Participant 3's 9/8/2021 class review). Doing different analyzes with the same textbook works as a major motivation for discussion.

As I start the group activity, I present the results of my textbook analysis and hear about the assignments of other members of the team, and I say, ‘Oh, the method of doing the assignments is different for each person. Each person is really different in the direction of analysis and in organizing the directions. There is no distinction between a correct method and an incorrect method.’ I thought. -Interview with Participant 2

At the same time, “a personality that does not like to hear bad stories from others” (interview with Participant 4) also acts as a motivating aspect of discussion learning. Research participants receive their own motivation and strive for better learning. In particular, they feel that time is tight for a smooth discussion, and they promise to “make an effort to supplement this in the next group activity” (Participant 2's 11/11/2021 class review), and hope for an appropriate intervention by the instructor.

It was short. So, if you take the wrong direction, there will be fewer things to talk about in that short time, so that time will be shortened, so I think the desire to have a clear direction and have a conversation is greater. - Interview with Participant 1

4.3. Field trip: Connection between online and offline

The biggest advantage of field trip is “unusual discovery of ordinary places” (Written interview with Participant 1). Although it is a place that students have always encountered in their life world, the place is newly connected through class. In addition, all the process of field trip is connected to classes. Although it is an online class, students use what they have learned in the offline field and act as active agency.

The positive aspect of the field trip was that it was possible to put the learned knowledge to practical use. It was enjoyable to see all the learning elements I had taken in all parts of the process of selecting a location, conducting a literature search, and writing a report with expert advice, rather than just studying at my desk. Field trips are considered an essential activity in anthropology lectures such as <Culture and Society>. - Written interview with Participant 3

These activities are a process of “continuous training and realization with the teacher’s ability” (Participant 3's 10/28/2021 class review) outside of class time. It is also a time to think about how to overcome these difficulties in one's own class in the future while feeling the difficulties faced during the field trip. This is the power that comes from the experience that students have actually done something.

I think the biggest advantage is that I can convey my experience to others in a much more vivid way. As I have experienced it myself, I was able to convey in detail what points to consider and what process to go through. I think this experience is an experience I want to pass on to my students even after becoming a teacher in the future. -Written interview with Participant 1

5. Conclusion

In order to actively treat the student as the subject of education in the educational context of non-face-to-face class, this study looked at the student as agency who leads the class, and intended to examine the experience of mutual communication as agency. The results of this study are as follows.

First, the students met with the class by experiencing the fear of the discussion class and the loneliness that comes from the non-face-to-face environment at the same time. Second, discussion classes connected theory and reality, reflecting on other students or changing their personal tendencies. Third, the field trip was an opportunity to expand the online class to the world of one's own life, and to draw a picture of future development as a teacher. Recommendations based on the above research results are as follows.

First, it should promote interaction with students and teachers. This is something that has been consistently mentioned as important in previous studies as well. In a face-to-face environment, it's easy to feel more intimate through body-to-body communication, but communication difficulties arise in non-face-to-face classes. Thus, in order to promote mutual communication with students and professors, it is necessary for teachers and educational institutions to provide an environment in which communication is ‘forced’. Second, it is necessary to provide an opportunity for the class to be connected in various ways, not just the class. For example, as in this study, it is necessary to analyze what has been learned through discussion and to increase the opportunity to share the results between students or to use what has been learned in the offline field. Through this process, students naturally demonstrate their agency. Third, strong motivation for class is very important. The research participants of this study were students enrolled in the College of Education and participated in this class with a firm goal and vision to become teachers. Consequently, it seems that the agency is more actively expressed. Thus, the instructor should consider what kind of motivation can be provided in demonstrating student agency.

This study does not suggest a universal law of student agency in that it only targeted students from the College of Education of A University in Korea. Nevertheless, it is meaningful in that by exploring the process of developing student agency, it gave hints on what direction to take in the future.

References

- Abrams, K. (1999). From autonomy to agency: feminist perspectives on self-direction. *William & Mary Law Review*, 40, 805–846.
- Ahearn, L. M. (2001). Language and agency. *Annual Review of Anthropology*, 30, 109–137
- Arnold, J., & Clarke, D. J. (2014). What is ‘agency’? Perspectives in science education research. *International Journal of Science Education*, 36(5), 735-754.
- Bandura, A. (1982). Self-efficacy mechanism in human agency. *American psychologist*, 37(2), 122.
- Biesta, G., & Tedder, M. (2006). *How is agency possible? Towards an ecological understanding of agency as achievement. Learning lives: Learning, identity, and agency in the life course.*
- Burkitt, I. (2016). Relational agency: Relational sociology, agency and interaction. *European Journal of Social Theory*, 19(3), 322-339.
- Cho, Seung-hui (2021). A Study on the Real-time Non-face-to-face Participatory Classes Experience of University Students. *The Journal of Humanities and Social science*, 12(4), 1131-1143.
- Choi, Dong-Yeon, Kim Ji-Un (2021). Analysis of learner's learning interest and learning experience forelaboration of real-time non face-to-face music class atcyber university in the contact-era. *Journal of Music Education Science*, 49(), 95-115.
- Choi, Hyeon-Sil (2021). A Study on the Non-face-to-face Teaching Experience of College Freshmen due to Covid-19. *Korean Journal of General Education*, 15(1), 273-286.
- Choi, Ra-young, (2021). Qualitative Exploration of Experiences in Non-Face-to-Face Class: Focusing on University Students at Advanced Course for Bachelor’s Degree in Early Childhood Education. *Journal of Public Society*, 11(4), 116-142.
- Choi, Sun-ju (2020). Understanding the Agency of Cooperative Members Through the Concept of Learner Position: A Narrative Analysis of YMCA Cooperative Members. *The Korean Journal of Cooperative Studies*, 38(1), 185-206.
- Emirbayer, M. & Mische, A. (1998) What is agency?. *The American Journal of Sociology*, 103, 962-1023.
- Jun, Joo-ram, Choi, Kyoung (2021). A Study on the Experience of College Students in Non-face-to-faceClasses during the COVID-19 Pandemic: A Photovoice Study. *Culture and Convergence*, 43(5), 65-85.
- Kim, Dong-hun, Jiang, Ting & Zhu , Yong-jun (2021). Exploring Opinions on University Online Classes During the COVID-19 Pandemic Through Twitter Opinion Mining. *Journal of the Korean Library and Information Science*, 55(4), 5-22.
- Kim, Yun-Min (2020) Correlation between Psychosocial Well-being, Resilience, and Self-directed Learning of Freshman Nursing Students in Non-face-to-face Lectures during the COVID-19 Pandemic. *Culture and Convergence*, 42(12), 295-318.
- Klemenčič, M. (2015). What is student agency? An ontological exploration in the context of research on student engagement. Student engagement in Europe: *Society, higher education and student governance*, 11-29.
- Lee, Heon-soo (2020). A Study on the Perception of Professors and Learners on the Remote Learning of University Education - Focused on the Cases of M University - *Journal of the Korean School Mathematics Society*, 23(3), 377-395.
- Lee, Seung-min, Min, Deok-gi & Shim, Gyu-nam (2013). Effects of using an educational robot on interactional aspects in group-based communicative activities. *Journal of the Korea English Education Society*, 12(2), 61~80.
- Lee, So-min, Kim, Kyung-lee (2021). A Study on Factors Affecting the Satisfaction of Non-face-to-Face Class in a University: Focusing on the Mediating Effect of Class Participation. *The Korean Journal of Educational Methodology Studies*, 33(2), 341-361.
- Lindgren, R., & Mcdaniel, R. (2012). Transforming online learning through narrative and student agency. *Journal of Educational Technology & Society*, 15, 344–355.
- Little, D. (1991). *Learner autonomy I: definitions, issues and problems.* Dublin: Authentik.
- Oh Seung-Min (2021). A Q Methodological Analysis of Types of Working College Students’ Perception Toward Online Learning during the COVID-19 Pandemic. *Journal of Learner-Centered Curriculum and Instruction*, 21(11), 673-693.
- Song, Eun-hwa, Kim, Myeung-chan & Im, Seon-mi(2021). Focus group interview on non-face-to-face class experience due to COVID-19. *Journal of Learner-Centered Curriculum and Instruction*, 21(22), 531-549.
- Song, Sue-Yeon, Kim, Hank-young (2020). Exploring Factors Influencing College Students’ Satisfaction and Persistent Intention to Take Non-Face-to-Face Courses during the COVID-19 Pandemic. *Asian Journal of Education*, 21(4), 1099-1126.
- Vaughn, M. (2020). What is student agency and why is it needed now more than ever?. *Theory Into Practice*, 59(2), 109-118.

NATURAL SCIENCES TEACHERS' PERCEIVED COGNITIVE ACADEMIC LANGUAGE PROFICIENCY (CALP) NEEDS

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Abstract

Teachers Cognitive Academic Language Proficiency (CALP) has been found to be important for meaningful teaching and learning of any subject. Over the years research has focused more on English second language learners' CALP needs and less on the teachers. Because teachers are the cornerstones who drive the process of teaching and learning in the classrooms, their proficiency in the language of teaching and learning are vital. In the South African context, English is regarded as the official language of teaching and learning from grade 4 onwards despite that both teachers and learners come from diverse linguistic backgrounds where English is a second or third language. Underpinned by the socio-cultural theory as the theoretical framework, the paper reports on a study that determined both in-service and pre-service teachers' perceived CALP needs when teaching Natural Sciences in multicultural township schools. In a qualitative research approach 12 teachers were randomly selected who comprised of six in-service teachers and six final year pre-service teachers enrolled for a Natural Sciences course at a University in South Africa. Each teacher was interviewed once using a semi-structured interview schedule which allowed them to freely express their perceived CALP needs. The data was analysed using a constant comparative method. Findings from the analysis of data showed that teachers experienced many challenges when teaching Natural Sciences using English, a language different from their home languages and those of their learners. They indicated that because science is a unique language on its own they struggle to spell, pronounce, understand and most importantly to explain to the learners using English. The teachers indicated their little to non-exposure to English other than in the classrooms compared to their home languages. Whilst some of the teachers perceived English as an important language due to its universality, they however indicated that code switching to own home language and those of the learners was inevitable when it comes to meaningfully explain some scientific concepts and processes in a way that learners would comprehend. However, others acknowledged the challenges of using code switching in the linguistic diverse classroom environments. Most teachers suggested training workshops intended to develop them with skills to identify appropriate terms and expressions, and explain complex scientific concepts in English. These findings have implications on both pre-service and in-service teacher professional development programmes.

Keywords: *Cognitive academic language proficiency, natural sciences, teacher's perceptions, English second language.*

1. Introduction

Language is the most powerful tool used during communication, particularly in teaching and learning. In South Africa, English is regarded as the language of teaching and learning from grade 4 onward (Department of Basic Education, 2010), which is a second or third language to most teachers and learners in schools, especially township schools. Teachers are required to be proficient in the English as the medium of instruction. This requires teachers to possess a well-developed Cognitive Academic Language Proficiency (CALP). CALP refers to the level at which a person has access to the academic language used for schooling and education (Van der Merwe, 2018). Furthermore, Razak and Yunus (2017) indicated that the concept CALP consists of two components which are the academic language and the academic content. The academic language is defined as a language which consists of a complex and specific grammar, academic vocabulary and a complex discourse style while the academic content is the specific subject matter (Krashen & Brown, 2007). In this study, we are referring to the Natural Sciences content.

As early as 2001, Willington and Osborne noted that science is a language on its own, and thus learning science is equivalent to learning a new language. In this regard teachers are tasked with teaching learners who are not only challenged with learning the science content in English but also have to cope

with language comprehension (Ferreira, 2011). It is with this reason that teachers are expected to possess a well-developed CALP. Van der Merwe (2018) mentioned that in order for learners to be proficient in the academic language which will allow them to successfully complete tasks, they require teachers who are competent in using the academic language. Otherwise, the teachers would fail to develop and engage the learners in the science content meaningfully. Merwe (2018) mentioned that language cannot be separated from one's context and thus language is learnt through social interactions. This accounts to the reasons that most teachers may not be proficient in the language of learning and teaching. Similar to the learners, teachers are also exposed to the English language in the classrooms only and speak their respective home languages during social interactions (Motloung, Mavuru & McNaught, 2021). Due to their comfortability and fluency in their home language, teachers unintentionally code-switch to their home languages to explain science concepts better. However, Ferreira (2011) mentioned that because of the language diversity within the South African context code-switching becomes a challenge because a teacher needs to be fluent in all the learners' home languages in order to use code switching successfully.

2. Literature review

Teacher's language proficiency is regarded as one of the important factors which has an effect on the learners' acquisition of concepts. Cahn and Renandya (2017) stated that teachers with an extended level of the target language proficiency are believed to be more capable of providing learners with meaningful explanation of concepts, which is one of the imperative aspects for effective and successful teaching and learning. In contrast, failure to distinguish and correct learners' mistakes is evident of teachers with less proficiency in the language (Farrell & Richards, 2007). An intense level of cognitive processes occurs in the classroom context where teachers and learners interact with one another (Kellerman & Evans, 2021). Poor interaction is exacerbated by the complex scientific processes, concepts and terms which require effective communication between the teachers and learners. Considering that English is a second language to most teachers especially in township and rural school contexts (Mavuru & Ramnarain, 2020; Nomlomo 2010 proficiency in the language of teaching and learning may be an inevitable challenge. This is because teachers are extensively exposed to their respective home languages as compared to the English language, which they merely speak in the classroom context. Consequently, teachers find themselves code switching due to their lack of proficiency in the language of teaching and learning (Kellerman & Evans, 2021)

In a study conducted by McCoy (2017) which assessed the impact of the teachers' limited language proficiency, it was found that teachers had hindrances when explaining scientific concepts in the English language because of their narrowed vocabulary and lack of communication abilities. Furthermore, McCoy's study revealed that even though the teachers were confident in their language proficiency, lack in language proficiency and language mistakes were evident in their conversations with the learners during the teaching and learning process. It could therefore be concluded from the study that teachers at times fail to recognize their own errors in the use of the English language. As early as 2007, Brock-Urnie conducted a comparative research where a teacher was observed teaching science in English in one class and another in a home language. It was observed that in the class where the teacher used English to teach science, little explanations were given on the subject matter and errors were evident in the language whereas in a class where a home language was used explanations were explicit and comprehensible. This indicates how teachers' poor CALP may unintentionally have a negative effect on the teaching and learning process.

The teachers' deficiency in CALP necessitate a development which should begin within the teacher education programmes. Van der Merwe (2018) argued for the need to develop pre-service teachers by teaching them the academic language and give them opportunities to develop in academic language prior to becoming qualified teachers. Van der Merwe's study highlighted the language aspects which pre-service teachers must be developed in for them to become competent teachers. These aspects include academic language conventions, convention of language necessary for discipline specific areas and cognitive exhausting tasks. On that note Tsang (2017) mentioned that even though teaching qualification is approved to determine the competency level of the qualification holder, it is not clear how the pre-service teachers' language proficiency is measured. Hence, many pre-service teachers continue to battle with language use after obtaining their teaching qualifications.

Kellerman and Evans (2021) noted aspects which may determine academic language proficiency such as oral fluency, vocabulary, pronunciation, grammatical accuracy, reading and writing. The mentioned aspects including intonation were confirmed as challenging areas in a study conducted by Gan (2012). Based on the arguments put forward in terms of the need for science teachers to be proficient in the language of teaching and learning, the current study sought to determine both in-service and pre-service teachers' perceived CALP needs when teaching Natural Sciences in multicultural township schools in context of South Africa.

3. Conceptual framework

This study was underpinned by the socio-cultural theory (1978) which emphasizes the role of language in learning and social interactions. This theory outlines that individuals acquire language through social interactions. Consequently, more exposure to a language influences the language proficiency. In this regard, English-second language teachers are more exposed to and communicate using their home languages socially, which makes them proficient in their home languages. In contrast, teachers are exposed to the English language only in the classrooms during teaching and learning hence they may lack proficiency in the language, also considering the fact that English is a second language to them. The theory also recognizes the responsibility of the teacher as a knowledgeable individual with the duty to ensure that learners understand the content taught. Therefore, this will require the teacher to be proficient in the language of teaching and learning. Semeon and Mutekwe (2021) posit that mediation is the essential part of the socio-cultural theory because the science concepts should be mediated to assist learners with comprehension. The teacher is the mediator and thus, language proficiency is required to provide explicit explanations and instructions to Natural Sciences learners.

4. Research methodology

The current study adopted a qualitative case study research design (Merriam, 2009). Qualitative research allows the researchers to determine the interpretation of individuals' experiences. Thus, the approach allowed for the establishment of the English second language pre-service and in-service teachers' CALP needs.

4.1. Selection of the participants

Using random sampling technique (Patton, 2002) six in-service Natural Sciences teachers teaching in six different township schools and six pre-service teachers enrolled at a South African University for a Natural Sciences methodology course were selected to take part in the study. The pre-service teachers were in their final year of study and had been involved in work-integrated learning at different school contexts throughout their four years of teacher development. All the selected teachers were English second language speakers.

4.2. Data collection and analysis

Data was collected by means of semi-structured interviews. Each of the teachers (both in-service and pre-service Natural Sciences teachers) were interviewed individually to determine their perceived CALP needs. Each interview took approximately 30-45 minutes long. Interviews were audio recorded with permission from the teachers and then transcribed verbatim. Using constant comparative method (Merriam, 2009), each data set was coded for the challenges and then categorised into language challenges teachers and developmental needs.

5. Findings

The teachers pointed out that they experienced challenges when they have to explain scientific concepts using English, which is their second language. Some of the teachers answered some of the interview questions in both their home language and English when trying to elaborate their answers. This is evident that teachers lacked English language proficiency because they speak English minimally outside the classroom context. Hence their home languages become the central part of their cognitive processes. Pre-service teachers were more comfortable in expressing their challenges as compared to in-service teachers who were a little reluctant to express their challenges. This could be because of the fear of appearing incompetent.

Teachers mentioned the complexity of the science subject matter which they have to teach using English in a manner that learners can easily comprehend as one of the challenges. They bemoaned that some of the learners they teach could not easily comprehend the Natural Sciences concepts because of their struggle with both the language of instruction (English) and the scientific language, which demand that teachers put extra effort. The other challenge teachers mentioned was the nature of the scientific content which is composed of Latin and Greek words, which both teachers and learners struggle to spell, pronounce, understand and even explain some of the terms and processes using English. Some of the examples of teachers' responses are captured as follows:

In-service teacher: *I find it difficult to pronounce scientific terms not only in Natural sciences but also in other subjects and explaining some scientific terms.*

Pre-service teacher: *Atoms and compounds and all those things, I could not really understand fully what they were so I tried to explain as best as I could but deep down I felt that I was not really understanding what I was teaching even though I was teaching it.*

The responses indicate that even though this particular study focused on Natural Sciences, teachers acknowledged the use of English language as a challenge for English second language teachers in other disciplines. The findings also found that teachers' subject matter knowledge is compromised since they were taught in English which is their second language. Some of the teachers pointed out that they provide superficial explanations to science concepts as a result of their own lack of understanding and inability to express oneself in English. As such, learners' acquisition of scientific concepts is compromised as their teachers fail to provide explicit explanations.

Some teachers indicated that sometimes they resorted to code switching during the teaching and learning process. Code switching as a strategy to mitigate language challenges in the science classroom drew mixed views from teachers. The following responses are testimony to this:

In-service teacher: *Code switching is okay because sometimes, you as a teacher you will be blank. You want to explain something in English but then English is gone, but you know what you to say.*

Due to the teachers' flexible and comfortable use of their home languages, some teachers view code switching as an escape when they struggle to explain concepts in English. In addition, they mentioned that code-switching is effective in enhancing meaningful explanation of scientific concepts. From the other teachers' responses, it shows that code switching may not be feasible in a linguistically diverse classroom context. This is evident in the following teacher's response:

Pre-service teacher: *There is diversity amongst learners with their home language so especially in schools in Gauteng where you could be sitting with learners that speak all eleven official languages. For me to code switch in a classroom like that would further create communication barriers because I am a Zulu speaker. I do not speak any other language. I would not be able to explain anything else in another language besides Zulu.*

It is with this reason that some of the teachers are not in favour of the use of code switching. In some instances, teachers and learners have different home languages and it is less likely that a teacher will be proficient in all the home languages of the learners in their Natural Sciences classrooms. Some of the teachers clearly indicated that they could only speak one indigenous language. What it means is that when such a teacher code switches to one home language other learners who speak a different home language would be excluded in the learning process. The teachers pointed out that code switching becomes effective when all the learners in the classroom have a common home language, which is almost impossible in township schools where Black people from various provinces were forced to relocate to during Apartheid era in South Africa.

Because of these challenges, teachers indicated that they needed professional development in the effective use of code switching in situations where teachers can speak learners' home languages. Some teachers recognized and acknowledged the importance of using English as the language of teaching and learning despite their lack of proficiency in the language. They perceived English as a universal language. As such, these teachers made requests that they be developed in other alternative strategies that mitigate language challenges which do not discriminate other learners. Some were vehement by pointing out the need for them to be developed continuously to improve their CALP and that of their learners. They indicated that developmental workshops should develop them with skills to identify common terminologies and expressions they can use in the classroom in place of some of the complex terminologies and the academic explanations used in science textbooks. These teachers pointed that they needed to be trained to assist and expose their township learners who are English second language to effectively perform cognitive demanding tasks and comprehend concepts in language. To this, one of the teachers said:

Pre-service teacher: *I think it is important that we get the basic understanding of how English works and how to write, how to speak it because if we cannot do it, then our learners will also not be able to do it.*

6. Discussions

Both in-service and pre-service teachers indicated that they were challenged to teach Natural Sciences in English, a language which is different from their home languages and those of their learners. These findings are consistent with findings from previous studies (e.g. Ferreira, 2011, Motloutung, Mavuru & McNaught, 2021) though in the context of Life Sciences. Based on Vygotsky (1978)'s constructivist theory it means that some of the teachers failed to create learning environments where learners and themselves could communicate, interact and mediate or scaffold learning. The teachers' perceived needs

are consistent with those obtained in previous studies for example Van der Merwe (2018) and Brock-Urnie (2007). Because their limited CALP, teachers intentionally and at times unintentionally code-switched to their home languages during the teaching and learning process. Whilst previous researchers (e.g. Mavuru & Ramnarain, 2020; Nomlomo, 2010) have showed how code switching can be useful when explaining science concepts in the classroom, it only becomes a powerful strategy when teachers are proficient not only in the language of teaching and learning, but also learners' home languages.

7. Conclusion

This study focused on establishing the Natural sciences teachers' perceived needs regarding their Cognitive Academic Language Proficiency. The findings showed that both pre-service and in-service teachers who are English second language speakers, lack in cognitive academic language proficiency. As a result, they struggle to spell, pronounce, understand and articulate themselves clearly without grammatical errors when using English. This is exacerbated by the complexity of the Natural sciences subject matter whose language is complex due to its academic nature and the use of scientific terms borrowed from unfamiliar languages other than English. Based on the teachers' perceived needs, it shows that both pre-service and in-service professional development programmes are failing to meet the teachers' needs in this respect. These findings have implications for professional development providers to equip teachers with the knowledge and skills to teach science in English. Focus should not only be on development of subject content knowledge and contemporary teaching strategies or use of technology but rather embed language development in any of the developmental workshops.

References

- Brock-Urnie, B. (2007). Learning through a familiar language versus learning through a foreign language: A look into some secondary school classrooms in Tanzania. *International Journal of Educational Development*, 27(5), 487-498.
- Cahn, L.E. & Renandya, W.A. (2017). Teachers' English Proficiency and Classroom Language Use: A Conversations Analysis Study. *RELC Journal*, 48(1), 67-81.
- Department of Basic Education (DBE). (2010). *The status of language of learning and teaching (LOLT) in South African public schools: A qualitative overview*. South Africa: Pretoria.
- Farrell, T.S. & Richards, J.C. (2007). Teachers' Language Proficiency. In Farrell T.S (ed). *Reflective Language Teaching: From Research to Practice*. London: Continuum, 55-66.
- Ferreira, J.G. (2011). Teaching Life Sciences to English second language learners: What do teachers do?. *South Africa Journal of Education*, 31, 102-113.
- Gan, Z. (2012). Understanding L2 Speaking Problems: Implications for ESL Curriculum Development In a Teachers Training Institution in Hong Kong. *Australian Journal of Teacher Education*, 37 (1), 43-59.
- Kellerman, J. & Evans, R. (2021). Perceptions of isiZulu-speaking Pre-service Teachers' Classroom English Proficiency. *South African Journal of Education*, 41(1), S1-S14.
- Krashen, J. & Brown, C.L. (2007). What is academic proficiency? *STETS Language & Communication review*, 6(1), 1-4.
- McCoy, B. (2017). *Education In An Unfamiliar Language: Impact of Teachers' Limited Language Proficiency, A Situational Analysis of Upper Primary Schools in Kenya*. New South Wales: Australia
- Merriam, S.B. (2009). *Qualitative research: A guide to design and implementation* (2nd ed). San Francisco, CA: Jossey-Bass.
- Razak, S.A. & Yunus, M.M.D. (2017). ESL primary classroom: Knowledge of cognitive academic language proficiency (CALP) or academic language and Basic Interpersonal Communication Skills (BICS) or social among pre-service teachers. *National conference on education, social sciences, engineering and technology*. eISBN 978-967-14257-2-5.
- Semeon, N. & Mutekwe, N. (2021). Perceptions about the use language in physical sciences classrooms: A discourse analysis. *South African Journal of Education* 41(1), 1-11.
- Tsang, A. (2017). EFL/ESL teachers' general language proficiency and learners' engagement. *RELC Journal*, 48(1), 99-113.
- Van der merwe, D. (2018) Aspects of academic language proficiency of intermediate phase teacher education students. *South Africa Journal of Childhood Education*, 8(1), a555
- Vygotsky, L. (1978). Interaction between learning and development. In Gauvain & Cole (Eds), *Reading on the development of children*. New York, USA.

PROMOTING SELF-REGULATED LEARNING IN NATURAL SCIENCES TEACHING THROUGH TECHNOLOGY INTEGRATION

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Abstract

The advent of the Fourth Industrial Revolution presents enormous opportunities for teachers to embrace digital transformation. The adoption of innovative pedagogical strategies is central to coherent development of scientific literacy in science classrooms. Coherent development of scientific literacy in science classrooms requires teachers as key agents of educational change to embrace pedagogic innovation. This study examined the role of technology integration as a sustainable means to promote self-regulated learning in Natural Sciences teaching in South African township schools. The study adopted a mixed-method approach as part of exploratory descriptive survey design and involved purposively selected teachers from South African township schools as participants. Quantitative data was collected through the administration of a survey questionnaire with the participants while qualitative data was collected through semi-structured interviews and classroom observations. Key findings demonstrated that technology integration plays a pivotal role in the promotion of self-regulated learning in Natural Sciences teaching. Theoretical implications for technology-enhanced learning are discussed.

Keywords: *Self-regulated learning, natural sciences, technology integration.*

1. Introduction

The prevalence of COVID-19 pandemic provided opportunities for self-regulated learning. The transition to remote teaching and learning underscored the need for self-directed learning to be embraced for purposes of realizing stipulated learning outcomes. Remote teaching and learning is largely predicated on technology integration. Synchronous and asynchronous delivery of virtual lessons requires coherent integration of technological applications. Self-regulated learning refers to a person's ability to understand learning environment and to have strategies to control this environment as a means to achieve one's goals (Zimmerman & Schunk, 2001). According to Park (2018), self-regulated learning encapsulates the ability to set academic goals and monitor progress to achieve these goals. Bandura (1986) further states that achievement of these goals requires selection and coherent implementation of pedagogical strategies. While research on self-regulated learning grew exponentially over the years, there is paucity of research studies focusing on how technological tools can be integrated to foster self-regulatory behaviour in science education (White & DiBenedetto, 2018). This study explored technology integration as a means to promote self-regulated learning in Natural Sciences teaching in South African township schools.

2. Background

By its very nature, the constantly evolving educational environment presents opportunities to embrace digital transformation. As key agents of educational change, teachers are required to carefully examine the pedagogic value of technology integration in teaching and learning. Firmin and Genesi (2013) posit that the proper use of technology results in true learning as a result of the enhancement and transformation of classrooms into smart learning environments. Smart learning environments create resourceful and student-centred learning opportunities that make learning more contextualised, social, reflective and active (Firmin & Genesi, 2013). Teachers play a central role in the integration of technology in the classroom. According to Chen et al. (2009), there has to be coherence among factors that affect the integration of technology in teaching and learning. These factors include teacher beliefs, knowledge and goals. Beliefs influence how teachers select and prioritize the goals of learning. In addition, beliefs influence teachers' perceptions of classroom interactions and their decisions about tools to be used in the process of learning. At another pragmatic level, access to technology determines whether teachers will employ technology in their classrooms or not (Farjon et al., 2019). According to Abdu

(2018), teachers are mainly responsible for the adaptation and implementation of information and communication technologies (ICT) in the classrooms and if they cannot access these technologies due to poor infrastructure or lack of finances, they cannot create smart environments. Another challenge facing teachers in the educational quest for technology integration is lack of ICT competence (De Vera et al., 2021). Teachers without technological knowledge find it increasingly challenging to address technological problems during teaching and learning. ICT competence is important as it allows teachers to devise and be creative enough in implementing technologies that are specific to their learning environments. Successful implementation of technology integration in the classrooms requires availability of digital tools in schools (Atabek, 2020).

3. Purpose of the study

The study explored the role of technology integration as a means to promote self-regulated learning in Natural Sciences teaching in South African township schools. The empirical investigation was underpinned by the following concomitant objectives.

- To identify technological tools used by teachers in Natural Sciences teaching.
- To explore the role of technology integration as a means to promote self-regulated learning in Natural Sciences teaching.

4. Research design and methodology

The study adopted a mixed-method approach as part of exploratory descriptive survey design. Exploratory descriptive survey design makes it possible for the researcher to gain new insights into a phenomenon (Saunders et al, 2012). The empirical investigation involved 63 purposively selected participants (3 teachers and 60 learners) from South African township schools. Quantitative data was collected through the administration of a survey questionnaire administered as a pre-test and a post-test with the participants. Qualitative data was collected through semi-structured interviews and classroom observations. Quantitative data was analysed using descriptive statistics while qualitative data was thematically analysed.

5. Research findings

Table 1 below provides technological applications used by teachers in Natural Sciences teaching coupled with the description of each technological application.

Table 1. Technological applications used by teachers in Natural Sciences teaching.

Technological application	Description of technological application
1. Ace your self-study	This tool provides personal support for learners by providing flexible and informative activities. This App also monitors progress and suggests different strategies which individuals may use to track and improve academic progress.
2. Self-mentor App	This is a personality development tool which helps individuals to improve by motivating them. Individuals get to collaborate and share ideas through this tool.
3. WhatsApp	This is a social platform which is easily accessible and helps learners communicate to help each other, share, debate and construct knowledge.
4. Study tips App	This tool provides different study tips for learners. These are tips which learners may use to attain academic goals.
5. Higher goals-goal setter and habit tracker	This tool helps individuals to set personal goals and brainstorm ways in which these goals may be achieved.
6. Progress tracker	This tool helps learners to track progress as a means to help them to achieve their goals.
7. Multi-notes handy, reminder notes	This tool is used as a diary where learners can write notes and to remind themselves of what they had planned to achieve.

Table 2 below provides results emanating from the questionnaire administered as a pre-test and a post-test with the participants. The results reflected a significant shift in the participants' disposition about technology integration as a means to promote self-regulated learning in Natural Sciences teaching. The post-test results showed that the participants demonstrated a largely positive disposition about the efficacy

of technology integration as an instructional intervention. In addition, the results underscore the need to embrace the use of various technological applications in science teaching with a view to foster pedagogic innovation. However, the advent of the Fourth Industrial Revolution critically exposed socio-economic disparities within the South African basic education system. Provision of technological resources is a key requirement for coherent integration of technology to promote self-regulated learning in science teaching.

Table 2. Pre-test and post-test results.

Item	Pre-test					Post-test				
	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
I keep track of my progress to attain my goal	0%	16%	30%	47%	7%	13%	87%	0%	0%	0%
I call in others for help when you need it	7%	33%	33%	20%	7%	0%	60%	20%	20%	0%
I am able to accomplish goals I set for myself.	0%	0%	13%	80%	7%	7%	10%	47%	20%	17%
I can study and learn on my own.	7%	3%	53%	17%	20%	3%	77%	17%	3%	0%
I have trouble following through with things once I've made up my mind to do something.	13%	40%	40%	17%	7%	0%	7%	47%	33%	13%
As soon as I see a problem or challenge, I start looking for possible solutions.	7%	13%	27%	43%	10%	0%	83%	17%	0%	0%
I have a hard time setting goals for myself.	10%	60%	20%	10%	0%	0%	0%	7%	77%	17%
I have trouble making plans to help me reach my goals	10%	53%	20%	17%	0%	10%	60%	17%	13%	0%
I set goals for myself and keep track of my progress.	10%	7%	43%	37%	3%	0%	50%	27%	23%	0%
I have rules that I stick by no matter what	10%	13%	10%	53%	13%	0%	10%	70%	20%	0%

Key findings emanating from qualitative data were clustered according to themes that emerged during data analysis, namely: efficacy of technology integration as a means to promote self-regulated learning in Natural Sciences teaching and teacher professional development needs on technological integration.

5.1. Theme 1: Efficacy of technology integration as a means to promote self-regulated learning in Natural Sciences teaching

The participants demonstrated a positive disposition about the efficacy of technology integration as a means to promote self-regulated learning in Natural Sciences teaching. They indicated that technology integration enables them to embrace pedagogic innovation. These sentiments are encapsulated in the following excerpt.

The use of various technological applications affords learners opportunities to monitor their own learning while actively engaging with the learning material. These applications enables teachers to be innovative.

5.2. Theme 2: Teacher professional development needs on technological integration

While the participants expressed fundamental appreciation of the pedagogical affordances of technology integration in Natural Sciences teaching, they bemoaned lack of sustainable professional development opportunities on the use of various technological applications. It is incumbent upon the Department of Basic Education to provide sustainable teacher professional development opportunities on technology integration. These sentiments are reflected in the following excerpt.

The use of technological applications is often problematic to us due to lack of adequate training. It will be appreciated if training opportunities on technology integration can be provided to professionally empower teachers.

6. Discussion

The participants demonstrated a positive disposition about technology integration as a means to promote self-regulated learning in Natural Sciences teaching. This implies that technology integration provides teachers and learners with opportunities to embrace digital transformation. The proper use of technology results in true learning as a result of the enhancement and transformation of classrooms into smart learning environments (Firmin & Genesi, 2013). Smart learning environments create resourceful and student-centred learning opportunities that make learning more contextualised, social, reflective and active (Firmin & Genesi, 2013). The participants indicated that technology integration enabled them to embrace pedagogic innovation. While the participants expressed fundamental appreciation of the pedagogical affordances of technology integration in Natural Sciences teaching, they bemoaned lack of sustainable professional development opportunities on the use of various technological applications. There is a critical need for careful identification of factors that serve as enablers and constraints of meaningful technology integration in science teaching. According to Chen et al. (2009), there has to be coherence among factors that affect the integration of technology in teaching and learning. Access to technology determines whether teachers will employ technology in their classrooms or not (Farjon et al., 2019). In addition, teachers are mainly responsible for the adaptation and implementation of information and communication technologies (ICT) in the classrooms and if they cannot access these technologies due to poor infrastructure or lack of finances, they cannot create smart learning environments (Abdu, 2018). Another challenge facing teachers in the educational quest for technology integration is lack of ICT competence (De Vera et al., 2021). Successful implementation of technology integration in the classrooms requires availability of digital tools in schools (Atabek, 2020).

7. Conclusion

Technology integration can serve as a catalyst for the promotion of self-regulated learning in science teaching. Teachers ought to be implored to embrace digital transformation with a view to foster pedagogic innovation in science classrooms. The advent of the Fourth Industrial Revolution presents enormous opportunities for harnessing pedagogical affordances of various technological applications.

References

- Abdu, A. K. (2018). A review of technology integration in ELT: From CALL to MALL. *Language Teaching and Educational Research*, 1(1), 1-12.
- Atabek, O. (2020). Experienced educators' suggestions for solutions to the challenges to technology integration. *Education and Information Technologies*, 25(6), 5669-5685.
- Bandura, A. (1991). Social cognitive theory of self regulation. *Organisational Behavior and Human Decision Processes*, 50, 248-287.
- Chen, F. H., Looi, C. K., & Chen, W. (2009). Integrating technology in the classroom: a visual conceptualization of teachers' knowledge, goals and beliefs. *Journal of Computer Assisted Learning*, 25(5), 470-488.
- De Vera, J. L., Andrada, M. D., Bello, A., & De Vera, M. G. (2021). Teachers' competencies in educational technology integration on instructional methodologies in the new normal. *Lukad: An Online Journal of Pedagogy*, 1(1), 61-80.
- Farjon, D., Smits, A., & Voogt, J. (2019). Technology integration of pre-service teachers explained by attitudes and beliefs, competency, access, and experience. *Computers & Education*, 130, 81-93.
- Firmin, M. W., & Genesi, D. J. (2013). History and implementation of classroom technology. *Procedia-Social and Behavioral Sciences*, 93, 1603-1617.
- Park, J. (2018). Effects of motivation factors on self-regulated learning and academic achievement. *The Korean Journal of Japanese Education*, 45, 43-58.
- Saunders, M., Lewis, P. & Thornhill, A. (2012) "Research Methods for Business Students" 6th edition, Pearson Education Limited.
- White, M. C., & DiBenedetto, M. K. (2018). Self-regulation: An integral part of standards based education. In D. H. Schunk & J. A. Greene (Eds.), *Handbook of self-regulation of learning and performance* (2nd ed., pp. 208-222). New York: Routledge.
- Zimmerman, B. J., & Schunk, D. H. (Eds.). (2001). *Self-regulated learning and academic achievement: Theoretical perspectives* (2nd ed). Lawrence Erlbaum Associates Publishers.

THE EFFECTS OF TEACHER EDUCATION ON TECHNICAL VOCATIONAL EDUCATION AND TRAINING COLLEGE LECTURERS

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Abstract

The aim of this paper is to analyse teacher training with regard to Content Knowledge (CK) and Pedagogical Content Knowledge (PCK) by universities in South Africa. The universities' training of teachers does not cater for Technical Vocational Education and Training (TVET) college lecturers, who are thus required to teach courses in which they are not competent. At the beginning of democracy in South Africa, reform of teacher education was initiated. This reform was followed by a closure of the teacher training colleges which therefore shifted the responsibility for training of future teachers to the universities. Minimum Requirements for Teacher Education Qualifications (MRTEQ) were adopted as the policy document for admission into the teaching profession. The reforms, however, excluded the training of (TVET) lecturers. TVET College lecturer training has not changed and most of the problems regarding lack of Content Knowledge (CK), PCK, and Subject Matter Knowledge (SMK) have not been attended to. This has negatively influenced the quality of lecturers at TVET colleges and resulted in a poor quality of TVET education. Semi-structured interviews collected the data regarding training in relation to courses currently being taught, as well as measuring CK, PCK, and SMK in those courses. The findings revealed that the lecturers were not competent in the courses they taught. Thus, the study strongly recommends more teacher training of the continuous professional development.

Keywords: *TVET, CK, PCK, SMK, MRTEQ.*

1. Introduction

This paper is a theoretical contribution to the understanding of how lack of training has affected teaching in the TVET college sector. Lecturers in the sector do not receive training in the specific courses offered at the colleges. The minimum requirement of teacher education has impacted negatively on lecturers at these institutions. It is, for example, a requirement to have a teaching qualification in order to teach engineering courses at colleges and so lecturers who have a trade, but do not have a teaching qualification, cannot not enter the profession. A particular challenge for lecturers is that they have a poor understanding of the subject. Teachers' capacity to recognize prevalent misconceptions underlying their students' work and to analyse the trade-offs between various instructional approaches is hampered by a lack of content expertise (Daehler, Heller, and Wong, 2015).

This article stresses how the lack of PCK impacts negatively on students' success. It leaves them with poor PCK and CK, basic requirements for them to carry out effective teaching (Motsoeneng and Mahlomaholo, 2015). The DBE and DHET (2011:4) point out that although "...a wide variety of factors interact to impact on the quality of the education system in South Africa, teachers' poor subject matter knowledge and pedagogical content knowledge are important contributors". A lecturer's knowledge and understanding of the content to be taught is a prerequisite of effective teaching (Janík, Najvar, Slavík and Trna, 2009). Technical Vocational Education and Training lecturers are, however, expected to teach subjects in which were not trained, thus defeating the Minimum Requirement of Teacher Qualification (MRTEQ) that the teacher must have "sound subject knowledge" and "know how to teach their subject(s) and how to select, determine the sequence and pace of content in accordance with both subject and student's needs", and must "know who their students are and how they learn" (DHET, 2011: 53). Teachers with a high level of PCK are better able to spot student errors and misunderstandings, employ instructional strategies to handle problems that develop throughout the teaching process, and provide lessons that are appropriate for students' cognitive abilities (Korkmaz & Şahin,2020).

The Integrated Strategic Planning Framework for Teacher Education and Development in South Africa 2011-2025 identifies several factors, one of which is teacher preparation, that focus specifically on subject matter knowledge and pedagogical content knowledge (DBE and DHET, 2011). This involves being well-grounded in the phase, subject, discipline, or practice's knowledge, skills, values, principles, methods, and processes. Different approaches to teaching and learning (and, if necessary, research and management) should be familiar to the educator, as well as how to apply them in ways that are acceptable for the students and the situation. The lecture must possess a thorough understanding of specialisation (DHET, 2011:49).

2. Discussion

The Minimum Requirements for Teacher Education Qualifications (henceforth, MRTEQ) (2011:9), requires teacher education offered at universities to “address critical challenges facing education in South Africa today – especially the poor content and conceptual knowledge found amongst lecturers, and the legacies of apartheid”. Contrary to this policy, the TVET sector of lecturer training is neglected by the universities – there is no effort to train these lecturers.

The qualifications, educational backgrounds, and experiences of TVET college lecturers in South Africa differ (DHET, 2015). TVET lecturers possess qualification not relevant to the sector needs. They are not qualified teachers as it required by the authorities to be permanent employees. This means cannot register with the South African Council for Educators (SACE), which is a condition for employment with the DHET. The senior lecturers have industrial and professional expertise as artisans, trainers, and facilitators. Although the new entrants in the sector are qualified to teach but lack the practical experience. They are unable to bridge the theory to practice. The policy thus rejects a “purely skills-based approach [that relies on] . . . evidence of demonstrable outcomes as measures of success, without paying attention as to how knowledge must underpin these skills for them to impact effectively on learning” (DHET, 2011:7).

In 2013, the government established a framework for new certifications, with the purpose of assisting lecturers to become qualified educators in addition to their professional credentials. In response, Warrington (2016) contends that, if colleges and lecturers placed a higher emphasis on education rather than work experience, TVET institutions' connections with industry (the workplace) might suffer. The lecture who join the system as artisan do not have an interest in obtaining teaching qualification.

Even though the curriculums are student-centred, lecturers are the ones who will personally implement those curriculums at every class level (Ömer Şahin, Burçin Gökkurt and Yasin Soylu, 2016). In this regard, teachers require knowledge that incorporates interpreting students' course-thoughts by using their own content knowledge and organizing their teaching in line with this. They have a responsibility in teaching the subject that is difficult for students to understand. As a result, the teacher's occupational expertise has a direct impact on the quality of learning and teaching processes.

3. Conclusion

The study concludes that policymakers and the DHET, and Sector Education and Training Authority (SETAs) should start re-looking at the Work Integrated Learning (WIL) initiative, how learning from practice can be factored in as a policy directive, and how necessary support and provision can be made available for this crucial component of WIL as a means to improve TVET colleges as learning institutions. In addition, a system should be put in place to retrain TVET College lecturers, specifically those who have extensive industry experience, but lack PCK. Teacher training should be aligned to courses that are offered at TVET colleges. In addition to management courses, students who have industry experience should be offered a qualification in teaching. The nature of TVET lecturer learning involves theory and practice, as well as the new technology which has been introduced lately and has to be mastered. Integrated learning should be made compulsory for all academic staff and should include exposure to the life situation.

4. Implications

This is a theoretical paper that reveals negative implications brought about by the quality of teaching in TVET Colleges which are the very ones expected to accelerate provision of skills to the youth of this country.

5. Recommendations

My recommendation for future research is to look into the nature of TVET college teachers' training and support before the curriculum is implemented in the classroom. More research is needed to determine what kind of training and support TVET college teachers will benefit from in order to successfully implement that curriculum. The role of college administrations in aiding curriculum implementation could also be studied.

References

- Cite, S., Lee, E., Menon, D., & Hanuscin, D.L. (2017) Learning from Rookie Mistakes: Critical Incidents in Developing Pedagogical Content Knowledge for Teaching Science to Teachers. *Studying Teacher Education*, 13(3): 275-293, DOI: 10.1080/17425964.2017.1366306
- Daehler, K. R., Heller, J. I., & Wong, N. (2015). Supporting growth of pedagogical content knowledge in science. In A. Berry, P. Friedrichsen, & J. Loughran (Eds.), *Re-examining pedagogical content knowledge in science education* (pp. 45–59). London: Routledge.
- Department of Higher Education and Training (DHET). 2011. Minimum requirements for teacher education qualifications. Pretoria.
- Department of Higher Education and Training (DHET). (2015). Statistics on Post-School Education and Training in South Africa: 2013.
- Department of Higher Education and Training (DHET). (2011). Integrated strategic planning framework for teacher education and development in South Africa 2011- 2025. Pretoria: Department of Basic Education & Department of Higher Education and Training.
- Janík, T, Najvar, P., Slavík, J. & Trna, J.2009.On the Dynamic Nature of Physics Teachers' Pedagogical Content Knowledge. *Orbis Scholae*, 3 (2): 47–62.
- Jin, H., Shin, H. J, Johnson, M. E., Kim, J., & Anderson, C. W. (2015). Developing learning Progression-Based Teacher Knowledge Measures. *Journal of Research in Science Teaching*, 52, 1269-1295
- Korkmaz, H.I. & Şahin, Ö. 2020. Preservice Preschool Teachers' Pedagogical Content Knowledge on Geometric Shapes in Terms of Children's Mistakes. *Journal of Research in Childhood Education*. *Journal of research in childhood Education*, 34(3): 385-405. <https://doi.org/10.1080/02568543.2019.1701150>
- Motsoeneng, M. & Mahlomaholo, S.2015. Entrepreneurship education for further education and training college lecturers. ICIE 2015 3rd International Conference on innovation and Entrepreneurship: ICIE 2015, 120.
- Şahin, Ö., Gökkurt, B., & Soylu, Y. 2016. Examining prospective mathematics teachers' pedagogical content knowledge on fractions in terms of students' mistakes, *International Journal of Mathematical Education in Science and Technology*, 47(4): 531-551, DOI: 10.1080/0020739X.2015.1092178

THE USE OF IMPROVISED RESOURCES IN SCIENCE CLASSROOMS IN SOUTH AFRICAN TOWNSHIP SCHOOLS

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Abstract

A considerable number of schools in South Africa are under-resourced and this dilemma poses formidable instructional challenges which stifle teachers' ability to foster meaningful teaching and learning in science classrooms. There is a critical need to circumvent general lack of resources in township schools by harnessing pedagogical affordances of improvised resources. In response to this key strategic imperative, the study examined the use of improvised resources in science classrooms in South African township schools. The study adopted a generic qualitative design and involved purposively selected science teachers from South African township schools as participants. Qualitative data was collected through semi-structured interviews and classroom observations. Key findings demonstrated that the use of improvised resources is central to coherent development of scientific literacy and sustainable inculcation of requisite scientific skills in science classrooms. Theoretical implications for pedagogic innovation are discussed.

Keywords: *Improvised resources, affordances, scientific literacy, pedagogic innovation.*

1. Introduction

A substantial number of schools in South Africa are under-resourced. There is a need for teachers to use improvised resources to circumvent general lack of resources in schools. According to Parker *et al* (2018), improvised instructional resources are local materials used in the absence of the real or original materials to bring about the same learning effect that the real equipment can bring about. Improvised instructional materials may include plants, soil or rocks, written or printed materials such as charts and magazines. The utilization of improvised resources can be harnessed to maximize the academic experience of learners in science classrooms (Adamu, 2020). According to Benson (2019), learners are able to learn through associative mechanism using multisensory modalities when teachers conduct lessons using different improvised resources. There is a need to explore the use of improvised resources particularly in under-resourced schools where opportunities for practical work are limited.

2. Background

Improvisation demands creativity, adventure, and curiosity on the part of the teacher (Mensah, 2015). Ntladi and Ramaila (2020) point out that teachers lack appropriate professional skills to use improvised resources in schools in a meaningful way. Teachers prefer to use original standardized materials in schools as opposed to improvised resources (Mensah, 2015). Many science teachers are not able to improvise science education equipment due to lack of skills (Akuna & Callaghan, 2016). In support of this assertion, Okori and Jerry (2017) maintain that many teachers cannot improvise biology equipment due to lack of creativity and resourcefulness. Lack of adequate professional development is a major factor militating against the effective use of local resources in science teaching (Okori & Jerry, 2017). The prevailing situation is exacerbated by general lack of teaching and learning resources in schools (Sedibe, 2011). Availability of adequate resources is central to the provision of quality education. Poor learner performance can be attributed to inadequate learning facilities (Oladejo *et.al*, 2011). Appropriate strategic interventions that encourage teachers to embrace pedagogic innovation ought to put in place. Such interventions can be harnessed to develop teacher professional capacity required for meaningful utilization of improvised resources in science classrooms.

3. Purpose of the study

The study examined the use of improvised resources in science classrooms in South African township schools. The empirical investigation was underpinned by the following concomitant objectives.

- To explore science teachers' perceptions about the use of improvised resources in teaching and learning.
- To identify pedagogical practices adopted by science teachers when using improvised resources in teaching and learning

4. Research design and methodology

The study adopted a generic qualitative design and involved six purposively selected science teachers as participants. According to McMillan and Schumacher (2010), a qualitative study is meant to be descriptive and interpretive by its very nature. Qualitative data was collected through semi-structured interviews and classroom observations. Qualitative data was thematically analysed.

5. Research findings

Table 1 below provides the demographic profile of the participants.

Table 1. Demographic profile of the participants.

Teacher	Gender	Teaching Experience	Qualification	Knowledge Area
A	Male	18 years	BSc	Physical Sciences
B	Female	4 years	Bed	Life Sciences
C	Male	6 years	Bed	Physical sciences
D	Female	5 years	HDE	Natural Sciences
E	Male	5 years	HDE	Life sciences
F	Female	8 years	Bed	Natural Sciences

Key findings emanating from the study were clustered according to the themes that emerged during data analysis, namely: science teachers' perceptions about the use of improvised resources in teaching and learning, pedagogical practices adopted by science teachers when using improvised resources in science classrooms and teacher professional development needs on the use of improvised resources.

5.1. Theme 1: Science teachers' perceptions about the use of improvised resources in teaching and learning

The teachers indicated that the use of improvised resources promotes active learner engagement. In addition, the use of improvised resources enables teachers to employ interactive activities which provide opportunities for learners to collaborate as the following excerpt demonstrates.

When using improvised resources, learners are actively involved in the learning activities. Learners are eager to learn from each other and exhibit high motivation levels.

The use of improvised resources was perceived to improve learner academic performance. This perception is captured in the following excerpt.

Availability of different resources positively influences how learners perform. Learners are able to learn by seeing what you are talking about and they will never forget. Availability of multiple resources accommodates different learning styles and helps learners with learning difficulties.

The teachers pointed out that they are compelled to use improvised resources in science classrooms due to general lack of resources in schools as the following excerpt illustrates.

As you can see the laboratory is empty, people broke in and stole everything, it has been years now. The Science Centre helps us a lot but they do not come all the time when we need to do experiments so sometimes we just read the instructions and the results so that learners can answer questions.

5.2. Theme 2: Pedagogical practices adopted by science teachers when using improvised resources in science classrooms

The teachers adopted various pedagogical strategies when using improvised resources in science classrooms. These pedagogical strategies include cooperative learning, concept mapping, self-directed learning, problem-based learning, inquiry-based learning and project-based learning.

When using improvised resources, I divide the learners into small groups to work on projects. Learners are also given opportunities to learn at their own pace and to investigate scientific phenomena independently.

5.3. Theme 3: Teacher professional development needs on the use of improvised resources

While the teachers expressed fundamental appreciation of the pedagogical affordances of improvised resources, they bemoaned lack of professional development in this regard. Meaningful and coherent integration of improvised resources in science teaching and learning requires professional capacity. These sentiments are encapsulated in the following excerpt.

I do not remember being taught about improvisation. I did BSc and not Bed maybe that is why. Professional development opportunities on the use of improvised resources must be provided on an ongoing basis.

6. Discussion

The use of improvised resources promotes active learner engagement and enables teachers to employ interactive activities which provide opportunities for learners to collaborate. In addition, the use of improvised resources was perceived to improve learner academic performance. This is consistent with a study conducted by Mboto *et al* (2011) which found that the academic performance of learners exposed to the use of improvised resources in science classrooms improves significantly. The teachers adopted various pedagogical strategies when using improvised resources in science classrooms. While the teachers expressed fundamental appreciation of the pedagogical affordances of improvised resources, they bemoaned lack of professional development in this regard. Lack of appropriate professional development on the integration of improvised resources stifles meaningful science teaching and learning (Ramathwala & Ramaila, 2020). According to Okori and Jerry (2017), lack of adequate professional training is a major factor militating against the effective use of improvised resources in science classrooms. The teachers pointed out that they are compelled to use improvised resources in science classrooms due to general lack of resources in schools.

7. Conclusion

The study demonstrated that sustainable and coherent utilization of improvised resources in science classrooms improves learner academic achievement. There is a need to put in place appropriate professional development interventions geared towards professional empowerment of teachers on the utilization on improvised resources to maximize the academic experience of learners.

References

- Adamu, Z.E., & Fati, A. (2020). Improvisation and integration of local instructional materials in junior secondary schools in Nigeria State, Minna. *International Journal of Research and Innovation in Applied Science* (IJRIAS), V(VI), 162- 168.
- Benson, E. (2019). Improvisation and effective utilization of instructional materials in science education by student teachers. Project: Impact of GSM Gazette on Students' Performance.
- Mboto, F.A., Udo, N.N., Stephen, Utibeabasi. (2011). Effects of improvised materials on students' achievement and retention of the concept of radioactivity. *African Research Review. An International Multi-Disciplinary Journal, Ethiopia*, 5(1), 342-353.
- McMillian, J., & Schumacher, S. (2010). *Research in Education: Evidence-Based Inquiry*, 7th Edition.
- Mensah, D. (2015). Using improvised instructional materials to teach chemical methods. Education and Psychology Department.
- Ntladi, K., & Ramaila, S. (2020). The affordances of improvised resources in physical science classrooms. Proceedings of the International Conference on Education and New Developments.

- Okori, A.O., & Jerry, O. (2017). Teaching and learning of science and mathematics in secondary schools in Cross River State. *Global Journal of Education Research*, 16, 21-28.
- Oladejo, M.A, Olosunde, G.R, Ojebisi, A.O & Isola, O.M. (2011). Instructional materials and students' academic achievement in physics: some policy implications. *European Journal of Humanities and Social Sciences*, 2(1), ISSN 2220-9425.
- Parker, J., Osei-Hima, V., & Asare, I. (2018). The effects of improvised materials on the study of science in basic schools in Aowin Municipality- Ghana. *Research on Humanities and Social Sciences*. ISSN: 2224-5766
- Ramothwala, M., & Ramaila, S. (2020). Factors affecting teachers' inclination to use improvised resources in life science classrooms. Proceedings of the International Conference on Education and New Developments.
- Sedibe, M. (2011) Inequality of access to resources in previously disadvantaged South African high schools. *Journal of Social Sciences*, 28(2), 129-135.

REFLECTIONS BY PRE-SERVICE ECONOMIC AND MANAGEMENT SCIENCES TEACHERS ON THEIR EXPERIENCES OF REMOTE LEARNING IN CURRICULUM PRACTICE

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Abstract

Curriculum reformists were caught off-guard over the past two years by the unforeseen and extreme pressure of the COVID-19 pandemic. This phenomenon threatened to engulf humans in despair. Institutions of higher learning initiated moves to remote learning, as a measure to prevent the spread of the virus while continuing to promote teaching and learning. Scholars were absorbed by grasping the importance and application of a revolution in curriculum reform. The use of remote learning in curriculum practice to improve teaching and learning is a recent initiative in the package of curriculum and pedagogical reforms in South Africa. The aim of this paper is to reflect on adaptive experiences of pre-service economic and management sciences teachers, their ability to adapt curriculum practice to remote learning of this specific curriculum, and pedagogical reform of the use of remote learning in schools. An architecture theory, which draws on the famous quotation of Adolf Loos's parable about "the poor rich man" and whether they really understand the lesson, was used as the main lens for the study. An interpretative phenomenological analysis approach, as a form of critical education science, was employed to generate data. The basic purpose and essence of the IPA approach in a qualitative research study is to examine the life experiences of the research participants and to allow them to narrate the research findings through their lived experiences and critical reflections, thereby deliberately embracing diversity as characterised by the unequal context of South African education. Phenomenological analysis was used to arrive at the following findings. First, higher learning institutions are obligated to create practical learning experiences for pre-service teachers. Second, the phenomenon that resulted in the necessity to embrace remote learning impacted participants academically, socially and psychologically. The paper concludes with the recommendation that the prefigured remote learning for professional teaching practice should be reconfigured.

Keywords: *Curriculum practice, phenomenon, pre-service teachers, COVID-19, qualitative research.*

1. Introduction and background

Globally, postsecondary institutions and governments are taking various legislative actions to contain the COVID-19 outbreak, including regulating teaching activities (Zhang, 2022). Arguably, in this regard there are ambiguity and disputes regarding curriculum practice and teaching methods, student readiness, teacher workload, and the equity of the education environment (Cairney & Kippin, 2022). As the spread and rate of infection continued to increase, human existence as we know it was threatened (Plümper & Neumayer, 2022).

The phenomenon directed the thinking processes of curriculum reformists and narrowed their decision-making to shifting from traditional teaching and learning to remote learning. The immediate closure of education institutions led to remote teaching and learning being adopted – teacher educators were expected to use available technological tools to ensure learning continuity for pre-service teachers, who were expected to adopt remote learning (Kulikowski, Przytuła & Sułkowski, 2022). However, Zhang (2022) argues that research reported in the literature highlights several flaws of this approach, including inadequate remote teaching infrastructure, teacher inexperience, a knowledge gap, and complex home environments.

Remote learning was the preferred method of teaching and learning during lockdown, though it was unclear how many students had access to electricity, computers and connectivity. Only half the world's population have internet access; in the Commonwealth it ranges from nearly 95% access in rich countries, like Brunei, to less than 15% in developing countries, like Liberia (Marwecki, 2019). Ansu Sonii, the minister of education of Liberia, narrates that their country was inadequately prepared for

remote learning, and they had to use radio broadcasts for lessons – which could, nevertheless, only reach 20% of the intended population (Wiakanty, 2020). A recent survey of Stanford University students determined that, in the time they were forced to rely on technology, 16% of undergraduate students did not have access to the Internet for half of their class sessions (Bates, 2021). Additionally, 60% of low-income undergraduate students do not have a private room where they can study. Therefore, scholars argue that greater effort should be invested in ensuring that the technologies are readily available, accessible, and affordable (Tang, 2022, Matus & Veale, 2022).

Ogbonnaya, Awoniyi and Matabane (2020) and Edem Adzovie and Jibril (2022) found that numerous institutions of higher learning in Ghana were unprepared for the shift to remote teaching and learning. Human capital and material resources were inadequate for remote education to take place adequately. They report that students were not prepared for the transformation to remote learning. According to Edem Adzovie and Jibril (2022), the introduction and implementation of remote learning solutions in Ghana were not particularly successful.

Researchers in Lesotho found that remote learning was considered to be a user-friendly and helpful tool by the majority of students (Matee, Motlohi & Nkiwane, 2022). However, a lack of resources, too few clear instructions from teachers, and a lack of cooperation by some teachers have all been identified as stumbling blocks when it comes to student involvement in remote learning (Anyim, 2021).

Reflection as an action refers individuals' internal processes, which are prompted by external stimuli recognised by individuals (Ansaldo, 2022). Curriculum practice, in this study, reflected on the gaps in teaching, learning and assessment resulting from the shift to remote learning. Smith, Soderberg, Netchaeva and Okhuysen (2022) report that reflection on experience is a way to assess a problem, or a particular viewpoint that is used to assess a phenomenon. Studying a situation from a particular perspective does not only offer students a new perspective, but also enables them to learn, expand their horizons, and become better equipped for the future.

2. Problem statement

In South Africa, only 10% of households have access to a stable Internet connection; an even greater proportion of households face unstable electricity supply as a result of load shedding applied by electricity generation agencies in South Africa (Tsfamichael, 2022). Furthermore, there is increasing concern in South African institutions of higher learning that, during remote learning, pre-service teachers are getting unwarranted assistance to complete their assessments, which elicits questions about the integrity of the assessment and the validity and quality of the qualifications obtained by pre-service teachers (Cornry, Wernick & Ware, 2022).

The Association of African Universities regularly hosts a platform where tertiary education students participate in focus group and panel discussions about the advantages and disadvantages of remote learning. One of the participants shared their experience of remote learning:

I did not learn anything, the lecturer just posted the learning material in the Blackboard platform, and we had to self-study and write assessments, I passed my assessments very well but I did not learn at all, I cannot even remember what the learning was about (AAU, 2021).

This study, similarly, intended to record the reflection experiences of economic and management sciences pre-service teachers of curriculum practice, how they experienced remote learning for teaching and learning, and how they experienced assessment during their remote learning.

3. Theoretical framework

The study is underpinned by architecture theory as the main framework for the study. architecture theory, which is appropriate for this study because it embrace comprehension and consistent organisation of facts (Plevoets, 2022). Architectural theory is based on the present and the future, and how the future is planned, built or organised. This theory analyses the origins and development of architectural form, style, ideologies, movements, and architects throughout history. The theory of architecture is relevant to this study, because it explains that architecture cannot be taught, and that people can only guide people during the process. Hence, the reflection process by economic management sciences pre-service teachers should be guided by the lecturers, and can be viewed with an architecture lens. The reflection, furthermore, revealed that teachers' experiences continue on a path that will enhance their intention to learn remotely and sustain future learning.

Philosophical approaches to architecture are relatively new, but are rapidly emerging in practice and in education curricula. The architecture theory tradition includes critical commentary on or explanations of architectural works or styles or movements, instructions or guidelines for architectural designs, reflection on the genesis of architectural types and styles, as well as advocacy for a new approach to architecture discipline and practice.

4. Research design and methodology

The study used qualitative research methodology to address the research objectives. The study used the technique of free attitude discussions to generate data, which was provided by economic and management sciences pre-service teachers – six women and six men in their final year of teacher education at one of the 26 institutions of higher learning in South Africa provided insights on their experiences in relation to remote learning. Economic and management sciences teacher education is intended to empower student teachers to teach Grades 8 and 9 learners.

4.1. Data analysis

In this qualitative research study, interpretative phenomenological analysis was employed as a methodology to generate data. In its basic form, interpretative phenomenological analysis is intended to examine the life experiences of participants and allow them to share their lived experiences and critical reflections, in this case, by deliberately embracing diversity in the unequal context of South African education. Phenomenological analysis was used to arrive at the following findings: First, higher learning institutions are obligated to create practical learning experiences for pre-service teachers. Second, the phenomenon that resulted in the necessity to embrace remote learning impacted participants academically, socially and psychologically.

5. Findings

5.1. Academic impact of remote learning on economic and management sciences pre-service teachers

The participants agreed that the institution had not prepared them sufficiently for remote learning. As a result, some of them fell behind due to their inability to keep up with the remote attendance of lessons. This is evident from the narratives shared by participants. Students' home environments were not conducive to remote learning, due to space constraints and unstable wi-fi networks. One of the participants reported that he had to climb a mountain and sit on the edge to access the signal needed to attend lessons.

Other students who missed lessons or failed to participate in assessment due to challenges relating to data struggled to reach the lecturers responsible for the modules. A participant said, "*number of times the lecturer will not respond to the emails which was frustrating*". This lack of communication contributed to anxiety and uncertainty about the future.

Multiple opportunities to write and submit assessments remotely had to be provided, even though repeated attempts could compromise the integrity and quality of assessments. Participants claimed that the quality of teaching was compromised, to the extent that even though a participant had written the tests and passed, they would not be able to transfer the knowledge they had been assessed on to learners. This gap was identified during teaching practice, when pre-service teachers practised teaching in the school environment under the guidance and supervision of the mentor teacher. The students' inability to learn sufficient content created a gap in their ability to impart knowledge to learners.

Lastly, students conceded that remote learning is efficient and effective, and should be carefully planned for as part of hybrid learning in the future. The concerns that need further attention and investigation included unstable Internet connections, expensive and inadequate data provision by the institution, and a home environment that was not conducive for studies.

5.2. Psychological impact of remote learning on economic and management sciences pre-service teachers

The lockdown and restrictions relating to COVID-19 not only affected the academic and social elements of university life, but also the mental wellbeing of university students. Adapting to this new reality has proven to be challenging, for various reasons. This was evident in one of the participants' narration:

I have experienced more stress and anxiety; I think being isolated in your home, although I do have my family with me, but I'm so used to being around friends and that is actually my support system for anxiety

*and stress, because those are the people I speak to about my problems. you know in my home we are not free to talk as our parents are unaware of mental health issues.
I come from a rural remote area with low access to network, I was supposed to climb to the edge of the mountain to be able to access network to attend classes and do my assessments.*

A briefing by the minister of Higher Education, Science and Innovation, Dr Blade Nzimande, on 14 June 2021, indicated that a study had found that 79% of senior students felt that they needed routine counselling support during remote learning (Nzimande, 2021). In the current study, participants expressed that they were not adequately supported, mentally, to learn in the mist of people dying of COVID-19, and increased domestic violence in families during lockdown. These experiences contributed to some of the participants being diagnosed with depression.

Research indicates that there was an increase in the suicide rate of students during remote learning (Viner, Russell, Saule, Croker, Stansfield, Packer et al. 2022; Daria & Islam, 2022), which may have resulted from anxiety due to uncertainty about the future. While students from high-income families were supported by their parents, who provided home learning resources, low-income-family parents struggled to work to put bread on the table – learning was the least of the concerns in such households. This inequality of remote learning education in South Africa contributed to mental health issues.

6. Conclusion

Remote learning that uses technology to enhance learning processes is considered successfully integrated when it makes education more effective, efficient and appealing (Aldhafeeri & Alotaibi, 2022).

During lockdown, and after the experience of the pandemic, one thing has become clear: There is a need to find innovative solutions that are appropriate to each different context, to ensure no one is left behind. During planning for the future, the investigation should focus on the three Cs for effective remote learning – connectivity, content and capacity – so that teaching and learning can be accessible to all.

Some universities in South Africa have started discussing how students will write examinations under the new circumstances. There is a need to ascertain who is writing the paper at home, because, during remote learning, secret invigilators are not present. To solve the problem of invigilation, an invigilator app was designed by the learning management system support team to work with facial recognition technology that ensures that it is actually the student who is writing a specific paper at the time. Furthermore, speech detection algorithms work in the background to ensure students are not left behind with their learning process. The app also tracks students' GPS coordinates to make sure students are not with other students when they are involved in assessments. Essentially, the invigilator app ensures that academic standards are maintained during remote learning.

References

- AAU (2021). *African students' voices: Merits and demerits of online education - The perspective of students*. Retrieved March 10, 2022 from <https://www.youtube.com/watch?v=zYPgKY8TrOo>
- Aldhafeeri, F. & Alotaibi, A. (2022). Effectiveness of digital education shifting model on high school students' engagement. *Education and Information Technologies*. <https://doi.org/10.1007/s10639-021-10879-4>
- Ansaldò, F. (2022). Reflections on the organisational processes on a SCBU – a child psychotherapist's view. *Journal of Child Psychotherapy*, 47 (3), 453–469.
- Anyim, W. (2021). Relevance of electronic resources and improvement of access for effective distance learning and continuing education programme. *International Journal of Asian Education*, 2(1). <https://doi.org/10.46966/ijae.v2i1.83>
- Bates, T. (2021). Research reports on Covid-19 and emergency remote learning/online learning. *Online Learning and Distance Education Resources*. Retrieved February 12, 2022 from <https://www.tonybates.ca/2020/07/27/research-reports-on-covid-19-and-emergency-remote-learning-online-learning/>
- Cairney, P. & Kippin, S. (2022). The future of education equity policy in a COVID-19 world: A qualitative systematic review of lessons from education policymaking. *Open Research Europe*, 1 (78). <https://doi.org/10.12688/openreseurope.13834.2>
- Conry, J., Wernick, A. & Ware, P. (2022). Pivoting, partnering, and sensemaking: How teachers navigate the transition to remote teaching together. *CALICO Journal*, 39 (1). <https://doi.org/10.1558/cj.19668>

- Daria, S. & Islam, M. (2022). Increased suicidal behaviors among students during COVID-19 lockdowns: A concern of student's mental health in Bangladesh. *Journal of Affective Disorders Reports*. <https://doi.org/10.1016/j.jadr.2022.100320>
- Edem Adzovie, D. & Jibril, A. (2022). Assessment of the effects of Covid-19 pandemic on the prospects of e-learning in higher learning institutions: The mediating role of academic innovativeness and technological growth. *Cogent Education*, 9 (1). <https://doi.org/10.1080/2331186X.2022.2041222>
- Kulikowski, K., Przytuła, S. & Sułkowski, Ł. (2022). E-learning? Never again! On the unintended consequences of COVID-19 forced e-learning on academic teacher motivational job characteristics. *Higher Education Quarterly*, 76 (1). <https://doi.org/10.1111/hequ.12314>
- Marwecki, A. (Ed.). (2019). *4th global report on adult learning and education: leave no one behind: participation, equity and inclusion*. UNESCO Institute for Lifelong Learning.
- Matee, G., Motlohi, N. & Nkiwane, P. (2022). Emerging perspectives and challenges for virtual collaborative learning in an institution of higher education: a case of Lesotho. *Interactive Technology and Smart Education*. <https://doi.org/10.1108/ITSE-06-2021-0110>
- Matus, K. & Veale, M., 2022. Certification systems for machine learning: Lessons from sustainability. *Regulation & Governance*, 16 (1). <https://doi.org/10.1111/rego.12417>
- Nzimande, B. (2021). *Social impact study on COVID-19*. South African Government.
- Ogbonnaya, U.I, Awoniyi, F.C. & Matabane, M.E. (2020). Move to online learning during COVID-19 lockdown: Pre-service teachers' experiences in Ghana. *International Journal of Learning, Teaching and Educational Research*, 19 (10). <https://doi.org/10.26803/ijlter.19.10.16>
- Plevoets, B. (2022). Heritage in fragments: on spolia and other forms of preservation of architectural fragments through reuse. *Journal of Architectural Conservation*. <https://doi.org/10.1080/13556207.2022.2026737>
- Plümper, T. & Neumayer, E. (2022). Lockdown policies and the dynamics of the first wave of the Sars-CoV-2 pandemic in Europe. *Journal of European Public Policy*, 29 (3), 321–341. <https://doi.org/10.1080/13501763.2020.1847170>
- Smith, I.H., Soderberg, A.T., Netchaeva, E. & Okhuysen, G.A. (2022). An examination of mind perception and moral reasoning in ethical decision-making: A mixed-methods approach. *Journal of Business Ethics*. <https://doi.org/10.1007/s10551-021-05022-9>
- Tang, C. (2022). Innovative technology and operations for alleviating poverty through women's economic empowerment. *Production and Operations Management*, 31 (1), 321–341. <https://doi.org/10.1111/poms.13349>
- Tesfamichael, M. (2022). Caught between hope and reality: how citizens reconcile ambitious dominant energy imaginaries with everyday service shortfalls. *Journal of Environmental Policy & Planning*. <https://doi.org/10.1080/1523908X.2022.2042675>
- Viner, R., Russel, S., Saullé, R., Croker, H., Stansfield, C. Packer, J., Nicholls, D., Goddings, A.L., Bonnel, C. Hudson, L., Hope, S., Ward, J. Schwalbe, N. Morgan, A. & Minozzi, S. (2022). School closures during social lockdown and mental health, health behaviors, and well-being among children and adolescents during the first COVID-19 wave: A systematic review. *JAMA Pediatrics*. <https://doi.org/10.1001/jamapediatrics.2021.5840tr>
- Wiakanty, S. (2020). Liberia: MoE launches 'teaching by radio' program. *Daily Observer*, April 6. Retrieved March 22, 2022 from <https://allafrica.com/stories/202004060760.html>
- Zhang, T., 2022. Chinese parents' perception of emergency remote K-12 teaching-learning in China during the COVID-19 pandemic. *Asian Journal of Distance Education*, 16 (1), 16–30.

HARNESSING PEDAGOGICAL AFFORDANCES OF IMPROVISED RESOURCES IN GEOGRAPHY TEACHING AND LEARNING IN TOWNSHIP SCHOOLS

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Abstract

Meaningful teaching and learning in South African township schools is hampered by general lack of instructional resources. As key agents of educational change, teachers face the key imperative to embrace pedagogic innovation with a view to realize envisaged educational outcomes. This study explored pedagogical affordances of improvised resources as a sustainable means to enhance the quality of instruction in Geography teaching and learning in township schools. The study adopted a mixed-method approach as part of exploratory descriptive survey design and involved purposively selected teachers from South African township schools as participants. Quantitative data was collected through the administration of a survey questionnaire with the participants while qualitative data was collected through semi-structured interviews and classroom observations. Key findings demonstrated that the use of improvised resources provides meaningful platforms to address pervasive knowledge gaps through coherent development of conceptual understanding in Geography teaching and learning. Theoretical implications for pedagogic innovation are discussed.

Keywords: *Improvised resources, affordances, pedagogic innovation.*

1. Introduction

Pedagogic innovation is central to meaningful science teaching and learning. A considerable number of schools in South Africa are still plagued by general lack of resources. Improvised resources can be used to demystify abstract scientific concepts. There is a need for provision of teacher professional development opportunities to enhance teacher professional capacity on the use of improvised resources. The use of improvised resources can serve to maximize the academic experience of students in science classrooms. Students that are frequently taught using improvised resources perform better than those rarely taught using improvised resources (Ong'amo, Ondigi & Omariba, 2017). Yet, teachers lack appropriate skills to use improvised teaching resources in schools (Akuma & Callaghan, 2016). This study primarily explored the pedagogical affordances of improvised resources in Geography teaching and learning in South African township schools.

2. Background

Provision of quality education is dependent on the availability of essential resources. However, the South African basic education system is largely characterised by inequitable access to resources (Sedibe, 2011). Improvised resources can be used to circumvent general lack of essential resources in schools. Ubawuike (2018) describes improvisation in science education as the process of creating alternative materials of teaching by replicating standard materials to function similarly as the original ones using locally sourced materials. According to Samba and Eriba (2011), improvisation is essentially the act of construction of instructional materials from locally available materials that can adequately replace or function in place of the original material which otherwise may be very expensive or in short supply or unavailable. Poor learner academic performance could be attributed to inadequate learning facilities (Olayinka, 2016). Teachers lack creativity when it comes to designing learning resources in science classrooms. Ntladi and Ramaila (2020) posit that teachers lack appropriate skills to use improvised teaching resources in schools.

3. Purpose of the study

The study explored pedagogical affordances of improvised resources in Geography teaching and learning in South African township schools. The empirical investigation was underpinned by the following concomitant objectives.

- To examine pedagogical affordances of improvised resources in Geography teaching and learning.
- To explore teachers' perceptions about the integration of improvised resources in Geography teaching and learning.
- To explore teachers' experiences about the integration of improvised resources in Geography teaching and learning.

4. Research design and methodology

The study adopted exploratory descriptive survey design located within the interpretivist paradigm. Exploratory research design allows for consideration of all aspects of the problem (Akhtar, 2016). In addition, exploratory research design is used to correctly define the problem, identify alternative courses of action, develop a hypothesis, gain additional insights before developing an approach, and set priorities for further examination (Akhtar, 2016). The study involved five (5) purposively selected Grade 12 Geography teachers as participants. Qualitative data was collected through semi-structured interviews and classroom observations. Data was thematically analysed.

5. Research findings

Key findings were clustered according to the themes that emerged during data analysis, namely: pedagogical affordances of improvised resources in Geography teaching and learning, teachers' perceptions about the integration of improvised resources in Geography teaching and learning and teachers' experiences about the integration of improvised resources in Geography teaching and learning.

5.1. Theme 1: Pedagogical affordances of improvised resources in Geography teaching and learning

The participants indicated that the use of improvised resources provides opportunities for experiential learning. Furthermore, learners are afforded opportunities to actively engage in the learning activities. These sentiments are encapsulated in the following excerpt.

The integration of improvised resources in Geography teaching and learning promotes experiential learning (hands-on learning), thus developing learners' skills to solve real-world challenges. Making models, charts, and maps enables learners to acquire psychomotor skills.

5.2. Theme 2: Teachers' perceptions about the integration of improvised resources in Geography teaching and learning

According to the participants, the use of improvised resources captures learners' attention and increases their concentration span and generally changes learners' attitude towards the subject. This sentiment is reflected in the following excerpt.

The integration of improvised resources promotes sustained engagement in the learning activities. Learners are afforded opportunities to indulge in cooperative learning.

5.3. Theme 3: Teachers' experiences about the integration of improvised resources in Geography teaching and learning

The participants indicated that improvised resources are affordable and are not as complicated as computers. Therefore, they are convenient for novice and experienced teachers who are not technology savvy. The use of improvised resources serves as a catalyst for enhancing learner academic performance. These sentiments are encapsulated in the following excerpt.

Improvised resources are easy to make. They can be shared with other teachers at school. Learner academic performance improves as a result of the integration of improvised resources.

6. Discussion

The study demonstrated that the use of improvised resources provides opportunities for experiential learning. In addition, the use of improvised resources provides opportunities for learners to actively engage in the learning activities. Teachers should make every effort to use accessible instructional resources wherever possible (Olayinka, 2016). Behrendt and Franklin (2014) posit that improvised resources enhance science learning and development of meaningful conceptual understanding. At another pragmatic level, improvised resources help teachers deliver information more accurately especially in instances where repetitions are required for concrete learning to occur (Ong'amo, Ondigi, & Omariba, 2017). However, many science teachers are not equipped with skills to incorporate new ideas in the teaching of science in the classroom (Silverstein *et al.*, 2009). The participants indicated that improvised resources are affordable and are not as complicated as computers. Therefore, they are convenient for novice and experienced teachers who are not technology savvy. The use of improvised resources serves as a catalyst for enhancing learner academic performance. The key advantage of using improvised resources is that they can be produced from readily available materials within the environment (Parker *et al.*, 2018). Improvised resources are often produced to address learning difficulties (Akuma & Callaghan, 2016). According to Dhakal (2020), teachers face the key imperative to embrace pedagogic innovation with a view to circumvent general lack of resources in schools.

7. Conclusion

The integration of improvised resources provides opportunities for experiential learning and active engagement in the learning activities. Teachers ought to be implored to embrace pedagogic innovation in order to foster meaningful development of scientific literacy by demystifying abstract scientific concepts.

References

- Akuma, F.V. & Callaghan, R. (2016). Framework for reducing teaching challenges relating to improvisation of science education equipment and materials in schools. *Eurasia Journal of Mathematics, Science and Technology Education*, 12(10), 2697-2717.
- Asare, I., Parker, J. & Osei-Himah, V. (2018). Teachers' attitude towards improvisation, its effects on the study of science at the Junior high schools in Aowin Municipality- Ghana. *International Journal of Education, Learning and Development*, 6(4), 90-95.
- Behrendt, M. & Franklin, T. (2014). A review of research on school field trips and their value in education. *International Journal of Environmental and Science Education*, 9(3), 235-245.
- Dhakal, K. R. (2020). Challenges of the use of instructional materials in teaching geography in secondary school. *Journal of Geographical Research*, 3(3).
- Ntladi, K. & Ramaila, S. (2020). The affordances of improvised resources in physical sciences classrooms. Proceedings of the International Conference on Education and New Developments (pp. 20-23).
- Olayinka, A. B. (2016). Effects of instructional materials on secondary schools' students' academic achievement in social studies in Ekiti state, Nigeria. *World Journal of Education*, 6(1).
- Ong'amo, B.L., Ondigi, S.R. & Omariba, A. (2017). Extent of use of Biology instructional resources and effect on students' academic performance in Secondary Schools in Siaya County- Kenya. *International Journal for Innovation Education and Research*, 5(7), 118-141.
- Parker, J., Osei-Himah, V. & Asare, I. (2018). The effects of improvised materials on the study of science in basic schools in Aowin Municipality-Ghana. *Research on Humanities and Social Sciences*. ISSN 2224-5766.
- Samba, R. M. O, & Eriba, J. O. (2011). Laboratory Techniques and the Art of Improvisation. Makurdi: His Masters Servant Media Apostolate Publications.
- Sedibe, M. (2011) Inequality of access to resources in previously disadvantaged South African high schools. *Journal of Social Sciences*, 28(2), 129-135.
- Silverstein, S. C., Dubner, J., Glied, S., & Loike, J. D. (2009). Teachers' participation in research programs improves their students' achievement in science. *Science*, 326(5951), 440-442.
- Ubawuikwe, A.B. (2018). Effects of teachers' use of improvised instructional materials on students' academic performance in Physics. *International Journal of Social Sciences and Management Research*, 4(7), 2545-5303.

ASSESSMENT OF THE PROBLEMS THAT AROSE IN THE DISTANCE EDUCATION DURING THE PANDEMIC FOR THE STUDENTS AT THE GREEK PUBLIC VOCATIONAL TRAINING INSTITUTES

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Abstract

The rapid spread of coronavirus (COVID-19) in early 2020 was an unexpected situation that affected all areas of human life, especially education and training. Distance education soon replaced classic, during the COVID-19 pandemic, due to the necessary social distancing to maintain global health.

Distance education is not an unknown form of education, as it is often used as educational tool at all levels of education. However, the sudden and exclusive use of distance education during the pandemic created concerns in members of the academic community and brought about radical changes at both, educational and psychosocial levels.

The purpose of this research is to record the degree of acceptance of distance teaching and learning methods in vocational education and training in Greece, especially in students studying at Public Vocational Training Institutes (PVTIs) and to identify potential obstacles or benefits of online learning during COVID-19.

Distance education in combination with distance e-learning is a form of distance education in which participants of the educational process, i.e., teacher and students, are in a different physical space and communicate with synchronous and/or asynchronous internet platforms.

Due to the nature of e-learning and its rapid spread in the educational community during the current pandemic, there is insufficient research examining its effectiveness in vocational education. The rapid development of mobile devices and wireless networks does not automatically mean the successful utilization and sustainability of e-learning systems.

In order to study the experience and problems of distance learning platforms, quantitative research took place among the PVTI students through questionnaire. The sample of the quantitative research consisted of 768 Greek PVTI students that have responded, and a pilot statistical processing of the received data has been done. To track the experience with the distance learning platforms, the sample has been asked to mention the potential issues faced with the platforms. Most of the respondents mentioned technical and accessibility issues. A variety of issues have been mentioned, either difficulties of the users or problems of the system. In parallel, they pointed out the advantages of personal contact and feedback from their professors. It is interesting that only a small part of the sample reported no problems at all.

The research shows moderate percentages of satisfaction from the enhancement of students' skills and from the coverage of their educational needs, while highlighting the upgraded role of asynchronous education platforms e-class, Moodle and e-classroom and of synchronous platforms Webex and Zoom.

Keywords: *Distance education, vocational education and training, e-learning platforms, pandemic, PVTIs in Greece.*

1. Introduction

The last two years have been marked by a particular upheaval in the field of education due to the outbreak of COVID-19. In most countries, live lessons were suspended and replaced by online courses. The new educational landscape and the needs brought by online education on such a large scale has been a challenge for the educational community around the world (Nikdel et al. 2020, Khlaif and Salha 2020 & Toquero 2020). This could not but affect vocational education, which as and the other educational levels of Greece adapted its educational plans to the needs of distance education. Although online teaching is not a new pedagogical method, it has never become necessary on such a large scale and has not been adequately evaluated for its effectiveness in achieving educational goals. Although it is generally accepted that in these circumstances the choice of distance education was a one-way street, significant

concerns raised about the quality of the educational content provided as well as the achievement of the educational objectives. Even though prior to the outbreak of the pandemic, online education had not been applied on such a large scale, there have been some studies in the literature evaluating the distance education process. For over a decade, numerous studies have recognized that online learning techniques are effective in the case of vocational education as well as increasing student satisfaction rates through interaction (Belaya 2018, Bignoux and Sund 2018). Cigdem et.al. (2014) donated the online Learning Readiness Scale (OLRS) of Hung et.al. (2010) to 725 vocational students to evaluate the effectiveness of online learning. OLRs has 18 elements grouped into five factors: computer / Internet self-efficacy (CIS), self-directed learning (SDL), student control (LC), motivation to learn (ML) and self-efficacy online communication (OCS). The study found that students surveyed were generally prepared for online learning but needed to improve themselves specifically in the CIS and OCS in order to succeed in online learning. Student characteristics (PC ownership, department, type of high school graduation) significantly affect students in some aspects of the OLRs dimension, especially in the CIS dimension. Given that online learning has gained importance in vocational education over the last 20 years, the well-known problem of high dropout rates still exists. In 2016, Stiller et.al. (2016) investigated the extent to which learners drop out of a professional online video training. It was found that the group of students who dropped out of school, reported more negative attitudes towards computers and a higher level of stress for the computer than the group of active students.

Recently, after the spread of COVID-19, many studies around the world have investigated the effect that the pandemic outbreak had on the educational process of vocational education. In 2020 Syauqi et.al (2020) studied the perceptions of Indonesian vocational students in the field of engineering in relation to online learning as a result of the effects of the COVID-19 pandemic. In this research, a structured questionnaire with Likert scale was used in a sample of 56 students. The results of this study showed that teachers in the management of online learning did not meet the expectations of students. Students believe that online learning has not provided better experience and productivity in skills acquisition but can provide motivation and ease in their learning. Some students mentioned that they had easy access to resources, but they were still reluctant to use them sustainably in the future. Almusharraf et.al. (2020) studied the learning experiences and level of satisfaction of post-secondary vocational students in Saudi Arabia, based on transformative learning theory (Mezirow J. 2000). The survey showed high levels of satisfaction with the online process as well as the Google Classroom and Moodle platforms. In a large-scale study conducted in China by Han et.al. (2020) with the participation of 270,732 vocational students, it was found that the online learning process was successful in that country and that the institutions met the challenges posed by the pandemic.

Despite the fact that, the literature review indicates that in several countries' studies have been conducted on the degree of satisfaction of vocational students with the process of online learning, no corresponding study has been conducted so far in the case of Greece. The aim of this paper is to study the degree of satisfaction of students at vocational schools in Greece from the process of online education and to investigate to what extent the educational goals and the challenges posed by the pandemic outbreak were met, respectively.

2. Methods

Cohort: In this study, a total of 768 learners were called to anonymously complete a concise and customized questionnaire of total duration about 10 minutes, as provided by Google forms.

The sample demographics are presented in Table 1.

Table 1. Sample demographics.

Variable	Groups	N	Percent
Gender	Male	238	31 %
	Female	530	69 %
Age group	18-25	274	35,4 %
	26-35	138	17,8 %
	36-45	198	25,6 %
	46-55	128	16,5 %
	55 or more	36	4,7 %
Higher level of education completed	Higher education	432	56,1 %
	Technical education	176	22,9 %
	BSc	138	17,9 %
	MSc	24	3,1 %

Family status	Married	284	37,5 %
	Not Married	398	52,5 %
	Other	76	10 %
Children in family	One	76	24,4 %
	Two	162	51,9 %
	Three	50	16 %
	Four	16	5,1 %
	More than four	8	2,6 %

Questionnaire: The questionnaire consisted of 28 questions, including both closed-ended and open-ended questions to facilitate the evaluation of the experience earned by distance learning, in a more holistic way.

Specifically, most questions, 23 out of 28, were closed-ended questions, of which 5 questions were about the attendants' demographic characteristics, 2 questions were about the by public Institutes of Vocational Training, 4 about the exploitation of asynchronous education platforms, 4 about the exploitation of synchronous education platforms, 2 about their general usage, and finally 6 of them were about the evaluation of the total experience of distance-learning.

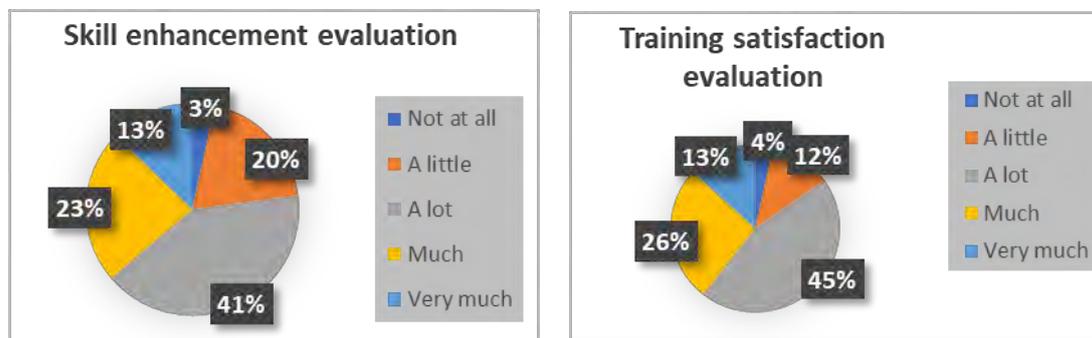
On the other hand, the remaining 5 open-ended questions exhorted attendants to write down their opinions suggesting methods to optimize the efficiency of distance-learning.

Statistical Analysis: All the answers given by the 768 attendants were selected, processed, and statistically analyzed, exploiting the Statistical software of SPSS version 24.0 (2016).

3. Results

Participants showed moderate levels of satisfaction both in terms of whether they enhanced their skills through the online learning process and whether their need for online training was met. The results are depicted on Figure 1.

Figure 1. Evaluation of skills' enhancement and training satisfaction.



As far as the synchronous training platforms are concerned, most of the participants state that they mainly use the Webex platform at a rate of 91%, followed by the Zoom platform at a rate of 62%. In addition, the five-pointed scale of satisfaction using the Webex platform achieved a score (mean \pm sd) = 4.00 ± 1.193 while the corresponding score for the Zoom platform was 3.57 ± 1.312 . On the other hand, in terms of asynchronous training platforms the majority of participants used the e-class platform at a rate of 74%, while lower percentages received platforms such as the Moodle and the Google Classroom with percentages of 28.6% and 27.8% respectively. Regarding the corresponding user satisfaction ratings, the scores were $3.28 \pm 1,218$, 1.47 ± 0.936 , and 1.68 ± 1.194 for each one of the above-mentioned asynchronous platforms, respectively.

Furthermore, participants were asked to state how frequently they used the above-mentioned platforms before the pandemic. In addition to that, they reported their familiarity with the usage of these platforms before and after the period of the pandemic. The results of these questions showed a low-level in the use of these platforms before the pandemic, while regarding the familiarity of usage results indicated that it has been raised from 2,6 to 4,12.

4. Discussion

This study aims to evaluate the degree of satisfaction of students at vocational schools in Greece obtained from the process of online education and to investigate the extent to which the set educational

goals were met and the extent to which the challenges posed by the pandemic outbreak were met. The research shows moderate percentages of satisfaction from the enhancement of students' skills and from the coverage of their educational needs. This result suggests that the respective curricula need to be redefined in order to be able to meet the new challenges dealing with the modern digital education environment. Nevertheless, the trainees showed a high adaptation to the new digital environment of synchronous and asynchronous online education and a high rate of adaptation to the new conditions. Future research efforts should include a larger sample and investigate whether the weaknesses and failures of online education identified in the present study during the pandemic, have been mitigated.

References

- Almusharraf, N., Khahro, S. H. (2020). Students' Satisfaction with Online Learning Experiences During the COVID-19 Pandemic. *International Journal of Emerging Technologies in Learning (iJET)*, 15(21), pp. 246–267, <https://doi.org/10.3991/ijet.v15i21.15647>. Retrieved April 1st, 2022, from: <https://online-journals.org/index.php/i-jet/article/view/15647>.
- Belaya V. (2018). The use of e-learning in vocational education and training (VET): Systematization of existing theoretical approaches. *Journal of Education and Learning*, 7 (5), pp. 92-101, doi:10.5539/jel. Retrieved April 9th, 2022, from: <https://www.ccsenet.org/journal/index.php/jel/article/view/75340>.
- Bignoux, S., Sund, K. (2018). Tutoring executives online: What Drives Perceived Quality?" *Behaviour and Information Technology*, 37(7), pp. 703-713, <https://doi.org/10.1080/0144929X.2018.1474254>. Retrieved April 9th, 2022, from: <https://www.tandfonline.com/doi/abs/10.1080/0144929X.2018.1474254>.
- Cigdem, H., Yildirim, O.G. (2014). Effects of students' characteristics on online learning readiness: A Vocational College Example. *Turkish Online Journal of Distance Education-TOJDE*, ISSN 1302-6488, 15 (3), article No 8, pp. 80-93. Retrieved April 5th, 2022, from: <https://files.eric.ed.gov/fulltext/EJ1043667.pdf>.
- Han, X., Zhou, Q., Shi, W., Yang, S. (2020). Online Learning in Vocational Education of China during COVID-19: Achievements, Challenges, and Future Developments. *Journal of Educational Technology Development and Exchange (JETDE)*, 13(2), article No 4, doi: 10.18785/jetde.1302. Retrieved April 13th, 2022, from: <https://aquila.usm.edu/jetde/vol13/iss2/4/>.
- Hung, M.L, Chou, C., Chen, C.H, Own, Z.Y. (2010). Learner readiness for online learning: Scale development and student perceptions. *Computers & Education*, vol. 55, pp.1080–1090, <https://doi.org/10.1016/j.compedu.2010.05.004>. Retrieved April 14th, 2022, from: <http://anitacrawley.net/Resources/Articles/Hung.pdf>.
- IBM Corp. (Released 2016). IBM SPSS Statistics for Windows, Version 24.0. Armonk, NY: IBM Corp.
- Khlaif, Z. Salha, S. (2020). The Unanticipated Educational Challenges of Developing Countries in COVID-19 Crisis: A Brief Report. *Interdisciplinary Journal of Virtual Learning in Medical Sciences*, 11(2), pp. 130-134, doi: 10.30476/ijvlms.2020.86119.1034, Retrieved April 5th, 2022, from: https://ijvlms.sums.ac.ir/article_46637.html.
- Mezirow, J. (2000). Learning as Transformation: Critical Perspectives on a Theory in Progress. The Jossey-Bass Higher and Adult Education Series”, Generic, pp. 371. Retrieved April 1st, 2022, from: <https://eric.ed.gov/?id=ED448301>.
- Nikdel A. Teymori, M. A. Fardin, (2020). COVID-19 and Educational Challenges: A Review of the Benefits of Online Education. *Ann Mil Health Sci Res*, 18 (3), pp. e105778, doi: 10.5812/amh.105778, Retrieved April 5th, 2022, from: <https://brieflands.com/articles/amhsr-105778.html>.
- Stiller, K.D., Köster, A. (2016). Learner Attrition in an Advanced Vocational Online Training: The Role of Computer Attitude, Computer Anxiety, and Online Learning Experience. *European Journal of Open, Distance and E-Learning*, 19(2), pp. 1-14, 2016. Retrieved April 14th, 2022, from: <https://eric.ed.gov/?id=EJ1138170>.
- Syauqi, K., Munadi, S., Triyono M. B. (2020). Students' perceptions toward vocational education on online learning during the COVID-19 pandemic. *International Journal of Evaluation and Research in Education (IJERE)*, 9(4), pp. 881~886, ISSN: 2252-8822, doi: 10.11591/ijere.v9i4.20766. Retrieved April 1st, 2022, from: <https://files.eric.ed.gov/fulltext/EJ1274581.pdf>.
- Toquero C.M. (2020). Challenges and Opportunities for Higher Education Amid the COVID-19 Pandemic: The Philippine Context. *Pedagogical Research*, 5(4), article No: em0063 <https://doi.org/10.29333/pr/7947>. Retrieved April 7th, 2022, from: <https://www.pedagogicalresearch.com/article/challenges-and-opportunities-for-higher-education-amid-the-covid-19-pandemic-the-philippine-context-7947>.

RENEWING THE CURRICULUM TO PROMOTE EPISTEMIC COGNITION IN THE KNOWLEDGE SOCIETY: SOME PROCEDURAL PRINCIPLES

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Abstract

In our Knowledge Society, the division of cognitive labor, the specialization of knowledge and the brisk growth of new information and communication technologies provide a complex challenge for those tasked with selecting what is worth teaching and how to do it. The ease of access to information due to advanced and user-friendly technologies often gives us the illusion to know more than we actually do. This “epistemic disease” is a danger to both democracy and public health. The educational system must therefore encourage good epistemic habits consistent with responsible citizenship. From a didactic perspective, this requires updating the curriculum in the light of the educational challenge of the 21st century: making students aware of what knowledge is and what knowing means by fostering their epistemic cognition. Since epistemic cognition is concerned with the acquisition of a habitus, that is, a durable disposition to act in a certain way under certain circumstances (second-level curriculum objective), curriculum updating should not be reduced to a mere quantitative increase in the knowledge to be taught. On the contrary, this revision should address, on a qualitative level, how the selected disciplinary content is didactically transpose. In this contribution, we intend to propose some procedural principles – conceived as pragmatic patterns of behavior – that can help teachers design instructional activities consistent with the goal of promoting students’ epistemic cognition. These procedural principles will be formulated based on a conception of discipline as a correlated system of epistemic products and expert practices of knowledge construction, validation, evaluation and justification.

Keywords: *Epistemic cognition, procedural principles, curriculum design, didactic transposition, disciplinary epistemic practices.*

1. The knowledge illusion as epistemic disease

The division of cognitive labor (Kitcher, 1990) underpinning the hyperspecialization that characterizes today's Knowledge Society, combined with the brisk growth of new information and communication technologies (e.g., the internet, mobile telephony, social media) provide a complex challenge for those tasked with selecting what is worth teaching and how to do it. The ease of access to information (at least in some Countries) enabled by increasingly advanced and user-friendly technological devices has not, as Tom Nichols (2017) points out, led to a new and more democratic “enlightenment”. On the contrary, it has ushered in “the age of incompetence”, where a narcissistic and uninformed egalitarianism opposes expert knowledge, thus undermining democracy. Information overload contributes to instilling in us the reassuring but dangerous belief that we master authentic knowledge, even though this is not the case. In short, we often suffer from knowledge illusion - i.e., we think we know more than we actually do (Sloman & Fernbach, 2017) - an “epistemic disease” fueled by increasing digitization, which may hinder the development of 21st century citizenship skills, as well as the achievement of the Sustainable Development Goals (SDGs) set by the United Nations 2030 Agenda. Indeed, the ongoing Covid-19 infodemic clearly shows how the presumption of knowledge combined with “information disorder” can undermine people's ability to make decisions.

The World Health Organization (WHO) labelled as “infodemic” the overabundance of information “including false or misleading information in digital and physical environments during a disease outbreak” that makes it difficult to find one's way around a given topic because of the difficulty of identifying reliable sources. The damage to public health that this information pathology can cause by prompting people to distrust scientific experts and health authorities can be further amplified by the *filter bubble effect*. This expression was coined by the American scholar Eli Pariser (2011) to refer to personalized information ecosystems generated by algorithms, as, for example, Google's personalized

search and Facebook's personalized news. These algorithms, based on the preferences previously granted by the user, tend to propose contents similar to what the user likes. As a result, naïve epistemic subjects (but not only), being excluded from information that contradicts their own standpoint, end up being isolated in their epistemic bubble or echo chamber. The knowledge illusion generated by the consensus of one's own group makes them more polarized and prone to conflict (Sunstein, 2009). In other words, interacting with a homogeneous network of like-minded friends makes people more likely to radicalize their positions, regardless of whether they have well-founded reasons to support them. This natural tendency of the human mind is further reinforced by the many types of cognitive bias (systematic cognitive errors) that influence our judgement and decision-making (e.g., Piattelli Palmarini, 1994; Kahneman, 2011). Especially relevant to the problem at hand is the confirmation bias, i.e., our spontaneous inclination to search for, accept and interpret evidence in a way that supports what we are already convinced of. Confirmation bias hampers public evaluation of opinions and arguments, promotes social conformity, devaluation of expert views, and polarization and manipulation of opinions. Although philosophers of science, following Karl Popper (2014), suggest us challenging a hypothesis by trying to disprove it, we (and very often scientists as well) are always looking for data that are consistent with our current beliefs (Kahneman, 2011). Thus, complying with the rules of scientific rationality requires a great cognitive effort from people as they need to get used to inhibiting their intuitions.

2. Promoting epistemic cognition in the curriculum

In the light of the above, whether information sharing can be the key resource of our society compared to those of the past also depends on the extent to which citizens are likely to enact knowledge-friendly behaviors while seeking new information and taking decisions. The education system needs, therefore, to encourage good epistemic habits consistent with responsible citizenship, by providing students with the conceptual, critical and epistemic tools to effectively select, evaluate, integrate and make sense of different sources of information. From a didactic perspective, this entails updating the curriculum – conceived as a theoretical and methodological device that allows knowledge, practices and skills to be articulated coherently (Martini, 2019) – to meet the educational challenge of the 21st century: making students aware of what knowledge is and what knowing means by fostering their engagement in sophisticated epistemic cognition (Greene, Sandoval & Bråten, 2016). In short, I argue that epistemic cognition, i.e., the ability to produce, evaluate, justify and use knowledge in formal and informal contexts, should be included among the life skills of the 21st century. On par with the others established by WHO, it is indeed necessary for enacting adaptive and positive behaviors “that enable individuals to deal effectively with the demands and challenges of everyday life”. Like critical thinking - to which for some scholars (Greene & Yu, 2016) it is closely related -, epistemic cognition concerns the acquisition of a *habitus* (Dewey, 1922; Bourdieu, 1977; Baldacci, 2012), that is, the formation of stable, long-lasting dispositions to think and act in a certain way under certain conditions. This is the reason why curriculum updating should not be reduced to a mere quantitative increase in the knowledge to be taught. On the contrary, this revision should address, on a qualitative level, how the selected disciplinary content is didactically transposed (Schubauer-Leoni, 2008). To clarify what I mean, I introduce the distinction between first-level and second-level curriculum proposed by Baldacci (2006), which is linked to Bateson's hierarchical theory of learning (2000).

According to Baldacci, the curriculum structure can be organized on two levels, which correspond to the first two distinct logical types of learning identified by Bateson. First-level curriculum aims to promote proto-learning (learning I), i.e., the acquisition of disciplinary knowledge and abilities (declarative and procedural knowledge). On the other hand, second-level curriculum is concerned with deuterio-learning, that is the development of habits of thought and actions, personal attitudes and interests, *formae mentis*, particular ways of seeing and thinking (including those of disciplinary experts). Proto-learning is direct, explicit and gives results in the short-to-medium term, whereas deuterio-learning is collateral – as it only takes place in parallel and in connection with learning I –, mostly implicit and gives results in the medium-to-long term. It follows that the promotion of students' epistemic cognition is a second-level curriculum objective insofar as it involves the development of a core of habits and attitudes characterizing a virtuous epistemic agent (Elgin, 2013).

In general terms, by virtuous epistemic agent I mean an individual who is both capable and inclined to pursue valued epistemic goals by engaging in reliable epistemic practices - included correct forms of reasoning - and to use sound epistemic standards to evaluate epistemic products and practices as well as to justify these evaluations. At the operational level, the second-level curricular objective of promoting the habitus (of thought and action) of the virtuous epistemic agent can be pursued through procedural principles that can help teachers design effective instructional activities in this regard. In other words, the various disciplines must provide the context in which students learn to repeatedly enact

knowledge-friendly behaviors that can collaterally promote the development of good epistemic habits and attitudes. My proposal is to formulate these procedural principles – conceived as pragmatic patterns of behavior (Stenhouse, 1977) - by applying a three-step methodological scheme initially devised for a previous research project on color education (Martini, D’Ugo, & Tombolato, 2021). In the next paragraph, I describe the three phases of this methodological scheme, which has been properly modified to fit the current research context and purpose and provide some examples of procedural principles.

3. Towards the identification of procedural principles

The *first phase* of the research consists of identifying some general epistemological categories that help characterize the habitus of the virtuous epistemic agent. According to the definition proposed above based on a review of the philosophical and educational literature (e.g., Goldman, 1999; Chinn & Rinehart, 2016; Kelly, 2008; Sandoval, 2005), these general epistemological categories are: epistemic goals directed at epistemic products, reliable epistemic practices, epistemic standards/criteria. However, since these categories are very broad, independent of a specific knowledge domain, they fail to provide precise guidance to teachers, most of whom are not accustomed to fostering students’ epistemic cognition during the didactic transposition of their disciplines. Therefore, in order to formulate procedural principles useful for supporting teachers’ practices, we need to sharpen these general categories by identifying, for each of them, *operationalized subcategories* in the form of epistemically virtuous behaviors to be related to the procedural principles aimed at their development (*second phase*). My working hypothesis is indeed that by consistently applying these procedural principles, teachers will be more likely to encourage students’ knowledge-friendly behaviors to be taken as indicative of the habitus of the virtuous epistemic agent. The behaviors at issue can be identified on two levels of specificity: a first a-disciplinary level, i.e., independent of any specific discipline; a second strictly disciplinary level, i.e., dependent on the specific characteristics of each discipline. This follows from the fact that, as some scholars (e.g., Knorr Cetina 1999; Sandoval, 2016) pointed out, different epistemic communities enact different epistemic practices, have different perspectives on objectivity and use different standards/criteria to justify their discipline knowledge claims, or to establish what counts as evidence.

My current research focuses on carrying out a *first-level operationalization* of the meaning of general epistemological categories in order to formulate some a-disciplinary procedural principles. For this purpose, it is necessary to explore the literature on epistemology (including social epistemology), education and epistemic cognition and to analyze the set of competences that constitute the construct of information literacy. *Second-level operationalization*, on the other hand, will be the target of future research, as it requires in-depth empirical investigation based on observation of the actual practice of disciplinary experts. With regard to *epistemic goals directed at epistemic products*, some examples of first-level operationalization are provided by the following knowledge-friendly behaviors: seeking objective knowledge, achieving disciplinary understanding, creating meaning from information, gathering reliable information, gathering sound evidence, forming true belief within a discipline, constructing different kind of explanations, providing sound epistemic justification of a knowledge claim and so on. Under the category of *epistemic practices* (Kelly, 2008; Tombolato, 2020) fall the variety of practices related to how knowledge is constructed, validated, evaluated, justified, used effectively to solve problems and make decisions within a scientific community. These practices can be formal, empirical, experimental, simulation-based, argumentation-based and include all forms of reasoning (inductive, deductive, abductive, model-based, probabilistic, statistical, counterfactual, by analogy, by trial and error, by falsification, by counterexamples, etc.). Finally, *epistemic standards* cover the specific criteria used to evaluate and justify products and practices: e.g. checking the soundness of an argument, identifying trustworthy sources of information, separating evidence/facts from opinions/fiction, checking the adequacy of an epistemic representation, assessing the credibility of an expert in relation to the subject matter, identifying biased procedures and reasoning, distinguishing good from bad explanations, distinguishing fruitful analogies from false or misleading ones, and so on.

Once the subcategories have been identified and operationalized in the form of knowledge-friendly behavior, the *third phase* is to construct some *procedural principles* that can guide teachers’ professional action. As Table 1 shows, each operationalized subcategory can correspond to numerous procedural principles, which translate these subcategories into actions that the teacher must perform in order to promote in learners those behaviors considered indicative of the habitus of the virtuous epistemic agent. It is worth noting that epistemological categories and, consequently, procedural principles have been conceptually isolated, but it does not mean that they can be actually isolated. Insofar as they are closely interconnected, almost every teaching activity exemplifies many of them. For the epistemic goal aimed at an epistemic product presupposes both an epistemic practice of which that product is the result and epistemic criteria on which to rely to evaluate practices and products.

Table 1. Some examples of procedural principles referred to each general epistemological category characterizing the habitus of the virtuous epistemic agent.

General epistemological categories	Operationalized subcategories (Epistemically virtuous behaviors)	Procedural Principles
Epistemic goals directed at epistemic products	Providing sound epistemic justification of a knowledge claim	Learners are more likely to develop the habitus of the virtuous epistemic agent if they are engaged in activities a) that require them to consistently justify their knowledge claims; b) that allow them to recognize if others' knowledge claims are justified or not c) that allow them to distinguish epistemic from non-epistemic (e.g., pragmatic) justifications; d) that allow them to become acquainted with different types of epistemic justifications, both reliable and unreliable and so on.
	Forming true belief within a discipline	Learners are more likely to develop the habitus of the virtuous epistemic agent if they are engaged in activities a) that allow them to distinguish beliefs formed through reliable disciplinary practices from naive beliefs; b) that prompt them to prove the truth of a knowledge claim within a discipline by referring to disciplinary modes of inquiry and knowledge-finding tools; c) that elicit them to reflect on how each discipline constructs, critiques, revises knowledge and proves the truth of its statements; d) that allow them to compare different disciplinary conception of what counts as evidence/proof, etc.
	Constructing different kind of explanations	Learners are more likely to develop the habitus of the virtuous epistemic agent if they are engaged in activities a) that allow them to distinguish an explanation from a description within distinct disciplines; b) that require them to provide disciplinary explanations about a fact, a phenomenon, a mathematical formula; c) that expose them to different types of explanations (e.g., nomological-deductive, inductive-probabilistic, simulation-based) in relation to different disciplines and so on.
Epistemic practices	Constructing disciplinary forms of knowledge	Learners are more likely to develop the habitus of the virtuous epistemic agent if they are engaged in activities that allow them a) to become acquainted with disciplinary rules and constraints which bound scientific community members when constructing knowledge; b) to compare different forms of reasoning in relation to the achievement of disciplinary epistemic goals; c) to choose which epistemic practices (formal, empirical, experimental, etc.) are to be employed to address a given disciplinary or interdisciplinary problem and so on.
	Justifying knowledge, practices, forms of reasoning	Learners are more likely to develop the habitus of the virtuous epistemic agent if they are engaged in activities that allow them a) to become acquainted with how experts evaluate and justify the practices enacted to construct knowledge in their domain of expertise; b) to compare disciplinary and naive forms of reasoning and so on.
Epistemic standards	Distinguishing good from bad explanations	Learners are more likely to develop the habitus of the virtuous epistemic agent if they are engaged in activities that elicit them to compare good and bad explanations on the basis of the following criteria: fit the facts to be explained, be falsifiable, not conflict with other facts, rely on valid inferences, avoid inferring causal relations from statistical correlations, distinguish relevant from irrelevant variables/facts, allow for new predictions (at least in some disciplines) and so on.
	Checking the soundness of epistemic justification	Learners are more likely to develop the habitus of the virtuous epistemic agent if they are engaged in activities that require them to evaluate an argument on the basis of good epistemic criteria such as: coming from expert testimony, logical consistency (no contradiction), soundness of evidence, coherence with previous data (no counterevidence), etc.
	Identifying biased procedures and reasoning	Learners are more likely to develop the habitus of the virtuous epistemic agent if they are engaged in activities that elicit them a) to evaluate the soundness of an inductive generalization by ascertaining whether there is a sufficient number of cases to draw a conclusion, whether the breadth of the conclusion is supported by the evidence, etc.; b) that prompt them to distinguish valid inference rules from common fallacies and so on.

4. Conclusion and future prospects

In this paper, I have attempted to turn the epistemological concept of *virtuous epistemic agent* into a didactically fertile construct through an operational definition of both the knowledge-friendly

behaviors that he/she habitually engages in (operationalized subcategories), and the instructional actions that the teacher can implement to promote these same behaviors in students (procedural principles). Encouraging students to repeatedly enact these behaviors through appropriately designed teaching situations can indeed foster a stable, long-lasting disposition to act epistemically responsible when dealing with personal and professional issues and when exercising their citizenship rights. Within this framework, there are two future challenges for educational research: to construct additional procedural principles that help teachers carry out a didactic transposition of their discipline aimed at promoting students' epistemic cognition. To train prospective and in-service teachers so that they are able to incorporate the results of didactic research into their instructional practice in order to meet the educational needs of the citizens of the information and knowledge society.

References

- Baldacci, M. (2006). *Ripensare il curricolo: principi educativi e strategie didattiche*. Roma: Carocci.
- Baldacci, M. (2012). *Trattato di pedagogia generale*. Roma: Carocci.
- Bateson, G. (2000). *Steps to an ecology of mind*. Chicago: University of Chicago Press.
- Bourdieu, P. (1977). *Outline of a Theory of Practice*. Cambridge: Cambridge university press.
- Chinn, C. A., & Rinehart, R. W. (2016). Epistemic cognition and philosophy: Developing a new framework for epistemic cognition. In J. A. Greene, W. A. Sandoval & I. Bråten (Eds.), *Handbook of epistemic cognition* (472-490). New York, NY: Routledge.
- Dewey, J. (1922). *Human nature and conduct*. New York: Holt.
- Elgin, C. Z. (2013). Epistemic agency. *Theory and research in education*, 11(2), 135-152.
- Goldman, A. I. (1999). *Knowledge in a social world*. Oxford: Oxford University Press.
- Greene, J. A., & Yu, S. B. (2016). Educating critical thinkers: The role of epistemic cognition. *Policy Insights from the Behavioral and Brain Sciences*, 3(1), 45-53.
- Greene, J. A., Sandoval, W. A., & Bråten, I. (Eds.). (2016). *Handbook of epistemic cognition*. New York, NY: Routledge.
- Kahneman, D. (2011). *Thinking, fast and slow*. New York, NY: Farrar, Straus and Giroux.
- Kelly, G. J. (2008). Inquiry, activity, and epistemic practice. In R. Duschl & R. Grandy (Eds.), *Teaching scientific inquiry* (99-117). Rotterdam, Netherlands: Sense.
- Kitcher, P. (1990). The division of cognitive labor. *The journal of philosophy*, 87(1), 5-22.
- Knorr Cetina, K. (1999). *Epistemic cultures: How the sciences make knowledge*. Cambridge, MA: Harvard University Press.
- Martini, B. (2019). Verso un Modello di curricolo Integrato. *Pedagogia più Didattica*, 5(2), 1-10.
- Martini, B., D'Ugo, R., & Tombolato, M. (2021). Teaching and learning color. An insight into STEM/STEAM approach. In *Proceedings of the International Colour Association (AIC) Conference 2021* (1121-1126). Milan, Italy: AIC.
- Nichols, T. (2017). *The death of expertise: The campaign against established knowledge and why it matters*. Oxford: Oxford University Press.
- Pariser, E. (2011). *The Filter Bubble: What the Internet is Hiding from You*. New York: Penguin Press.
- Piattelli Palmarini, M. (1994). *Inevitable illusions*. New York: Wiley.
- Popper, K. (2014). *Conjectures and refutations: The growth of scientific knowledge*. London: Routledge.
- Sandoval, W. A. (2005). Understanding students' practical epistemologies and their influence on learning through inquiry. *Science education*, 89(4), 634-656.
- Sandoval, W. A. (2016). Disciplinary insights into the study of epistemic cognition. In J. A. Greene, W. A. Sandoval & I. Bråten (Eds.), *Handbook of epistemic cognition* (184-194). New York, NY: Routledge.
- Schubauer Leoni, M. L. (2008). Didactique. In A. van Zanten (Eds.), *Dictionnaire de l'éducation* 129-133. Paris: PUF.
- Schwab, J. J. (1964). Structure of the Disciplines: Meanings and Significances. In C. W. Ford & L. Pugno (Eds.), *The Structure of Knowledge and the Curriculum* (6-30). Chicago: Rand McNally.
- Sloman, S., & Fernbach, P. (2017). *The Knowledge Illusion: Why We Never Think Alone*. New York: Riverhead Books.
- Stenhouse, L. (1975). *An introduction to curriculum research and development*. London: Heinemann.
- Sunstein, C. R. (2009). *Going to extremes: How like minds unite and divide*. Oxford: Oxford University Press.
- Tombolato, M. (2020). *La conoscenza della conoscenza scientifica. Problemi didattici*. Milano: FrancoAngeli.

TRANSFERENCE OF TEACHERS' EMOTIONAL INTELLIGENCE TO STUDENTS DURING ADOLESCENCE

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Abstract

Introduction. This study explores the impact of teachers' emotional intelligence on the emotional intelligence of students aged between 14 to 16 yrs. studying in the 9th and 10th grade. The study is interested to understand the level of transference of teachers' emotional intelligence to the students through the teacher-student interactions that happen at schools. This is the age where the students are highly vulnerable to their surroundings and need highest support from teachers and teachers' way of behavior has huge impact is the hypothesis.

Background. Adolescence is a very vulnerable age where the children need the support of an adult to identify and maneuver through life. School is one place where this is accomplished majorly. But are the teachers equipped enough to provide this support emotionally in this new generation with technological advancements? And how is the EI of teachers affecting that of the students? This study focuses on this question.

Methodology. This is a quantitative analytical study involving administering of two questionnaires (one to teachers and one to students).

Sample considered were students and teachers from schools from Karnataka state who consented to be part of the study. Each teacher was mapped to the students who were taught by the teacher. Emotional Intelligence of both teachers and students was measured using Bar-On EIQ.

Results. There is no correlation between the teachers and students' emotional intelligence. Analyses was performed using mean analysis, Anova and exploring correlations between the components of EI between teachers and students.

Conclusion. This result of no correlation could be due to lockdown and further research (both qualitative and quantitative) needs to be conducted to see if this is the effect of the pandemic and the lockdown.

Keywords: Teacher, student, emotional intelligence, adolescence, interaction.

1. Introduction

Education is meant to empower and enable the youth of the country to learn the nuances of the real world and allow them to function effectively. The methods of teaching followed till now in India has been teacher centric which is now slowly turning learner center and the effectiveness with which a learner learns is dependent on three factors, namely, teacher factor, learner factor and common factors (classroom environment) (K.Suresh & P.Srinivasan, 2018). Because "...effective learning is much more a function of the emotional response to a learning environment than the techniques and structures on which it is based" (Zahed-Babelan & Moenikia, 2010), how much does teachers' emotional intelligence influence the emotional intelligence of students? This is a critical question to answer which can lead us to finding the source of effective learning. This paper focusses on answering this question taking a sample of students and teachers from different schools studying in private schools in the state of Karnataka.

Adolescence is a very vulnerable age where the children need the support of an adult to identify and maneuver through life. School is one place where this is accomplished majorly. This is the age when the primary need of the student is to identify with self and find their grounding. This is a very confusing age as their internal guiding system is not fully developed and the transition from childhood to adulthood would be very heavy especially in this VUCA world.

One of the questions this article addresses is, how is the EI of teachers affecting that of the students? How is the teachers' EI affecting that of the student? This study focuses on this question.

1.1. Emotional intelligence

Emotional Intelligence has been defined in multiple models depending on whether it is based on ability, trait, competency or personality. Generally, it is defined as the ability to perceive, understand and manage one's emotions and that of others (Choksi et al., 2012; Cobb & Mayer, 2000; Faltas, 2017; John D. Mayer, Joseph Paul Forgas, Joseph Ciarrochi, 2001). While Williford (2000), Marquez, Martin and Brackett discovered the relationship between EI and academic performance along with many other studies evidencing this correlation (Ahmad et al., 2016; Brackett et al., 2004; Vişcu et al., 2017), there is enough data to support its predictability in aspects of health (physical and mental), (K.Suresh & P.Srinivasan, 2018; Martins et al., 2010), life satisfaction (B. Palmer et al., 2002; Rey et al., 2011) and its influence on learners attitude to learning whether in person (Haynes, 2019; Zhoc et al., 2020) or online (Vişcu et al., 2017).

There are three models of EI through which it is explained and measured. The earliest model is Ability Model, the one designed by the fathers of EI Peter Salovey and John Mayer. Since this had the limitation of only knowledge and no experience, K.V.Petrides introduced the Trait Model. Research fraternity indicated the subjectivity of answers of the participants and hence there came the Mixed Models by Daniel Goleman (Competency) and Rueven Bar-On (Personality).

1.2. Teacher-Student relationship

Other than the role of teaching that the teachers do, there are the assignments that they give and the classroom climate that they create where student-teacher and student-student interactions happen (Perry den Brok, 2009; Wubbels, 2016). Even though learning is available for the student in many ways (like home, video games, internet, friendships, sports, etc.) (Wubbels, 2016), a school provides a formal learning environment where the teacher is a primary source of learning. Cognitive as well as emotional learning is happening in these environments, and research seems to spell that quality of a teacher has a lot (7 to 15% of variance in school outcomes) (Den Brok, Wubbel, et al., 2004) to do for effective learning to happen (Wubbels, 2016). In a study between teacher-student centric or student-centric reading, anxiety in students was generated more in teacher-student centric reading (Jordan et al., 2019) with physical presence.

“Teaching is an emotional practice in which emotions play an integral role in teacher-student interactions” said Hargreaves (1998) (Andy Hargreaves, 1998; Jordan et al., 2019). Teachers are human beings with both emotional and cognitive capacities and their interactions with the students can elicit all feelings which could be productive or non-productive. If non-productive, in the long run, their feelings of anger, anxiety and their inability to manage relationships with students (Zandvliet et al., 2014) could make them less sensitive to students which could lead to lower motivation and achievement in their classes (Aldrup et al., 2020) and increases stress in students (Oberle & Schonert-Reichl, 2016).

2. Methodology

This is a quantitative analytical study involving administering of two questionnaires (one to teachers and one to students). The questionnaires were administered using Google docs, only after they were taken through an orientation about EI and how to answer the questionnaire.

Sample:

Sample considered were adolescent students and teachers from schools from Karnataka state who consented to be part of the study. Age of students considered was 13 to 15 yrs studying in private higher secondary schools.

The researcher visited eight schools in different parts of the state based on purposive sampling through reference collect the data. Data was collected of 858 students and 62 teachers from 8 different schools in South Karnataka.

2.1. Instrument

Emotional Intelligence of both teachers and students was measured using Bar-On EIQ. The transference of teachers EI happens through their behavior and the interactions that they have with the students. The adult version was used for measuring EI of teachers and the youth version was used to measure EI of the students. The questionnaire consists of 133 items in the adult version and 60 items in the youth version. The items are rated using five-point Likert scale for both the questionnaires, ranging from 1- rarely true for me to 5- Always true for me. Bar-On clustered the items into fifteen components grouped under five factors which are Intrapersonal skills, Interpersonal skills, Adaptability, Stress Management and General Mood.

2.2. Objective of the study

The null hypothesis of this study is there is no relationship between teachers' EI and students' EI. Alternate hypothesis is there is a positive relationship between teachers' EI and students' EI.

Data Analyses was performed using mean analysis, Anova and exploring correlations between the components of EI between teachers in Excel and SPSS.

3. Results

3.1. Descriptive analysis

Total sample size considered was 858 students mapped to 62 teachers. Mapping was randomly made keeping in mind that the teachers were handling classes for the students and hence direct interaction was happening. The different demographics of the teachers considered were as follows,

Table 1. Demographic details of the sample of teachers and students.

Gender				Age			
Teachers		Students		Teachers		Students	
Male	Female	Male	Female	21-40 yrs	41-60 yrs	13-14 yrs	15-16 yrs
14	48	385	473	39	23	443	415
23%	77%	45%	55%	63%	37%	52%	48%

Table 2. Teachers' break-up as per their work experience.

Work Experience			
0-5 yrs	6-10 yrs	11-15 yrs	16-25 yrs
19	11	15	17
31%	18%	24%	27%

3.2. ANOVA

Sample of teachers consisted of all subject handling teachers. There was no significant difference in EI based on gender nor based on age which was measured through ANOVA. This is in line with the studies till far (Birol et al., 2009; S Jerslina and Dr. N Devaki, 2016; Wang, 2022). Nor there was any significant difference between teachers' seniority and their EI. Among students too, there was no significant difference in EI based on gender or age. There were eight schools who had participated in this study and there were significant differences ($p < 0.05$) in the emotional intelligence of the students in different schools.

3.3. Correlation

The results of Pearson Correlation showed no significant relationship between the teacher EI and the corresponding student EI. Hence alternate hypothesis can be rejected. The null hypothesis is accepted.

This is contradicting to the studies that have indicated a positive relationship between EI and academic performance, life satisfaction, performance and also research on how emotional aspects of teacher impact the overall student outcomes (Barłozek, 2013; Brackett & Katulak, 2013; Divaris et al., 2008). Not many studies were found measuring the relationship between teachers' EI and students' EI and hence not much data is available on this aspect.

Teaching practices including teachers emotional support has the ability to influence students' attitudes and behaviors (Blazar & Kraft, 2017), but does this actually impact the emotional intelligence of the students is not clear even from this study. This could be due to the effect of the pandemic and the lockdowns where the students did not get to meet the teachers for long, and when they met, it was online and this has created a disconnection between them.

4. Conclusion

The pandemic and the lockdown phenomena have impacted and made many connections and also disconnections. Some conversations with the teachers during the data collection process brought out the shift in the attitudes and behavior of students towards the teachers and towards academic and studying which was not very pleasant. The students had got into the habit of computer games, not wanting to listen to adults, rebelling and majorly being distracted very easily. Even though all these challenges are natural during adolescence, this lockdown phenomena seems to have negatively influenced the children to a very large extent which has disconnected the children from life itself. Research is encouraged to understand this phenomenon closely.

References

- Ahmad, W., Wan, J., Kumar, J. A., Jaafar, W. A., & Cowan, B. (2016). *Emotional Design in multimedia learning: The relationship between emotional intelligence and learner satisfaction. Emotional Design in Multimedia Learning: The Relationship between Emotional Intelligence and Learner Satisfaction. April.*
- Aldrup, K., Carstensen, B., Köller, M. M., & Klusmann, U. (2020). Measuring Teachers' Social-Emotional Competence: Development and Validation of a Situational Judgment Test. *Frontiers in Psychology, 11*, 892. <https://doi.org/10.3389/fpsyg.2020.00892>
- Andy Hargreaves. (1998). *The Emotional Practice of teaching. 14*(8), 835–854.
- Barłózek, N. (2013). Teachers' emotional intelligence — a vital component in the learning process. *PsychoLingwistyczne Eksploracje Językowe*, Red. O. Majchrzak, Wydawnictwo Uniwersytetu Łódzkiego, [95]-112.
- Birol, C., Atamtürk, H., Silman, F., & Şensoy, Ş. (2009). Analysis of the emotional intelligence level of teachers. *Procedia - Social and Behavioral Sciences, 1*(1), 2606–2614. <https://doi.org/10.1016/j.sbspro.2009.01.460>
- Blazar, D., & Kraft, M. A. (2017). Teacher and Teaching Effects on Students' Attitudes and Behaviors. *Educational Evaluation and Policy Analysis, 39*(1), 146–170. <https://doi.org/10.3102/0162373716670260>
- Brackett, M. A., & Katulak, N. A. (2013). Emotional Intelligence in the Classroom: Skill-Based Training for Teachers and Students. *Applying Emotional Intelligence, 1–27*. <https://doi.org/10.4324/9781315782935>
- Brackett, M. A., Mayer, J. D., & Warner, R. M. (2004). Emotional intelligence and its relation to everyday behaviour. *Personality and Individual Differences, 36*(6), 1387–1402. [https://doi.org/10.1016/S0191-8869\(03\)00236-8](https://doi.org/10.1016/S0191-8869(03)00236-8)
- Choksi, N. P., Brain, T. E., Intelligence, D. E., & Models, E. I. (2012). Chapter 2: Emotional Intelligence: An Overview. *Book.*
- Ciarrochi, J., Chan, A. Y. C., & Bajgar, J. (2001). Measuring emotional intelligence in adolescents. *Personality and Individual Differences, 31*(7), 1105–1119. [https://doi.org/10.1016/S0191-8869\(00\)00207-5](https://doi.org/10.1016/S0191-8869(00)00207-5)
- Cobb, C. D., & Mayer, J. D. (2000). Emotional intelligence. *Educational Leadership, 58*(3), 14–18. <https://doi.org/10.2190/DUGG-P24E-52WK-6CDG>
- D'Amico, A., Geraci, A., & Tarantino, C. (2020). The relationship between perceived emotional intelligence, work engagement, job satisfaction, and burnout in Italian school teachers: An exploratory study. *Psihologijske Teme, 29*, 63–84. <https://doi.org/10.31820/PT.29.1.4>
- den Brok, P., Brekelmans, M., & Wubbels, T. (2004). Interpersonal teacher behaviour and student outcomes. *School Effectiveness and School Improvement, 15*(3–4), 407–442. <https://doi.org/10.1080/09243450512331383262>
- Divaris, K., Barlow, P. J., Chendea, S. A., Cheong, W. S., Dounis, A., Dragan, I. F., Hamlin, J., Hosseinzadeh, L., Kuin, D., Mitirattanakul, S., Mo'Nes, M., Molnar, N., Perryer, G., Pickup, J., Raval, N., Shanahan, D., Songpaisan, Y., Taneva, E., Yaghoub-Zadeh, S., ... Vrazic, D. (2008). The academic environment: The students' perspective. *European Journal of Dental Education, 12*(SUPPL. 1), 120–130. <https://doi.org/10.1111/j.1600-0579.2007.00494.x>
- Faltas, I. (2017). *Three models of emotional intelligence. March, 1–3*. https://www.researchgate.net/publication/314213508_Three_Models_of_Emotional_Intelligence
- Haynes, N. (2019). *Social, Emotional, Physical and Academic Experiences in Adolescence. October*. <https://doi.org/10.13140/RG.2.2.15811.96807>
- John D. Mayer, Joseph Paul Forgas, Joseph Ciarrochi, J. B. (2001). *Solvey and Mayer_1.pdf*.
- Jordan, A., Codina, N., Peng, S., Dong, Y., Wu, S. X., & Wang, W. (2019). Is the Student-Centered Learning Style More Effective Than the Teacher-Student Double-Centered Learning Style in Improving Reading Performance? *Frontiers in Psychology | Www.Frontiersin.Org, 10*. <https://doi.org/10.3389/fpsyg.2019.02630>
- K. Suresh, & P. Srinivasan. (2018). A Study of Teacher's Intelligence and Emotional Intelligence on Students' Mental Health among Higher Secondary School of Thanjavur District. *American Journal of Educational Research, 6*(6), 869–876. <https://doi.org/10.12691/education-6-6-41>
- Martins, A., Ramalho, N., & Morin, E. (2010). A comprehensive meta-analysis of the relationship between Emotional Intelligence and health. In *Personality and Individual Differences* (Vol. 49, Issue 6, pp. 554–564). Elsevier Ltd. <https://doi.org/10.1016/j.paid.2010.05.029>

- Oberle, E., & Schonert-Reichl, K. A. (2016). Stress contagion in the classroom? The link between classroom teacher burnout and morning cortisol in elementary school students. *Social Science and Medicine*, 159, 30–37. <https://doi.org/10.1016/j.socscimed.2016.04.031>
- Palmer, B., Donaldson, C., & Stough, C. (2002). Emotional intelligence and life satisfaction. *Personality and Individual Differences*, 33(7), 1091–1100. [https://doi.org/10.1016/S0191-8869\(01\)00215-X](https://doi.org/10.1016/S0191-8869(01)00215-X)
- Palmer, B. R., Stough, C., Harmer, R., & Gignac, G. (2009). *Assessing Emotional Intelligence*. 103–117. <https://doi.org/10.1007/978-0-387-88370-0>
- Perry den Brok, J. van T. (2009). *Teacher – Student Interpersonal*. 2009, 309–324.
- Rey, L., Extremera, N., & Pena, M. (2011). Perceived emotional intelligence, self-esteem and life satisfaction in adolescents. *Psychosocial Intervention*, 20(2), 227–234. <https://doi.org/10.5093/in2011v20n2a10>
- Robin Berenson, Gary Boyles, A. W. A. (2008). Emotional Intelligence as a Predictor for Success in Online Learning. *International Review of Research in Open and Distance Learning*, 9(2).
- S Jerslina and Dr. N Devaki. (2016). Emotional intelligence of prospective teachers. *International Journal of Applied Research*, 2(7), 321–325. <https://doi.org/10.3923/jeasci.2017.1677.1680>
- Shabani, J., Hassan, S. A., Ahmad, A., & Baba, M. (2010). Exploring the Relationship of Emotional Intelligence with Mental Health among Early Adolescents. *International Journal of Psychological Studies*, 2(2), 209–216. <https://doi.org/10.5539/ijps.v2n2p209>
- Szczeniak, M., & Tulecka, M. (2020). Family functioning and life satisfaction: The mediatory role of emotional intelligence. *Psychology Research and Behavior Management*, 13(March), 223–232. <https://doi.org/10.2147/PRBM.S240898>
- Vișcu, L. I., Cornean, C. E., Colojoară, R., & Cădariu, E. I. (2017). The Role of Emotional Intelligence in Online Learning. *The International Symposium of Research and Applications in Psychology*, 24(September), 1–7.
- Wang, L. (2022). Exploring the Relationship Among Teacher Emotional Intelligence, Work Engagement, Teacher Self-Efficacy, and Student Academic Achievement: A Moderated Mediation Model. *Frontiers in Psychology*, 12, 6065. <https://doi.org/10.3389/FPSYG.2021.810559/BIBTEX>
- Wubbels, T. (2016). *Teacher-student relationships and interactions as a factor in learning environments*. The Psychology of Education Section of The British Psychological Society.
- Zahed-Babelan, A., & Moenikia, M. (2010). The role of emotional intelligence in predicting students' academic achievement in distance education system. *Procedia - Social and Behavioral Sciences*, 2(2), 1158–1163. <https://doi.org/10.1016/j.sbspro.2010.03.164>
- Zandvliet, D., Brok, P. Den, Mainhard, T., & Jan Van Tartwilk. (2014). Interpersonal relationships in education: From theory to practice. In *Advances in Learning Environments Research* (Vol. 5).
- Zhoc, K. C. H., King, R. B., Chung, T. S. H., & Chen, J. (2020). Emotionally intelligent students are more engaged and successful: examining the role of emotional intelligence in higher education. *European Journal of Psychology of Education*, 35(4), 839–863. <https://doi.org/10.1007/s10212-019-00458-0>

EXPLORING THE ROLE OF TECHNOLOGICAL PROCESS IN CIVIL ENGINEERING AND CONSTRUCTION STUDIES AT TECHNICAL VOCATIONAL EDUCATION AND TRAINING (TVET)

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Abstract

Civil Engineering and Construction studies are subjects that develop and promulgate knowledge and skills through teaching, learning and assessment. The aim of the study was to explore the perceptions of lecturers regarding the role of technological process in Civil Engineering and Construction Studies at TVET colleges in the Free State Province in South Africa. While the objective is to determine the perception role of technological process in Civil Engineering and Construction (CEC) studies during the teaching, learning, and assessment process, When the driving research question was: what is the role of technological process in Civil Engineering and Construction Studies at TVET colleges with regard to teaching, learning, and assessment? The mix method consisting of quantitative and qualitative elements was employed. A questionnaire and a face-to-face interview were used as instruments to gather data. Twenty-six (26) CEC studies lecturers from four (4) different TVET colleges in the Free State province in South Africa. The study revealed that all lecturers prefer technological process as their main teaching and learning methods, in particular for final assessment.

Keywords: *Technological process, civil engineering construction, technical vocational education and training.*

1. Introduction

The research was aimed at exploring the perception of Civil Engineering and Construction lecturers with reference to the role of the technological process at TVET colleges. The Technological process is perceived to be a teaching method that promulgate the integration of theory and practical content through problem solving skills and its aspects. Moreover, Civil Engineering and Construction studies at TVET colleges are all about nourishing skill development competence in totality. According to Loynes (2017:2), TVET colleges should impose a large premium on employability in order to assist students to become more valuable to the industry and maintain their competitiveness.

2. Conceptualisation of the study

2.1. Technological process

The Technological process in this study defined as the teaching method that promotes critical thinking through sound development of problem solving skills. Furthermore, the technological process in this study uses purely a six step style. According to Mokhothu, (2019:118); Masoabi (2015:127); DBE (2011b:10); Van der Walt (2009:26), the six steps of the technological process are expounded as follows:

Step 1. Identify: Make a meaningful summary of the problem from the scenario given or created

Step 2. Investigation:

- Design brief describes a problem, how do you think you can solve it and draw free-hand three possible solutions,
- Write specification and constraints.

Step 3. Design: Formal drawing plan with full details using the scale and material list

Step 4. Make: Physically making your project using guided and corresponding with a formal plan

Step 5. Evaluation and Test: Compile a checklist for the project

Step 6. Communication: Presentation of the project (portfolio, project exhibition, and flow- chart)

2.2. Civil Engineering and Construction Studies

Civil Engineering and Construction embraces skills like bricklaying, tiling, woodworking, and plumbing among many others in the context of the building environment (Mokhothu, 2018:323; Mokhothu, Masoabi and Makura, 2021:210). As stated by the Department of Higher Education and Training (DHET) and Training, the course in Civil Engineering and Building Construction encompasses all aspects of construction, including masonry building; woodworking; drainage; and sanitation. This course therefore combines technical knowledge and theory with real-world skills and values to help students learn (DHET, 2015:8; Maeko, 2020:38).

3. The aim of the study

The study aimed to explore perceptions of lecturers regarding the role of the technological process in Civil Engineering and Construction Studies at TVET colleges in the Free State Province of South Africa.

4. The Objective of the study

The objective was to determine the perceived role of the technological process in Civil Engineering and Construction (CEC) studies during the teaching, learning, and assessment process.

5. Methodology

5.1. Context of the study

The researcher visited all the workshops and theory classes where NCV, NATED and Skill courses are presented for both theory and practical of Civil Engineering and Construction. The researcher developed a small simple conversation regarding teaching methods that are used for the teaching and learning process including the technological process. Thereafter, the researcher briefly explained the questionnaire before disseminating it to the participants.

5.2. The participants

The participants were all Civil Engineering and Construction lecturers from all TVET streams: NATED, NCV and Skills. Lecturers were in divers⁷/ diverse in gender: male n=20 (76.9%) female n=6 (23.1%); race: Africans n=25 (96.2%) and coloured n=1 (3.8%); and age (25 to 60). All lecturers studied within the building environment fields at different levels of qualifications.

5.3. Procedures

Disseminated questionnaires reached all participants within two to three days. On the fourth day the researcher initiated an hour-long face-to-face semi-interview session with the participants to confirm what was not clarified on the questionnaire. Collected, analysed and presented data included both qualitative and quantitative.

6. The findings presentation, interpretation and discussion

6.1. Quantitative data

Table 1. The extent lecturers use ALA in Civil Engineering and Construction studies at TVET colleges.

Q1	I use case studies as a teaching and learning technique frequently in my class.				
		Frequency	Percent	Mean	Std. Deviation
Valid	Strongly Agree	4	15.4	2.08	.628
	Agree	16	61.5		
	Disagree	6	23.1		
	Total	26	100.0		
Q2	I use projects frequently as a technique to teach other aspect of the content.				
		Frequency	Percent	Mean	Std. Deviation
Valid	Strongly Agree	8	30.8	1.96	.824
	Agree	12	46.2		
	Disagree	5	19.2		
	Strongly Disagree	1	3.8		
	Total	26	100.0		

Q3 I use research as a teaching and learning technique frequently to promote critical thinking in my class.					
		Frequency	Percent	Mean	Std. Deviation
Valid	Strongly Agree	11	42.3	1.77	.863
	Agree	12	46.2		
	Disagree	1	3.8		
	Strongly Disagree	2	7.7		
	Total	26	100.0		
Q4 I use demonstration method as the main teaching method in my class.					
		Frequency	Percent	Mean	Std. Deviation
Valid	Strongly Agree	17	65.4	1.42	.643
	Agree	7	26.9		
	Disagree	2	7.7		
	Total	26	100.0		
Q5 I use problem solving method to teach integration of content knowledge and practical work in my class.					
		Frequency	Percent	Mean	Std. Deviation
Valid	Strongly Agree	16	61.5	1.42	.578
	Agree	9	34.6		
	Disagree	1	3.8		
	Total	26	100.0		
Q6 I use technological process method to teach integration of content knowledge and practical work in my class.					
		Frequency	Percent	Mean	Std. Deviation
Valid	Strongly Agree	7	26.9	1.96	.824
	Agree	15	57.7		
	Disagree	2	7.7		
	Strongly Disagree	2	7.7		
	Total	26	100.0		

Table (1) above illustrates quantitative data representing the use of the technological process and its fundamental aspects. The results from Q1, Q2, Q3, Q4, Q5 and Q6 indicated that majority of lectures are more towards agree with all questions regarding the use and effective role of the technological process in Civil Engineering and Construction studies. The findings above coincide with Teis (2010:30), which confirmed that the main purpose of problem solving is stimulating a scientific method of hypothesis generation and testing. Therefore, the technological process is significant in promoting problem solving skills.

6.2. Qualitative data

Table 2. Types of teaching method and assessment in CEC.

Q1	How do you choose types of assessment for ALA in CEC studies?
A	All assessments are from DHET, but for expanded opportunity I use six steps technological process
B	I prefer a written test to assessment to show individual capacity or understanding
C	Types of assessment are given to us by DHET (Test, simulation, practical and Exam)
D	Assessment should be relevant to the topic, if it requires theory it will test, if practical it will be practical work or simulation.
E	All assessments are based on DHET stipulation. Both theory and practical. I recommend oral test and major practical only
F	40% theory and 60% practical as stipulated in the policy but in reality is other way round 60% theory and 40% practical. All assessments are given from DHET
G	Test, simulations, practical and examination as stipulated from the policy. I recommend six steps of technological process as a main key assessment
H	Test, simulation, practical and Examination. As stated in the policy
I	Test, simulation, practical and Examination
J	I use all assessment provided: Test, simulation, practical and Exam. But I recommend Technological process
Q2	How are the outcomes of assessment after the use of ALA in CEC studies?
A	Based on the standards of DHET out comes differ based on topics, but through technological process outcomes are excellent.
B	Most of my students are performing well
C	The outcomes are good even if some are not clear because at TVET we need practical not exam

D	They will depend on the topic but usually outcomes are good because students are always hand on (action action)
E	Based on my experience on size does not fit all, because students do differ cognitively other love practical's over theory. When I assess practical most students perform well
F	Because this is skills, ALA is giving the best results
G	We can't measure the outcome because we are using unit standard, but if I use my old experience I always measure specific outcomes and students do well
H	Base on test student are well, but practical work is outstanding
I	Through ALA I always reach my outcomes but not perfectly as I planed
J	Outcome are good but not as I prefer them

The two questions were posted for semi-structured face-to-face interviews to determine the perceptions of lecturers regarding the technological process and the impact of the outcomes from the use of the technological process. Lecturers revealed a preference towards the utilisation of the technological process with its fundamental aspects incorporated. This finding corresponds with Mokhothu (2019:118)'s findings accentuating that the technological process works as key principle of learning and assessment in Civil Engineering and Construction studies at TVET.

7. Conclusion

In conclusion the study claims that the technological process should be a main effective teaching, learning and assessment method or approach in Civil Engineering and Construction studies. the study found that lecturers utilise the technological process and its fundamental aspects for an effective teaching and learning process regularly, even though others were not aware.

References

- Masoabi, CS. (2015). *The Effect of Student Teams Achievement Divisions (STAD) as a Cooperative Learning Method in Cultural-Diverse School Setting*. Doctorate Degree thesis, Bloemfontein: University of Free State.
- Mokhothu, KG. (2015). *The Integration of Technical Subjects in Civil Technology Curriculum with Special Reference to FET Technical Schools*. MEd Dissertation. Bloemfontein: Central University of Technology Free State.
- Mokhothu, KG. (2019). Preventing Spectators in a Group-work: Civil Technology Student's perspective. Education and New Development 8th Ed. Lisbon, Portugal. (117-120), ISBN: 978-989-54312-5-0
- Teis NJP (2010). *Problem-Solving Teaching Strategies in Civil Technology in the Free State*. MEd Thesis, Unpublished. Bloemfontein: University of Free State.

THE CHALLENGE OF THE INITIAL TRAINING OF MATHEMATICS TEACHERS: KNOWLEDGE, PRACTICE, AND IDENTITY

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Abstract

In this research we pretend to answer the question: how is the initial training of mathematics teachers in the field of geometry? We argue that it is especially relevant to examine the content of mathematics teacher training in order to improve training processes. For this, we have analyzed training tasks and their management by the teacher educator about polygons, the construction of the definition and different classifications. The results show the variety of knowledge that is combined in this stage, including professional knowledge, professional practices and professional identity, providing evidence of theoretical advances in the field.

Keywords: *Initial teacher training, didactics of geometry, professional knowledge, professional practices, professional identity.*

1. Introduction

To answer the questions “What do prospective primary teachers (PPTs) need to learn to teach mathematics?” and “How do they learn it?” is mediated by the vision of what mathematics is for those who answer it, as teachers and as teacher educators. Also, it has to do with our beliefs about what a teacher is, beyond their knowledge. Initial teacher training is, therefore, heterogeneous in terms of its structure and content (Watson & Mason, 2007; Sánchez & García, 2008).

During initial training, the PPTs must make connections between the theoretical ideas that emerge from the field of Mathematics Education—theories, models, difficulties around a topic—and the implementation of these ideas in designs and planning (Jaworski and Huang, 2014). Likewise, in line with Ponte (2012), we consider that the content of initial teacher training is articulated around three main axes: professional knowledge, teaching practices and professional identity.

In the Spanish university context, the PPTs receive university degree training for four years, in which the courses aimed at developing their knowledge about the teaching and learning of mathematics is variable. Sometimes, some study programmes divide the subjects according to whether they work mainly on mathematical knowledge (MK) or pedagogical content knowledge (PCK), and on others, the subjects integrate both knowledge around the main mathematical topics (Nolla et al., 2021). According to the context in which this research has been developed, we are going to consider the second of the training models.

To explore the content addressed in the initial mathematics teacher training classroom, we are going to use the Mathematics Teacher's Specialized Knowledge Model (MTSK, Carrillo et al., 2018), the definition of mathematical competence by Blömeke et al. al. (2020) and the contributions on professional identity by Blake et al. (1998).

1.1. The MTSK model as a structure of knowledge in initial teacher training

The MTSK model has been shown to be useful as a structurer for initial teacher training programs as well as a guide in permanent training contexts (Montes, et al., 2019; Montes et al., 2021). The MTSK model continues Shulman's (1987) classical division between different teacher knowledge: mathematical knowledge and pedagogical content knowledge. The inclusion of the teacher's beliefs and the concept of specialization of the different types of knowledge that make it up are two distinctive features of this model compared to its peers (Ball et al., 2008; Rowland et al., 2009). On the one hand, it is considered that beliefs about mathematics and about the teaching and learning of mathematics permeate the different subdomains of the teacher's knowledge and serve as a filter or enhancer of professional knowledge and its development (Aguilar-González, et al., 2019). On the other hand, from the perspective

of the model, mathematical knowledge for teaching is intrinsic to the context in which it is constructed and used and, therefore, the teacher's knowledge, as a whole, is of a specialized nature (Carrillo et al., 2013). Another of the contributions of the MTSK model to the understanding of the specialized knowledge of teachers and, therefore, to the characterization of the knowledge that is built in the initial training classroom, is its detail in the description of different subdomains and categories of knowledge.

An example of how MTSK has been used to organize the content of teacher training, specifically in the subject that has been used as the context for obtaining the information in this research, can be found in Montes et al. (2019).

1.2. Skills, competencies and professional practices

During the development of a mathematics class, at any educational stage, the professional competence of the teacher plays a very important role, which has a significant impact on the quality of teaching and the learning of their students (Blömeke et al., 2020). The results, in this sense, lead our interest towards that second area of teacher training proposed by Ponte (2012), that of professional practice. We understand that initial training must be configured as a space where the construction of that knowledge in action takes place. In this way, we will consider teaching competence as the ability to offer an observable response, supported by the teacher's cognitive and motivational resources, as a result of interpreting a teaching-learning situation (Blömeke et al., 2020).

The development of this type of teaching skills allows teachers not only to respond to contingency situations in the classroom (Rowland et al., 2009), but also to be able, previously, to optimally design teaching situations and, in addition, extend their reflections throughout the process (Schön, 1991).

1.3. Being and feeling like a teacher

We understand professional identity as a part of the self-concept that develops in dialogue with the social and cultural constructions of the profession, as a result of interaction with others (Blake et al., 1998), and is considered to be in constant construction throughout of the professional career of the teacher (Losano et al., 2018). It is the way in which the individual, in our case the teacher, is personally recognized within the professional body from a social and cultural point of view. According to Lave (1988), the development of professional identity within a community and the construction of knowledge and professional practices are part of the same process. The construction of professional identity motivates, gives shape and meaning to the rest of learning. For this reason, the initial training of teachers is articulated as a key scenario in their development (Losano et al., 2018). The construction of different teaching practices and the legitimization of certain types of knowledge in the initial training classroom can help EPMs to develop a professional identity (Ponte, 2002).

2. Design

According with our interpretive point of view, we have chosen the case study as the research design (Bassegy, 1999, Stake, 1995). Our intention is to understand the meanings that are developed in the initial training classroom. The research we have developed corresponds to an inductive approach, in the sense exposed by Bryman (2001). The information collection instrument that we have used in this research is non-participant observation (Flick, 2007), recorded by audio and video recording of the sessions. A total of five sessions, each lasting two hours, were recorded, in addition to PPTs class tasks.

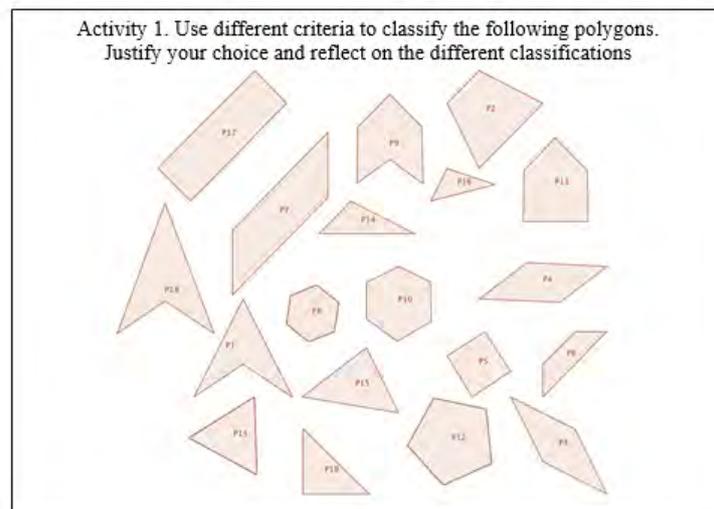
The meanings that emerge from the work in the training classroom and in the proposed training tasks have been analyzed from the point of view of content analysis (Krippendorff, 1990). The validation of the analysis is achieved through the triangulation processes of consensus among experts (Flick, 2007) and the contrast between fragments from different collection instruments, as a multi-methodological approach (Baxter & Lederman, 2001).

3. Discussion

During the analysis of the information, different types of training moments have been found in which the focus of work changes from the deepening of mathematical knowledge to the development of the professional identity of students to teacher. Below, we show some examples found.

In relation to the professional knowledge that is developed in the classroom, we find activities intended, for example, to deepen the understanding of the classification of polygons of the students for teacher PPTs (Figure 1). The objective of the activity is to deepen the understanding of the mathematical elements that underlie the classification of polygons, showing an inductive process of construction of the classification from the discussion of examples.

Figure 1. Activity on polygon classification (I).



The management of this activity allowed us to identify a particular way of working with mathematical content, which allows the PPTs to discuss and question its foundations so that they can unpack that knowledge for their teaching (Ma, 1999). In parallel, the pedagogical content knowledge of the PPTs has been developed. In this sense, the training activities invited reflection on the didactic potential of the task, its criticism and enrichment. (Figure 2).

Figure 2. Activity on polygon classification (II).

Activity 2: Analyze properties and characteristics

- a) (Before class) Design a session to work on classifying triangles in 4th grade. Use some resource (geoplans, point plots, geostrips,...) for this.
- b) (In class) Discuss with your classmates the strengths and weaknesses of the different proposals made.
- c) Get a point plot and draw as many different triangles as you can.
- d) Discuss why each one is different from the previous ones.
- e) Can you draw an equilateral triangle on the plot? Reason your answer.

The observation allowed us to identify mathematical knowledge and pedagogical content knowledge that could be characterized by the MTSK model (Carrillo et al., 2018) on a recurring basis. Activities in which elements of professional knowledge were discussed as content of initial training predominated, identifying a mixed model of training in relation to mobilized knowledge (Nolla et al., 2021), over the other blocks of content determined by Ponte (2012).

The design of activities, a task that can also be seen in Figure 2, is the central teaching practice identified during the observations. However, it also reflects on the learning difficulties of mathematics in Primary Education, based on joint readings on the difficulties caused by the representation of geometric figures in textbooks (Jaime et al., 1992). and on the sequencing of geometric content based on the Van Hiele model (Fouz, 2004), which allows students to foresee contingency situations (Rowland et al, 2008) and act accordingly, including these considerations in their didactic designs.

Based on modelling strategies (Rojas et al., 2021), the teacher educator includes different didactic designs for teaching geometry within the content of the initial training, specifically in relation to the definition of the polygon, as observed in Figure 3:

Figure 3. Class transcript extract.

Teacher educator: This activity can be exported to a Primary course, as is. What we are doing here, I can transfer to Primary Education. Defining, agreeing on properties, leads us to a shared way of defining a polygon in the face of an imposed definition of which we do not understand why those criteria are imposed, right? Well, it works the same when you teach it, because your students will also be able to do this process, which is richer.

Finally, we have observed a trend towards the development of professional identity in PPTs during initial training in parallel with the rest of the training activities. Other authors account for this phenomenon (Lave, 1988). In this way, the presence of learning resource, textbook and curriculum analysis activities point towards the development of an active and critical professional profile. On the other hand, the sense of construction of mathematics and the attribution of a social character to this process, favors the development of beliefs about mathematics linked to problem solving and discovery tends. Both groups of beliefs, about mathematics and about its teaching and learning, have been studied using the MTSK model as a reference (Aguilar et al. 2019) and are part of how PPTs can be recognized within the teaching community.

4. Conclusions

In conclusion, reflecting on the initial training of mathematics teachers is a crucial issue today. The improvement of the teaching of mathematics depends on the training of mathematics teachers and this training, on how the programs are articulated in the universities. This study has served to systematically analyze the content of the initial training of mathematics teachers and contributes to initiating other interventionist-type research that can optimize the processes of initial and permanent training of mathematics teachers. The case study as a research methodology has served us to delve into the observed reality, although complementary studies are necessary to compare and discuss in different contexts.

As a consequence of the characteristics of the observed context, evidence on mathematical knowledge in initial training predominates. However, organizing initial training based on professional teaching skills is a growing approach and a reality in other training contexts. In relation to research on the processes of shaping professional identity, we find ourselves before a particularly relevant field due to the difficulty of extracting empirical evidence and the scarcity of research results in this regard.

References

- Aguilar-González, Á., Muñoz-Catalán, M. C., & Carrillo, J. (2019). An Example of Connections between the Mathematics Teacher's Conceptions and Specialised Knowledge. *Eurasia Journal of Mathematics, Science and Technology Education*, 15(2), 15.
- Ball, D. L., Thames, M. H., & Phelps, G. (2008). Content knowledge for teaching: What makes it special? *Journal of Teacher Education*, 59, 389–407.
- Bassey, M. (1999). *Case Study Research in Educational Settings*. Oxford, UK: Open University Press.
- Blake, N., Smeyers, P., Smith, R. & Standish, P. (1998). *Thinking again: Education after postmodernism*. Massachusetts, US: Bergin & Garvey.
- Blömeke, S., Paine, L., Houang, R.T., Hsieh, F., Schmidt, W., Tatto, M.T., Bankov, K., Cedillo, T., Cogan, L., Han, S.I., Santillan, M., & Schwolle, J. (2008). Future teachers' competence to plan a lesson: first results of a six-country study on the efficiency of teacher education. *ZDM Mathematics Education*, 40(5), 749-762.
- Blömeke, S., Kaiser, G., Köning, J., & Jentsch, A. (2020). Profiles of mathematics teachers' competence and their relation to instructional quality. *ZDM Mathematics Education*, 52(2), 329-342.
- Bryman, A. (2001). *Social Research Methods*. Oxford, UK: Oxford University Press.
- Carrillo, J., Climent, N., Contreras, L.C., & Muñoz-Catalán, M.C. (2013). Determining specialized knowledge for mathematics teaching. In B. Ubuz, Ç. Haser & M. Mariotti (Eds.), *Proceedings of the Eighth Congress of the European Society for Research in Mathematics Education* (pp. 2985-2994). Antalya, Turkey: ERME.
- Carrillo, J., Climent, N., Montes, M; Contreras, L.C., Flores-Medrano, E., Escudero-Ávila, D., Vasco-Mora, D., Rojas, N., Flores, P., Aguilar-González, A., Ribeiro, M. & Muñoz-Catalán, M.C. (2018). The Mathematics Teacher's Specialised Knowledge (MTSK) model. *Research in Mathematics Education* 20(3), 236-253.
- Flick, U. (2007). *Introducción a la investigación cualitativa*. Madrid Spain: Ediciones Morata.
- Jaworski, B., & Huang, R. (2014). Teachers and didacticians: key stakeholders in the processes of developing mathematics teaching. *ZDM Mathematics Education*, 46(2), 173-188.
- Krippendorff, K. (1990). *Metodología de análisis de contenido. Teoría y práctica*. Madrid, Spain: Paidós.
- Lave, J. (1988). *Cognition in practice: Mind, mathematics and culture in everyday life*. Cambridge, UK: Cambridge University Press.

- Losano, L., Fiorentini, D., & Villareal, M. (2018). The development of a mathematics teacher's professional identity during her first year teaching. *Journal of Mathematics teacher Education*, 21, 287-315.
- Ma, L. (1999). *Knowing and teaching elementary mathematics: Teachers' understanding of fundamental mathematics in China and the United States*. Lawrence Erlbaum Associates.
- Montes, M., Carrillo, J., Contreras, L. C., Liñán-García, M. M., & Barrera-Castarnado, V. (2019). Estructurando la formación inicial de profesores de matemáticas: Una propuesta desde el modelo MTSK. In E. Badillo, N. Climent, C. Fernández & M. T. González (Eds.), *Investigación sobre el profesor de matemáticas: Prácticas sobre el aula, conocimiento, competencia y desarrollo profesional* (pp.157-176). Salamanca, Spain: Ediciones Universidad de Salamanca.
- Montes, M., Pascual, M.I., & Climent, N. (2021). Un experimento de enseñanza en formación continua estructurado por el modelo MTSK. *Revista Latinoamericana de Investigación en Matemática Educativa*, 24(1), 83-104.
- Nolla, A., Muñoz, R., Cerisola, A., & Fernández, B. (2021). La formación inicial de los maestros en matemáticas y su didáctica. *Revista interuniversitaria de Formación del Profesorado*, 96(35.1), 185-206.
- Ponte, J.P. (2012). Mathematics teacher education programs: practice and research. *Journal of Mathematics Teacher Education*, 15(5), 343-346.
- Ponte, J.P., Oliveira, H, & Varandas, J. M. (2002). Development of pre-service mathematics teachers' professional knowledge and identity in working with information and communication technology. *Journal of Mathematics Teacher Education*, 5, 93-115.
- Rojas, F., Montenegro, H., Goizueta, M., & Martínez, S. (2021) Researching modelling by mathematics teacher educators: shifting the focus onto teaching practices. In M. Goos & K. Beswick (Eds.) *The learning and development of mathematics teacher educators* (pp. 367-382). Springer.
- Rowland, T., Turner, F., Thwaites, A., & Huckstep, P. (2009). Transformation: Using examples in mathematics teaching. In T. Rowland, F. Turner, A. Thwaites, y P. Huckstep (Eds), *Developing Primary Mathematics Teaching: Reflecting on Practice with the Knowledge Quartet* (pp. 67-100). London, UK: Sage.
- Sánchez, V. & García, M. (2008). What to teach and how to teach it: dilemmas in primary mathematics teacher education. In B. Jaworski & T. Woods (Eds.), *The Mathematics Teacher Educator as a Developing Professional*, (pp. 281-298). London, UK: Sense Publishers.
- Schön, D. (1991). *The reflective practitioner: How professionals think and act*. Avebury.
- Shulman, L. S. (1987). Knowledge and Teaching: Foundations of the New Reform. *Harvard Educational Review*, 57(1), 1-22.
- Stake, R.E. (1995). *The Art of case study research*. London: SAGE.
- Watson, A. & Mason, J. (2007). Taken-as-shared: a review of common assumptions about mathematical tasks in teacher education. *Journal of Mathematics Teacher Education*, 10, 205-215

THE IMPACT OF “ROLE PLAY” AS A TEACHING APPROACH IN CIVIL TECHNOLOGY: A CASE STUDY

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Abstract

Civil Technology is one of the subjects in Technical and Technology that requires lecturers and student teachers to take full responsibility for class and workshop. The aim of the study was to assess the impact of role play as a teaching approach in Civil Technology safety as the topic. While the objective was to examine the impact of role play as a teaching approach that imparts sustainable knowledge and application in subject content. Participants in the study were thirty-two (32) third-year Civil Technology students from the University of Technology in the Free State province in South Africa. The Mix method, consisting of quantitative and qualitative components, was used to collect data. The findings of the study indicated that students have better construal and mastery of the content application when they are granted free role play to determine their own knowledge and application style.

Keywords: *Civil technology, safety, role play.*

1. Introduction

Safety is regarded as one of the most important chapters in Civil Technology curriculum, escalating from first year to third year of studies additional safety encompasses theory and practical aspects. A qualified Civil Technology teacher should be competent to manage safety in a classroom, workshop and on a site. While Civil Technology aims to prepare a teacher that is confident enough to maintain and implement a safety role in a field, to safe life of others involved in the process of teaching and learning. Hence, Curriculum Assessment Policy statement (CAPS) on Specialisation (2012:13) emphasises that the requirements of the Occupational Health and Safety (OHS) Act 85 of 1993 need to be complied with at all the times.

2. The Conceptualisation of the study

2.1. Role play

Role playing methods in professional engineering education includes a variety of different approaches, such as simulated or consistent mini project methodology, mannequin-based methodologies, role-playing, games and virtual reality (Bearman, Palermo, Allen, NutrDiet and Williams, 2015). Therefore, role play is one of the methods that afford students opportunity of independency while learning.

2.2. Safety

Safety in this study describes the chapter in Civil Technology curriculum that covers general safety roles in the workshop, personal protective equipment, hand tool, portable power tools and machine safety and maintainers. Furthermore, CAPS on specialisation (2014: 13) pronounce that the teachers should service the workshop through execution of precautionary maintenance, upgrading, service and repair of devices.

2.3. Civil Technology

Civil Technology in this study refers to one of the subjects in technical education incorporating all subjects in building environment. Civil Technology equip students with theory and practical work. Hence, the subject is categorised in to three specialisations which are: Civil Services (water work and plumbing), Construction and Woodworking. Mokhothu (2019: 118) defines Civil Technology as the subject that is developing the skills level of learners from grade 10-12 and student teachers from first year to third year level to embrace effective integration of theory and practical work (DoE, 2014:11).

3. The aim of the study

The aim of the study was to assess the impact of role play as a teaching approach in Civil Technology safety as the topic.

4. The objective of the study

The objective was to examine the impact of role play as a teaching approach that imparts sustainable knowledge and application in subject content.

5. Proposition

Role play promotes student confidence and competence of Civil Technology theory and practical in safety as a topic.

6. Methodology

6.1. Context of the study

The formal classes of Civil Technology were conducted under safety as a subject topic. The safety topic was covered from the first, second and third year with the same group of students. The research was conducted in the first term of the second semester of their studies in Bachelor of Education Senior Phase and Further Education and Training. The oral presentation and practical were used to measure the impact of role play as a teaching approach or method.

6.2. Participants

The participants of the study were all Civil Technology third year registered at one of the University of Technologies in South Africa. Participants were N=34 in total, comprising of females n=15 (44%) and males n=19 (56%), and all were from various ethnical groups (Africans, coloured and whites).

6.3. Measures

During the first year the topic of general safety at a workplace, hand tool safety and personal protective equipment were addressed. In the second year, the following topics were covered: Safety in a workshop, power tools safety and machine safety. During the third-year level the following topics were addressed: the Acts and regulations from all regulatory bodies involved in building environment field such as: Occupational Health and Safety (OHS), South African Bureau of Standards (SABS), South African National Standards (SANS), National Building Regulator (NBR) and National Home Builders Registration Council (NBHRC). Therefore, the researcher presented students with the task where they were asked to develop a safety booklet which will orientate grade 11-12 learners in safety. Then individual students should develop a booklet and in groups students should develop a present Power Point presentation to present in class.

7. The results and discussion

Table 1. Safety booklet.

Stage	Individual	Frequency	Percentage (%)	Average
Stage 1	34	5	70	90
		5	82	
		11	75	
		13	80	

Table 2. Group presentation.

Stage	Groups	Frequency	Average
Stage 2	1	70	72
	2	70	
	3	78	
	4	70	

The two tables (1 and 2) above, indicated findings of the study from the booklet stage to presentation stage. Table (1) highlights that students managed to score an average of 90, revealing that role play has a significant impact on the teaching and learning process in Civil Technology. Table (2) illustrates the findings on group presentations where students scored an average of 72, indicating the competence and confidence of student in theory and practical work. All the results above coincide with the statement of Bearman, Palermo, Allen, NutrDiet and Williams, (2015) which characterised role playing methods in professional engineering education that included a variety of different approaches, such as simulated or consistent mini project methodology, mannequin-based methodologies, role-playing, games and virtual reality.

8. Conclusion

In conclusion, role play promotes student confidence and competence of Civil Technology theory and practical in safety as a topic. Role play also encourages group work as an intervention to clarify other missed content.

References

- Bearman, M., Palermo, C., Allen, LM, NutrDiet & Williams, B. (2015). Learning Empathy Through Simulation: A Systematic Literature Review. *Journal of the Society for Simulation in Healthcare*, 10(5): 19-308. doi: 10.1097/SIH.000000000000113.
- Department of Higher Education and Training. 2012a. Green paper for Post-school Education and Training. Pretoria: Department of Higher Education and Training.
- DoE (Department of Education) (2014). Government Gazette, Vol. 589 No.37840. Pretoria: Department of Education.
- Mokhothu, KG. 2019. Preventing Spectators in a Group-work: Civil Technology Student's perspective. Education and New Development 8th Ed. Lisbon, Portugal. (117-120), ISBN: 978-989-54312- 5-0.

PREPARING AFRICAN LANGUAGE STUDENT TEACHERS FOR THE WORKPLACE IN SCHOOLS: A STUDY IN SOUTH AFRICA

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Abstract

There is considerable agreement that learning to teach African Languages (AL) is optimized when coursework learning is combined with quality practice learning experiences in schools. The importance of role of (AL) in teacher education programmes and in children's learning is of paramount importance. This study focuses on the use of the African Language (AL) as the language of learning and teaching (LoLT) and its impact on the language development of (AL) student teachers and AL learners. The main aim of this study was to explore the views of a group of student teachers on their practice learning experiences in a 'teaching school' (TS). Against the background of major theories in Home Language (HL) teaching and learning, this topic is contextualized within the South African education system. Through qualitative analysis of a dozen semi-structured interviews, this study identifies the issues that limit the ability of African Language Education (ALE) programmes to prepare student- teachers for teaching in South Africa. Based on the findings, a questionnaire was designed to determine the extent of the impact of student teachers' limited on African Language Proficiency (ALP). A comparison of teacher and learner written errors was made. The findings of the questionnaire responses are presented. Recommendations are made on how student teachers can improve their teaching approaches to ensure quality AL teacher input and AL learner performance. Qualitative questionnaires and (focus group) data were collected, involving all the student teachers in the programme. The responses to the questionnaire were analysed descriptively. The study was conducted at an urban campus of a South African university.

Keywords: *African language, home language, teaching schools, African language proficiency, African language education.*

1. Introduction

The aim of this paper is to identify the issues that affect the ability of African Language Education programmes (ALPs) to prepare students for the workplace in South African schools. The quality of higher education is a significant factor in enhancing the capacity and development of an economy (Kirtley & Choudhury, 2016). The language of learning and teaching (LoLT) remains one of the most controversial issues in South African education. Three-and-a-half centuries of colonialism and apartheid have resulted in a language regime in which the valorisation of Afrikaans and English came at the expense of the indigenous African languages, which have been systematically excluded from the political landscape (Bangbose 2000). This societal exclusion is reflected in their marginalisation in education at both school and teacher development levels. Depriving children from using the Mother Tongue (MT) as their primary learning resource results in cultural alienation, a lack of self-confidence, and under-achievement (Braam & Nijssen, 2004). The precise issues in preparing African Language (AL) students for the workplace, and how to address those issues, are likely to vary according to several factors, including the level of educational development.

Aligning the languages of teacher training with the languages of schooling is nonetheless one of the most self-evident tasks for Mother Tongue Based Bilingual Education (MTBBE) in South Africa. MTBBE assumes that the schooling system is to be based not on a second or a third language, but on learners' mother tongues (Alexander 2006). At present most African-language speaking children experience a maximum of three years of mother tongue education (MTE), before the (on-paper) transition to English in Grade 4. It is well documented that the use of the Home Language (HL) continues de facto, as the transition to English as LoLT in the fourth year of schooling is premature in most African-language contexts. It is also widely recognised even within government circles that the use of the MT for learning for at least the first six Grades represents an essential, if insufficient, step-in ensuring literacy and numeracy development (Plüddemann et al. 2010).

2. Design

To lay a foundation for the empirical research, the following section reviews three sets of literature. First, four existing studies of African languages in education in South African universities are reviewed. Second, to provide an overview of issues in African languages in education, a well-established series of reviews of empirical research in African languages in education is used, with a particular focus on developing countries. Third, the concept of institutional isomorphism is outlined. The next three sections describe the objectives, research method, discussion, and conclusions respectively.

3. Objectives

The study makes three main objectives. First, it provides a rare examination of the ability of South African universities to prepare students for the workplace. A strength is the canvassing of the views of both faculty and practitioners. Second, not only is it the first study to focus on the important issue of the preparation of students for the workplace in South Africa, but its findings add to the general body of knowledge on African language education there, which previously was based on weak empirical foundations. In doing so, the study also adds to the body of knowledge about African language education in South Africa. Third, to develop a set of recommendations for improving the ability of African Language Education (ALE) in South Africa to prepare students for the workplace. These recommendations are likely to be of potential relevance to other developing countries

4. Research method

Reflecting an orientation towards quantitative research, questionnaires have been a very popular method of collecting empirical data in ALE research. However, they are not suited to accessing actors' views in depth, which is a strength of qualitative techniques such as focus groups, participant observation and interviews. Such data were required to meet the aim and objectives of the present study. For practical reasons, only interviews were feasible. Interviews come in many forms (Benny & Hughes, 1977). A decision was made to interview educators from a range of ALPs, so that the findings would not be driven by the idiosyncrasies of any individual institution. It was also decided to interview practitioners, because students can be viewed as the outputs of ALPs to the workplace, and practitioners' views might differ from those of faculty. Practitioners are exposed to current workplace demands and have experienced the transition from academic study to professional practice, so their views are likely to possess validity. Twelve interviewees (seven educators, from two different state universities, and two practitioners) participated in the study. The interviewees were assured of data confidentiality and anonymity in the reporting of findings. The research approach was approved by the relevant university ethics committee. The aim of the study and a broad understanding of the African language education literature in mind, guidance for question themes was derived through a reading of Bui and Porter (2010), which is an interview-based study focused on the gap between the competences employers expect and perceive African language graduates to possess. Reference was also made to three studies that use interviews and draw on institutional theory (Gonzalez et al., 2009; González & Hassall, 2009; Hassall et al., 2005).

5. Discussion / Conclusions

The teachers and their contribution to the development of our students; depend on a teaching school to fulfil multiple roles. In addition to their teaching role, they also have to take up the role of school-based teacher educator, dealing not only with the complexity of working with and managing groups of students, but also collaborating with the university-based teacher educators (Gravett, 2012). Ideally, such teachers should be purposefully selected to ensure that they have the potential to fulfil these multiple roles. However, as a public school, the teachers are appointed by the School Governing Body (SGB), and they do not necessarily have the profile that fits the requirements. Not only do these teachers require a more specialised knowledge of their subjects and of teaching methods, but also of how to mentor students. Feiman-Nemser and Buchman (1985) profoundly make the point that if classrooms are to become settings for learning to teach that go beyond adaptation and unreflective imitation, purposes of learning to teach cannot automatically be subordinated to the goal of pupil learning. Teachers also must see themselves as teacher educators willing to plan for the learning of a novice. A teacher's experience as teacher alone is not sufficient. Regarding the coursework planning and structuring suitable tasks for students, the interweaving of practical knowledge situated in the school with knowledge of ideas in the coursework requires careful planning and familiarity with the curriculum followed in the school. It also necessitates close collaboration between school staff and university staff (Gravett, 2012). These pre-requisites present challenges that are

not insurmountable, but they still place an additional burden on staff at the school and university. We have also learned that student observations need to be planned and structured carefully beforehand and that students need to be prepared well for observation.

Synergy in curriculum change conversations; Looking to Africa: Stuck in a dilemma of change; and Re-humanising education and the curriculum: Making better human beings for a better society. All participants were allocated pseudonyms to protect their identity and to comply with research ethics. Le Grange (2016) asserts that decolonising the curriculum is not an occurrence but a complex process of productively moving forward, being unable to turn back the clock, and beginning with a clean slate to challenge dominant ideologies and knowledge systems. Therefore, curriculum should include integrated histories that are “conducive to a reconstructed curriculum, that incorporates reality as perceived from different cultural historical moments” so that learning becomes a meaningful experience (Shizha, 2013:15).

. In South Africa, academics in this position are still in the minority and so it will take time for decolonisation to take place within higher education (Maserumule, 2015). Heleta (2016) elucidates the opposition to be within the institutional structures who hold on to power, influence, and decision-making, and will do anything in their power to resist change and to maintain the status quo. In responding to decolonisation as a process of curriculum change, some participants called for the process of decolonising the curriculum to commence with an abrupt departure from the status quo that interrogates and removes colonial and apartheid knowledge systems, and with holding institutions which perpetuate colonial thoughts and ideals accountable.

This paper attempted to situate the curriculum decision-makers within the context of teacher education curriculum development for the purpose of understanding their thinking regarding the curriculum and what it means for reengineering the curriculum considering the current debates surrounding decolonisation.

In South African education, many changes have taken place over the past 28 years of democracy. (Grosser & De Waal (2008); Swart & Oswald (2008) postulate that in particular, the introduction of the outcomes based curriculum demanded that changes be made in teacher development with regard to pedagogy, teacher identities and roles to facilitate effective implementation in schools. Ongoing efforts are being made to induct teachers into the New Curriculum Statement (NCS), but the training does not focus on teachers’ epistemological and pedagogical development in terms of conceptual knowledge, creative thinking and innovativeness.

References

- Alexander, B. (2006). Web 2.0: A new wave of innovation for teaching and learning? *Educause review*, 41(2), 32.
- Andreotti, V., Ahenakew, C. & Cooper, G. (2011). Epistemological pluralism: Ethical and pedagogical challenges in higher education. *AlterNative: An International Journal of Indigenous Peoples*, 7(1):40–50. <https://doi.org/10.1177%2F117718011100700104>
- Bamgbose, A., & Bamgbose, A. (2000). Language and exclusion: The consequences of language policies in Africa (Vol. 12). LIT Verlag Münster.
- Bell, S. K., Etchegaray, J. M., Gaufer, E., Lowe, E., Ottosen, M. J., Sands, K. E., ... & Kenney, L. (2018). A multi-stakeholder consensus-driven research agenda for better understanding and supporting the emotional impact of harmful events on patients and families. *The Joint Commission Journal on Quality and Patient Safety*, 44(7), 424-435.
- Benny, M., & Hughes, E. C. (1977). Of sociology and the interview. In M. Bulmer (Ed.), *Sociological research methods* (pp. 233–242). Macmillan.
- Benson, P., & Gao, X. (2008). Individual variation and language learning strategies. *Language learning strategies in independent settings*, 25-40.
- Braam, G. J., & Nijssen, E. J. (2004). Performance effects of using the balanced scorecard: a note on the Dutch experience. *Long range planning*, 37(4), 335-349.
- Bryman, A. (2001). *Social research methods*. Oxford University Press.
- Bui, B., & Porter, B. (2010). The expectation-performance gap in accounting education: An exploratory study. *Accounting Education: An International Journal*, 19(1–2), 23–50. <https://doi.org/10.1080/09639280902875556>
- Chilisa, B. (2012). *Indigenous research methodologies*. Los Angeles, CA: Sage.
- Denzin, N. K., & Lincoln, Y. S. (1998). *Collecting and interpreting qualitative materials*. Sage.
- Department of Education (DoE). (2007). *National policy framework for teacher education and development*. April 2007 Pretoria: DoE

- Feiman-Nemser, S., & Buchmann, M. (1985). Pitfalls of experience in teacher preparation. *Teachers College Record*, 87(1), 53-65.
- González, J. M. G., & Hassall, T. (2009). The changes to accounting education and accounting educators as a result of changes in the Spanish university system: A case study using an institutional theory approach. *International Journal of Management Education*, 7(3), 13–25. <https://doi.org/10.3794/ijme.73.246>
- Gonzalez, J. M. G., Arquero Montaña, J. L., & Hassall, T. (2009). Pressures and resistance to the introduction of skills in business administration and accounting education in Spain: A new institutional theory analysis. *Journal of Vocational Education and Training*, 61(1), 85–102. <https://doi.org/10.1080/13636820902820071>
- Gravett, S. (2012). Crossing the " Theory-Practice Divide": Learning to Be (come) a Teacher. *South African journal of childhood education*, 2(2), 1-14.
- Grosser, M., & De Waal, E. (2008). Recentring the teacher: From transmitter of knowledge to mediator of learning. *Education as Change*, 12(2), 41-57.
- Hassall, T., Joyce, J., Arquero Montaña, J. L., & Donoso Anes, J. A. (2005). Priorities for the development of vocational skills in management accountants: A European perspective. *Accounting Forum*, 29(4), 379–394. <https://doi.org/10.1016/j.accfor.2005.03.002>
- Heleta, S. (2016). Decolonisation of higher education: Dismantling epistemic violence and Eurocentrism in South Africa. *Transformation in Higher Education*, 1(1):1–8. <https://doi.org/10.4102/the.v1i1.9>
- Howie, S. J., Venter, E., Van Staden, S., Zimmerman, L., Long, C., Du Toit, C. M., ... & Archer, E. (2007). *PIRLS 2006 summary report: South African children's reading achievement*. Centre for Evaluation and Assessment (CEA).
- Kirtley, O. F., & Choudhury, F. (2016). Trust and integrity: The accountancy profession's call for action by the G-20. IFAC.
- Le Grange, L. (2016). Decolonising the university curriculum: Leading article. *South African Journal of Higher Education*, 30(2), 1-12.
- Maserumule, M. H. (2015). Engaged scholarship and liberatory science: A professoriate, Mount Grace, and SAAPAM in the decoloniality mix. *Journal of Public Administration*, 50(2), 200-222.
- Plüddemann, A., Flisher, A. J., McKetin, R., Parry, C., & Lombard, C. (2010). Methamphetamine use, aggressive behavior and other mental health issues among high-school students in Cape Town, South Africa. *Drug and alcohol dependence*, 109(1-3), 14-19.
- Shizha, E. (2013). Reclaiming our indigenous voices: The problem with postcolonial Sub-Saharan African school curriculum.
- Stevick, E. W. (1990). Research on what? Some terminology. *The Modern Language Journal*, 74(2), 143-153.
- Swart, E., & Oswald, M. (2008). How teachers navigate their learning in developing inclusive learning communities. *Education as change*, 12(2), 91-108.

THE PRE-SERVICE TEACHERS UNDERSTANDING OF FRACTION AND HOW FUTURE INSTRUCTIONS CAN BE IMPROVED TO OPTIMISE LEARNING

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Abstract

There is an ongoing debate on whether preservice teachers should be taught the mathematics content knowledge because they start their mathematics content courses believing that they know enough mathematics to teach at a primary school level. Previous research has shown that much of the preservice teachers' knowledge lacks conceptual understanding. Consequently, the current study explored preservice teachers' knowledge of fractions. The study focuses on preservice' teachers' knowledge when comparing sizes of different fractions. The study will identify what the preservice teachers know about the comparison of size when it comes to fractions. A better understanding of how student teachers understand mathematics will inform better teaching methods for future instructions. This is to inform better instructional design in future ITE courses. The needed data consisted of 90 preservice teachers' activity scripts and a task-based interview of some students. The study was guided by the research question: What is the preservice teachers' understanding of fraction comparison, and how can future instruction be improved to optimize learning? The study adopted a mix-method approach where preservice teachers' responses to activities items were analysed from a first-year module conducted at a university level. Content analysis of the data yielded important findings that showed that preservice teachers have some misconceptions when they must determine the bigger fraction between the two. This study may be helpful to academics designing initial teacher education courses for mathematics and teachers who are already teaching mathematics in primary schools.

Keywords: *Mathematics for teaching, initial teacher education. preservice teacher practices, fractions, error analysis.*

1. Introduction

The mathematics common content knowledge is not always common to each preservice teacher. There is always an argument that the preservice teachers are assumed to possess the common content knowledge because it is based on what was previously taught during their school years. However, the pedagogical content knowledge for mathematics always lags the common content knowledge. This implies that, for an individual to teach mathematics effectively, their mathematics content knowledge should be intact. Primary school teachers' content mathematical knowledge remains an issue of broad concern in South Africa. Most of the research on the knowledge of the mathematics teacher in South Africa has been focused on in-service primary teachers, and particularly teachers at Intermediate Phase (grades 4–6) level (e.g. Carnoy & Chisholm, 2008; Taylor, 2011; Venkat & Spaul, 2015). The findings from these studies show a substantial gap in upper primary teachers' mathematical knowledge. Additionally, teacher performance on assessment items requiring reasoning beyond the purely procedural consistently shows low results (Carnoy & Chisholm, 2008).

We constantly ask ourselves whether preservice teachers should be taught the content knowledge they are going to teach to their learners, or should we assume that they already know the content? To add to that, preservice teachers also start their mathematics content courses believing that they know enough mathematics to teach at a primary school level. The study done by Stohlmann et al. (2014) confirms that prospective teachers enter universities with that belief and mindset. As a result, the initial teacher education courses in mathematics usually focus on pedagogical content knowledge (PCK) instead of the mathematics subject matter knowledge (SMK).

With a focus on primary school foundation phase mathematics preservice teachers, while zooming on the topic of fractions, comparing sizes of different fractions, the study will identify what the preservice teachers know about comparing fraction values or size to inform better instructional design in future initial teacher education courses.

2. Literature review

According to Van De Walle et al. (2012), the study of fractions is significant for students because it is essential for algebra and many advanced mathematics topics. Student teachers are taught this topic to improve their subject matter knowledge as well as the content knowledge. When students struggle to understand fractions, they will have difficulties in many areas such as decimals, percentages, rate-ratio, measuring fractions, and using them in algebra (Aliustaoğlu, Tuna & Biber, 2018). The study done by Deringöl (2019) revealed that fraction concepts are more difficult for students than many of the topics in the mathematics curriculum. The research done by Aliustaoğlu et al. (2018) showed that students at all levels of education have many misconceptions about fractions. The best way to prevent them is to focus on teacher educators because they are the ones that lay the foundations for future mathematicians.

The study done by Aliustaoğlu et al (2018) revealed that students have misconceptions about comparing fractions and operations on fractions. One of the misconceptions is based on how students view fractions. Same as the learners in the primary school level, they learn about whole numbers before they can learn fractions. Students build new concepts by using their previous knowledge of whole numbers. According to Van De Walle (2012), students use their knowledge of whole numbers on fractions and assume that numerator and denominator are distinct values without thinking that both numerator and denominator form a fraction that should be looked at holistically. For example, when finding the bigger fraction between the two, some students only focus on the numerator or denominator individually and then assume that if the number at the numerator is bigger, the fraction is also bigger, or if the number at the denominator is bigger, the fraction is smaller. This misconception is coming from the understanding that the numerator determines the size of the fraction in comparison to the whole. For example, $\frac{2}{5}$ is bigger than $\frac{1}{5}$, and $\frac{2}{5}$ is bigger than $\frac{2}{10}$. Students fail to understand the context of the fraction and overlook the concept of part and whole. The study done by Okur & Çakmak Gürel (2016) revealed that students struggle to pay attention to the fact that parts of shapes must be equal before one can even begin to compare the two fractions. This confirms what Alacaci (2014) argued when he says misconceptions are due to focusing on a single component instead of the searching relationship between numerator and denominator and thinking of fractions as natural numbers.

3. Theoretical framework

This study used students' understanding of error and misconception as a heuristic that teachers can use to inform better teaching methods for future instructions and support students to gain conceptual understanding of the mathematics they are learning (Nesher, 1987). Part of being an effective mathematics teacher is the ability to communicate mathematics common content knowledge by using effective pedagogical content knowledge that is informed by the students' knowledge. (Ball & Bass, 2000; Nesher, 1987; Shulman, 1986). This study draws from Ball & Bass (2000)'s work on mathematics knowledge for teaching and Nesher (1987)'s work on mathematics misconception by making a claim that knowing what to teach and what the learners know and how they use what they know to acquire new knowledge will determine possession of good pedagogical content knowledge.

4. Methodology

The description is based on mixed-method research. The required data were collected by analysing students' written assessments. The quantitative part focused on the number of themes obtained from activities done in class. The qualitative component is descriptive, and the researcher is the main instrument of this research describing what students know and interpret their understanding.

4.1. Selection of participants

The needed data was collected by analysing 90 preservice teachers' written activities given when the module was taught. It was a first-year module taught during the year 2021 using a hybrid learning platform. All activities were done online and student teachers' responses to the activities were analysed. Five students were also selected for a task-based interview.

4.2. Data collection and analysis

This study used two data collection methods to ensure methodological triangulation (Creswell, 2005). The first activity was a baseline assessment to discover students' knowledge of fraction size comparison. A follow-up class activity was also given to find out more about the students' knowledge, where students were requested to use the diagram to show their understanding. To triangulate the data, a task-based interview was conducted with 5 purposefully sampled students to validate their reasoning based on what they had written. According to Weber et al. (2020), the task-based interview is used to understand how mathematics students complete given tasks to gain insight into how students can be taught to complete these tasks or to discover students' thinking to support them properly to get their mathematics thinking correct.

The thematic analysis method was used to analyse data. Thematic analysis is a method used to identify, organize, and offer insight into patterns of meaning (themes) across a data set to allow the researcher to see and make sense of collective or shared meanings by identifying what is common to the way a topic is written and making sense of those commonalities (Braun & Clarke, 2012). From different collected themes, quantification through percentage was used to make sense of different identified themes. Some of the individual's chosen written work was also compared to what the same individual explained during interview and the conclusion was drawn from that.

5. Findings and discussions

5.1. Activities

From the first activity, students were asked the following question: Tom claims that $\frac{3}{4} < \frac{5}{8}$ because $3 < 5$ and $4 < 8$. Is Tom correct? How can you help his understanding with the use of representation/s? From the answer given, the following data was received in the table below:

Table 1.

Themes	Number of students	Percentage
Students who knew that Tom was wrong	72/90	79%
Students who think Tom is correct	18/90	21%
Students who could not explain or support their reasoning	55/72	76%
Students who supported their reasoning using diagram	12/72	17%
Students who supported their reasoning by converting fraction to decimal	6/72	8%
Students who supported their reasoning through solving equivalent fraction	17/72	19%

From the table above, it is clear that students have some knowledge about fraction size. 79 % of the students knew which fraction was bigger between the two. However, out of the 79%, 76 % could not give a correct explanation why the other fraction was bigger than the other. These are students who explained incorrectly or students who did not give a reason. To validate what was obtained in the first activity, a similar question was given with direct instruction to see if students could support their reasoning using different interpretations. Students were given the activity in the form of a three-day assignment. The question from the activity was as follows: Vuyo claims that $\frac{3}{4} < \frac{6}{9}$ because $3 < 6$ and $4 < 9$. Is Vuyo correct? Use three different methods (algorithm, diagram, and a practical example) to make your claim plausible.

Table 2.

Themes	Number of students	Percentage
Got the diagram correct	38/90	42%
Got the diagram wrong	52/90	58%
Got diagram wrong because the whole was not the same size	26/52	50%
Got the diagram wrong because parts of the whole were not the same size	12/52	23%
They were completely wrong	12/52	23%
Students who said Vuyo is correct	2/52	4%
Students who got the algorithm correct	74/90	82%
Students who got the practical example correct	11/90	12%
Students who got the practical example wrong	79/90	88%

More students seem to understand the difference between fraction size from the table above. However, students did not know all the concepts based on fractions size. It appears that students master the concept of a written algorithm where the denominators are made to be the same size first and then compare the size of their denominators. The fact that 58% of the students got the diagram wrong shows that most of the students do not fully understand the concept of fractions. Out of those who got the diagram wrong, students don't understand the idea of a whole. As much as they understood the algorithm part that stipulates that to compare fractions, you must first make the denominators the same and then compare the numerators, they were unable to transfer this knowledge to the use of a diagram. Making denominators the same means having equal parts inside a whole. 23% of the students did not understand this concept. Having an equal whole means we are comparing the same thing. When the fraction being compared have a different whole, it is like comparing bread and apple, which is not easy to compare because bread and apples aren't usually the same size. 50% of the students also did not understand this concept because they were drawing two diagrams that were not the same size.

5.2. The interview

From the interview, student A did not agree with Tom. This was her statement: "Tom is incorrect, $3/4$ is $> 5/8$ because we are dealing with fractions. In fractions, the denominator represents how many parts there are in the fractions and in this case 4 will be greater than the 8" The question that was asked during the interview was to elaborate on her reasoning. The student replied by saying: "In fractions, small number fractions are greater than big number fractions, and when it comes to whole numbers, the small numbers remain small, and big numbers remain big" This shows that the student does not fully understand fractions. Student A has some truth that is not complete. The student is looking at a fraction as number and not as a representation of a part of a whole. Once we start manipulating the numbers (elements of fractions) without referring them to their representation, we create learners who do not understand the true meaning of fractions. Hence most of the students manipulated the fractions by making the denominator the same. This is all just procedural without focusing on conceptual understanding.

Another student called Student B wrote: Tom is incorrect, $3/4$ is $> 5/8$ because we are dealing with fractions. In fractions, the denominator represents how many parts there are in the fractions, and in this case, 4 will be greater than 8. When asked to elaborate during the interview, she said, "The bigger the denominator, the smaller the quantity, because there have been more pieces cut in the higher denominator."

This shows misconceptions. What the student is saying is not always true. When comparing fractions of the same size whole, the bigger denominator will reduce the size of the fraction. This principle does not apply when the whole is not the same size. Student usually misconceive this concept and use it out of context.

6. Conclusion

This study reveals that students know how to compare fractions using a written algorithm but lack conceptual understanding of the representation of the written algorithm on the diagram or representing it using practical examples. Preservice teachers also have the same misconception as the learners in primary school. This study recommends that initial teacher educator institutions should not assume that students know but teach all the concepts from the beginning to cover all the loopholes that might be there.

References

- Aliustaoğlu, F., Tuna, A., & Biber, A. Ç. (2018). The misconceptions of sixth grade secondary school students on fractions. *International Electronic Journal of Elementary Education*, 10(5), 591-599.
- Ball, D. L., & Bass, H. (2000). Interweaving Content and Pedagogy in Teaching and Learning to Teach: Knowing. *Multiple perspectives on mathematics teaching and learning*, 1, 83.
- Braun, V., & Clarke, V. (2012). Thematic analysis.
- Carnoy, M., & Chisholm, L. (2008). *Towards understanding student academic performance in South Africa: a pilot study of grade 6 mathematics lessons in Gauteng province*.
- Creswell, J. W., & Creswell, J. D. (2005). Mixed methods research: Developments, debates, and dilemmas. *Research in organizations: Foundations and methods of inquiry*, 2, 315-326
- Deringöl, Y. (2019). Misconceptions of Primary School Students about the Subject of Fractions. *International Journal of Evaluation and Research in Education*, 8(1), 29-38.

- Nesher, P. (1987). Towards an instructional theory: The role of student's misconceptions. *For the learning of mathematics*, 7(3), 33-40.
- Shulman, L. S. (1986). Those who understand: Knowledge growth in teaching. *Educational researcher*, 15(2), 4-14.
- Stohlmann, M., Cramer, K., Moore, T., & Maiorca, C. (2014). Changing Pre-service Elementary Teachers' Beliefs about Mathematical Knowledge. *Mathematics Teacher Education and Development*, 16(2), 4-24.
- Taylor, N. (2011). The national school effectiveness study (NSES): Summary for the synthesis report. *Johannesburg: JET education services*.
- Van De Walle, J. A., Karp, K. S., & Bay-Williams, J. M. (2012). Elementary and secondary school mathematics: Teaching with developmental approach. *Ankara: Nobel Academic Publishing*.
- Venkat, H., & Spaul, N. (2015). What do we know about primary teachers' mathematical content knowledge in South Africa? An analysis of SACMEQ 2007. *International Journal of Educational Development*, 41, 121-130.
- Weber, K., Dawkins, P., & Mejía-Ramos, J. P. (2020). The relationship between mathematical practice and mathematics pedagogy in mathematics education research. *ZDM*, 52(6), 1063-1074

ENHANCING *BATHO-PELE* PRINCIPLES IN THE CONTEXT OF SCHOOL ADMINISTRATION CLERKS: THE QUEST FOR PUBLIC SERVICE EXCELLENCE

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Abstract

The operational image of the Public Service is received and noted with a compromised image. It is still plagued with negative attitudes in terms of service standards, particularly customer service and ‘*Batho-Pele*’ principles as displayed by School Administration Clerks. There are further notable challenges underpinned on a quest for a coherent transformed, transparent, efficient and accurate responsible service delivery to the necessities of all citizens. The latter ideals are pertinently elucidated by Public Service Vision thus saying: “A better life for all South African citizens by putting people first”. The “White Paper in the context of the Public Service, articulates the following eight essential pillars, namely: Consultation on service rendered; specification of service standards in respect of quality to be rendered; unrestricted access to service delivery; courteous treatment of clients with integrity; Openness and transparency of Departmental operations and redress on failed quality standard rendered as well as assurance on the value for money within the constraints of financial budgets

‘*Batho-Pele*’ is a Sesotho adage meaning “people first.” This is the ideal since 1997, a government initiative to transform public service delivery to citizens enshrined on the eight basic principles alluded. The study engages the qualitative research Free Attitude Interviews (FAI) dynamics to gather data on the need for an inviting collaborative service delivery; the key points in delivering quality service; the challenges in respect of service delivery; the environment conducive to a progressive quality service delivery as well success indicators to arm inviting service couched in the eight *Batho-Pele* public service principles. The study composed of administration clerks at both primary and secondary schools who are male or female in gender. The base for the discussion in this study is informed by the Critical Theory as a theoretical Framework adopted. To fortify our service excellence through *Batho-Pele*, critical elements on both Nigeria and Botswana service chatters have formed reference base to this research argument on matters of positive human treatment for service distinction. The study concludes with the fact attentive customer listening; show of human respect; personal integrity; quality service standards and swift response to customer grievances enhance the quest for *Batho-Pele* service excellence. The recommendation is that clerks in new public entrance ought to be inducted in this service ideal with further research undertaken for both relevance and sustainability.

Keywords: *Batho-Pele* principles, constitutional bill of rights, critical discourse analysis (CDA), critical theory (CT), free attitude interviews (FAI).

1. Introduction

This paper seeks to place *Batho-Pele* as a pivotal service practice for organizational competitive service delivery and excellence at schools in particular. The study is located in the Free State (FS) School administrative and management space, with School Administrative Clerks. This study is further under-taken in order to identify the challenges and the factors that lead to the School Administration Clerks in the Free State Department of Education. This is particularly concerned with the non-implementation of the principles of ‘*Batho-Pele*’ and also provide guide to manage this deficiency in their service offer (ETU, n.d.).

‘*Batho-Pele*’ is a Sesotho adage meaning “people first” (Fox et al., 2006). It has been, since 1997, a government initiative to transform public service delivery to citizens and is based on basic principles contained in The Constitution of the Republic of South Africa, 1996 (herein after referred to as The Constitution). During 2003 and later, the government once again launched concerted efforts to reaffirm its

commitment to this service ideal in the Public Service space. The formation of *Batho-Pele* unfolds with the following eight principles: Consultation of the needed service with the client; Service standards expected in the offer exchange; Access improved possibility to service offering; Courtesy unveil as a human virtue; Information giving to available services; Openness and transparency with nothing to hide in the service delivery; Redress whatever problems encountered in the service offer space as well as Value for money commensurate with the service rendered with prudent economical repercussion (NWDC, n.d.).

The eight '*Batho-Pele*' principles were published as a policy document called The White Paper on Transforming Public Service Delivery of 1997 and made specifically applicable to all central and provincial government departments. It is emphasized that the whole process should be a continual one of improving service delivery, and then setting ever-higher quality standards in order to reach global benchmark. In the current circumstance, the respective principles are enshrined in the South African Constitution under the Bill of Rights. This Bill is a cornerstone of democratic virtues enshrined in the SA Constitutional framework. This is about human dignity, social justice, equality and freedom to shared information and knowledge through communication (DoJ, 2017). Fundamental to the Bill of Rights, is the imperative mandate for people to operate and be served in an environment conducive to treatment with dignity and equality to access information in service as the *Batho-Pele* Principles Philosophy advocates.

2. The research aim and objectives

The study aims at highlighting the challenges behind the implementation of *Batho-Pele* Service Philosophy by the School Administrative Clerks at Schools in the Free State. This aim is underscores the following ensuing objectives: Espouse the need and importance for the implementation of *Batho-Pele* Principles in respect of the School Administration Clerks in the Free State; Highlight the key aspects behind the implementation of *Batho-Pele* Service Principles in respect of the School Administration Clerks in the Free State; Locate the challenges in the implementation of *Batho-Pele* Service Philosophy in respect of the School Administration Clerks in the Free State; Classify the environment conducive for the implementation of *Batho-Pele* Service Philosophy in respect of the School Administration Clerks in the Free State; Exhibit the success indicators behind the implementation of *Batho-Pele* Service Philosophy in respect of the School Administration Clerks in the Free State.

3. Theoretical framework: Critical Theory (CT)

This paper adopts the Critical Theory (CT) as a theoretical framework to guide the narratives herein contained. The theory seeks to reconstruct practices that are rather not progressive for human advancement, like the case of poor service application in the context of *Batho-Pele*. The ideal contains elements democratization of ideologies for service with openness and transparency for social justice discourse.

The nature and scope of CT campaigns for deeper philosophical ramifications. CT advocates for the universal principle of co-responsibility, which here is about the service provider and the client with the eagerness to eradicate possibilities of injustice in our community spaces communicative dialogue and shared empowerment. The theory is about democratic liberty to offer the best in opportunity through human service and foundations of ethical philosophies. The inherent principle of social justice quest negates practices of discrimination based on gender, race and societal standing. Being imbued by the context of CT, one becomes motivated to serve and be the agent of justice and fairness in all circumstances of life and transcend all facets of marginalization. The theory is an armament for human rationality for the capacity to transparency and passion to give and support. Human service enhances virtues of solidarity and collective identity with noble spirit of *us* not *me* critical for institutional transformation for social justice quest (de Vita, 2014).

CT is apt to be engaged *Batho-Pele* Principles in order to propagate issues of fairness, democratic collaboration and progressive participation, equity as well as equality in a space that originally was racially inclined and intransigent for change for the better in-service delivery in the public arena. CT interrogates the current situation in service offering with the agenda for change and upgrading the status quo. This calls for standards of quality and excellence in the culture of service in education and schools in particular.

4. Theoretical lens: Critical Theory (CT)

The theory has social grounding as a theoretical to address and critique social ills and troubling discursive inequalities in society through transformation and change. This philosophical engagement unmask illusions propelled as reality for a just peaceful society free of dominance and exploitation CT as a theoretical lens is deemed prudent in this study in order to debate and critique the inadequacies around

Batho-Pele Service Philosophy that informs this research undertaking. The philosophy offers space for reflective assessment on societal discourses for free spirited service offering and empowerment in the case of *Batho-Pele* Philosophical undertaking. The philosophy objects domination and exploitation in society with a critical Marxist opinionated views on freedom and social justice (Crossman, 2019). *Batho-Pele* has a strong agitation against service inequalities in Public Service that necessitated transformation and change to unmask alienation of people base on class, gender and race.

5. *Batho-Pele* Service Philosophy: The evaluation and monitoring (M&E) framework guide

This aspect talks to the current alluded process on the challenges of implementation of *Batho-Pele* service Philosophy. The process is two pronged: Monitoring: This address the process of data generation and analysis in respect of application and implementation, the second aspect of the process is: Evaluation: This zooms into the programs’ effectiveness with regard to implementation and achievement of set goals or objectives (Sopact, 2021).

The purpose of M&E is to give and assist good guidance on developing operational tactics, data generation, operational strategies and accessing the extent to which plans, and goals have been realized (USAID, 2014). The M&E process encapsulates the following steps: Communicate the shared monitoring and evaluation plan; Identify requirement to essential to execute the plan; guide selection of data generation plan and offer sustained plan analysis (TechSolve, 2021). In addition, the purpose behind M&E is to fill the gaps identified in both execution and application of the process; track implementation challenges, measure effectiveness of the planned strategy and address the changes to be adopted (UN Women, 2010).

M&E as a process guides the strategy based on the following approaches: Self-assessment plan to see if one really is compliant to expectations and goals envisioned by the enterprise or institution; sustained feedback on peers implementing the plan so as to guide and encourage good work or challenges arising; selecting a focus group to get information on aspects needed to generate policy as well; on job observation to identify gaps and challenges as well as evaluating personnel based on the set Key Performance Indicators (KPIs) (Verma, 2021).

The following rubric could assist in the M&E process on the *Batho-Pele* Service Principles:

Table 1. *Batho-Pele* Framework.

<p>A. PRINCIPLES AND EXPECTATIONS</p> <p>CONSULTATION</p> <ul style="list-style-type: none"> ✓ Good service offers in advancing the institution image ✓ Give better options to client that the institution is capable to offer <p>SERVICE STANDARD</p> <ul style="list-style-type: none"> ✓ Communicate service quality for choice that the institution may offer ✓ Key service factors to expect at the institution <p>COURTESY</p> <ul style="list-style-type: none"> ✓ Warm inviting attitude to better brand the institution ✓ Show of respect at all times with politeness at the institution <p>ACCESS</p> <ul style="list-style-type: none"> ✓ Allow people to available services the institution offers ✓ Enhance service ownership to clients at the institution <p>INFORMATION</p> <ul style="list-style-type: none"> ✓ Information accuracy with clarity about the institution ✓ Communication with sustenance in the institutional context ✓ Fairness and social justice quest as a brand to identify the institutional values

6. Recommendations

The challenges the study highlights are so critical that it is of utmost importance that Free State Department of Education ensures that School Administration Clerks are capacitated in terms of ‘*Batho-Pele*’ principles, and that a monitoring tool is in place. This ideal holds true to new appointees to the public service; they should be exposed to training in the principles of ‘*Batho-Pele*’ as part of a mandatory orientation programme. The *Batho-Pele* Service Philosophy ought to be integral to the PDMS performance evaluation process; Sustainable feedback on the Front-Line Service personnel in critical for improvement and self-reflection on personal deficiencies, School Clerks need to be awarded incentives for better delivery in service excellence trough *Batho-Pele* Philosophy (Ngidi & Dorasamy, 2013). The Education Department and broader Public Service organs need to: Communicate the goals and purpose of

M&E, provide training programs about the process and communicate what is expected of front-line personnel in the delivery of M&E process as well as what are the key area deemed essential in the delivery of the process. Lastly, further research about how ‘*Batho-Pele*’ Principles should be implemented is recommended.

7. Conclusion

This study encapsulates the fact that School Administration Clerks (participants) know the principles, but the majority have not been trained by the Department of Education about the principles of ‘*Batho-Pele*’ Service Philosophy. The result is such that there is discrepancy between School Clerks and customers they serve with evident poor monitoring strategy. *Batho-Pele* Service Philosophy is a legislative policy advancing the ideals behind the Bill of Rights the SA Constitution espouse; regrettably, School Clerks seem not to be articulate on this fundamental clause.

The notion of accountability is pivotal in enhancing the dynamics of service delivery in institutions underpinned on *Batho-Pele* Service Philosophy. The essence of accountability ought to be practiced as a school mantra for service excellence, *Batho-Pele* is best defined by School Clerks who are: Committed to the service at school, supportive and loving to the school community, considerate and caring with charisma. School Clerks are the face of the school and as such should portray a positive mental attitude to create a warm school ambiance to attract clients and service excellence. This ideal is about personal comfort and a sense of belonging to the school community with the agenda to magnify the goal behind the vision and mission the school espouses. The school service in *Batho-Pele* also leads the imperatives that defines the school culture, values and ethos

References

- Crossman, A. (2019). *Understanding Critical Theory*. Retrieved from <https://www.thoughtco.com/critical-theory-3026623#:~:text=Critical%20theory%20is%20a%20social,on%20understanding%20or%20explaining%20society>
- De Vita, Á. D. (2014). Critical theory and social justice. *Brazilian Political Science Review*, 8(1), 109-126.
- Department of Public Service and Administration (DPSA). (2003). *Batho Pele Handbook*. Retrieved from <http://www.dpsa.gov.za/dpsa2g/documents/gics/bphb/BathoPeleHandbook.pdf>
- Directorate of Public Service Management (DPSM). (2008). (2008). *Public Service Act (Act No. 30 of 2008)*. Republic of Botswana.
- Education & Training Unit (ETU). (n.d.). *Batho Pele: Improving government service*. Retrieved from <https://www.etu.org.za/toolbox/docs/govern/bathopele.html>
- Education Review Office, Te Tari Arotake, Mātauranga. (2020). *Annual Report, 2019/20*. Available from <https://ero.govt.nz/about-us/annual-report-2019-2020>
- Fox, W.; Bayat, S., and Ferreira, N. (2006). *A Guide to Managing Public Policy* (1st Ed.). Juta & Co.
- In the Loop. (2020). *7 Advantages of Teamwork*. Retrieved from <https://www.intheloop.io/blog/advantages-of-teamwork/>
- Ngidi, T. L., & Dorasamy, N. (2013). Challenges on the approach of *Batho-Pele*: A case study of the Department of Home Affairs, Durban Regional Office. *Bangladesh e-Journal of Sociology*, 10(1), 30-50.
- Nigerian Maritime Administration and Safety Agency (NIMASA). (n.d.). *Servicon*. Retrieved from <https://nimasa.gov.ng/services/servicom/>
- Republic of South Africa (RSA). (1997). White Paper on Transforming Public Sector Delivery (WPTPS). Republic of South Africa.
- Republic of South Africa. (1996). *The Constitution of the Republic of South Africa, Act 108 of 1996*. Republic of South Africa.
- Sopact. (2021). *Monitoring and evaluations – PostCovid 19*. Retrieved from <https://www.sopact.com/monitoring-and-evaluation>
- TechSolve. (2021). *Five Steps to Successful Monitoring*. Retrieved from <https://www.techsolve.org/five-steps-to-successful-monitoring/>
- Verma, E. (2021). *How to Measure Training Effectiveness in 2021*. Retrieved from <https://www.simplilearn.com/how-to-measure-effectiveness-corporate-training-article>

CULTIVATION OF INNOVATIVE ABILITY OF TALENTS IN JOB TRAINING COURSES FROM THE PERSPECTIVE OF EDUCATION ECOSYSTEM

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Abstract

Focusing on the cultivation of talents' innovation ability by the professional course system of unmanned aerospace vehicle (UAV) technology, we will explore the talent cultivation mode from the perspective of education ecosystem, analyze the low enthusiasm for independent learning in talent cultivation, how to reflect the job demand, closed-loop talent evaluation and lifelong learning how to implement and other issues. Innovative education models, curriculum system design, training quality assurance and other methods and mechanisms driven by job competency requirements are studied, which actively coordinate to "producers", "decomposers" and "consumers" in the innovative education ecosystem and "inorganic environment" and other major factors, aiming to explore the innovation ability training of high-quality innovative talents. Combining scientific literacy, innovative talents with "knowledge-ability-quality" are cultivated. Combined with the innovative education model of the education ecosystem, the innovation ability of talents will be improved. Combined with talent evaluation feedback and training exchange mechanism, the improvement of iterative education ecological cycle can be realized.

Keywords: *Job training, education ecosystem, innovative ability, innovative talents cultivation.*

1. Innovation and entrepreneurship education ecosystem

1.1. Introduction

The construction of innovation and entrepreneurship education ecosystem in colleges and universities is a frontier hotspot of innovation and entrepreneurship education research at home and abroad. Since the middle of the 20th century, innovation and entrepreneurship education research and practice have increasingly become a topic of the times that countries around the world pay close attention to. Innovation and entrepreneurship, as a social phenomenon, have existed for some time (Harvard,2005). Following the opening of the first entrepreneurship course at College of Business of Harvard in 1947, innovation and entrepreneurship education in foreign universities has gradually developed vigorously. At present, developed countries such as the United States and the United Kingdom have formulated national frameworks for innovation and entrepreneurship education, and international organizations such as the United Nations and the European Union are also making every effort to promote them.

In the early 20th century, Xingzhi Tao's "creation" education in the theory and practice of life education should be the source of modern innovation and entrepreneurship education in China. At the beginning of the reform and opening up, Comrade Deng Xiaoping vigorously advocated and effectively promoted the education of "hard work and entrepreneurship", and developed it into a kind of entrepreneurship education for the whole nation.

China is currently in a new era of "double first-class" higher education development. In order to break the traditional single-track competition model of "research universities can become world-class universities", the education community is actively exploring the inclusion of innovation and entrepreneurship education into the "double first-class" evaluation index system. The construction of the educational ecosystem has gradually been recognized by the higher education innovation system, especially in local colleges and universities, and the school-running concept of "applying what you have learned", represented by Stanford University, has gradually become the consensus of higher education. Innovative education is an extremely complex systematic project. It is not the mechanical combination and superposition of various elements, but the interactive generation and organic integration of various elements based on the overall goal and relying on internal logic. Domestically, universities have conducted in-depth exploration and practice in innovation incubation bases, integration of production, education and research, and university innovation and entrepreneurship science parks.

China's specific national conditions and characteristic paths determine that the Western model cannot be copied, and must be based on China's national conditions, make Chinese choices, and reflect Chinese characteristics on the basis of comprehensively drawing on the experience of ancient and modern China and foreign countries. Focus on creating a "China model", especially in terms of stimulating innovation and development, promoting the improvement of systems and mechanisms, and building an internal and external support system.

1.2. Evolution

Throughout the development process of innovation and entrepreneurship education research and practice in various countries in the world, it has mainly gone through three stages. The first is the stage of small entrepreneurship education. At this stage, the main body of practice is business schools and other individual departments, and the target is also limited to a small number of students. The goal is to promote more entrepreneurial enterprises. The theoretical research field mainly focuses on how to teach students to start new enterprises. The second is the stage of innovation and entrepreneurship education (Ebrahimminejad,2017). At this stage, entrepreneurship education has developed into a school-wide, broad-spectrum innovation and entrepreneurship education for all students, multi-departmental collaboration, and mutual promotion of innovation and entrepreneurship. How to improve students' innovation and entrepreneurship literacy. The third is the stage of ecological innovation and entrepreneurship education. In the 1930s, MIT played a key role in the reconstruction and revival of the New England area at that time, which aroused people's thinking about the relationship between the tripartite cooperation between universities, industry and government and innovation and development.

In recent years, domestic scholars' research on the construction of innovation and entrepreneurship education ecosystem in colleges and universities has mainly focused on three aspects: first, the research on the construction experience of typical foreign universities; second, the analysis of outstanding problems in the construction of innovation and entrepreneurship education ecosystem in Chinese universities; third It is to put forward some construction paths that reflect universal experience and Chinese characteristics.

2. Cultivation of relevant talents in the innovation and entrepreneurship education ecosystem

2.1. Engineering practice ability

Engineering practice ability is also known as competence, professional ability, problem-solving ability, etc. in the field of engineering specialty. It is different from a single flat hands-on ability, but a multi-dimensional ability system that integrates knowledge, skills, emotions, attitudes, and values. The definition of the concept of engineering practice ability in the current education circle is mainly divided into two types: 1. Deconstruct engineering practice ability as a sack of undergraduates applying professional knowledge and technology to solve engineering problems under the background of professional disciplines, focusing on problem solving at the technical level; 2. Deconstruct engineering practice ability into a real practice situation, The set of competencies required by undergraduates to engage in professional practice as a prospective engineer not only focuses on solving problems at the technical level, but also interacts with stakeholders at the non-technical level (Pons, 2016).

2.2. Artificial intelligence in education

Since the concept of artificial intelligence was proposed, it has been more than 60 years of development and has accumulated huge potential. Artificial intelligence in education is the deep integration and development of artificial intelligence and education. The research on "artificial intelligence + education" is in full swing, producing many research results. At present, the main application form is artificial intelligence education. By applying artificial intelligence to the field of education, the quality of education can be improved. "Artificial intelligence + education" can realize large-scale customized educational content and precise services, help teachers to correct homework, communicate with students, and promote personalized learning, etc. Some research results define the connotation of educational artificial intelligence (Yan, 2017), and put forward the development path of artificial intelligence education application in China in the era of smart education (Ma, 2017). Education should be one of the main application fields of artificial intelligence.

2.3. Scientific literacy

Scientific literacy is an essential literacy for individuals to achieve life-long development. The United Nations Educational, Scientific and Cultural Organization (UNESCO) clearly points out that the core literacy index system must cover the field of "science and technology", requiring students not only to

master a specific scientific knowledge system, but also to develop or apply scientific knowledge. technology. Its three key components: rational thinking, critical questioning and scientific inquiry, which complement each other and complement each other, and are also the basic components of the world view. This is also an important part of the ideological and political education that the Chinese education community is now promoting.

3. Innovation and entrepreneurship education ecosystem construction

3.1. System composition and elements

This paper focuses on the cultivation of talents' innovation ability by the UAV technology professional talent training system, explores the talent training mode from the perspective of the ecological education system, and analyzes the low enthusiasm for independent learning in talent training, how to reflect the job demand, and closed-loop talent evaluation. and how lifelong learning is implemented. Driven by job competency requirements, research methods and mechanisms for innovative education models, curriculum system design, and training quality assurance, and actively coordinate the "producers", "decomposers", "consumers" and "inorganic environments" in the innovative education ecosystem Various main factors, explore the innovation ability training of high-quality innovative talents.

Combined with the characteristics of intelligent unmanned systems, explore the training mode of "UAV technology" demand field of job training. The main research contents include:

(1) "Producer's Perspective", study the optimization design of the curriculum system and the construction methods of teachers; the optimization design of the first-class curriculum system mainly includes the overall design and optimization of the curriculum system, the reform of teaching content, and the construction of teaching materials.

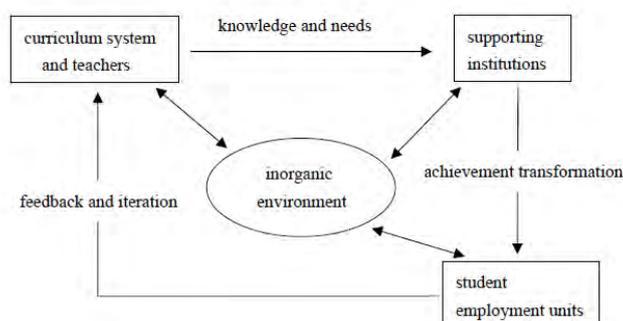
(2) "Consumer perspective", combined with training demand research, through questionnaires, interviews with various units of the army, literature research and other methods to study the current status and needs of UAV technical talents; post ability model analysis and design, aiming at the basics and positions of students Analyze and design job competency models based on needs, school advantages and teacher conditions.

(3) "Decomposers, Inorganic Environment Perspective", based on innovative Internet networks, colleges and departments and other institutions, optimize the "inorganic environment", combine demand-driven, study the design of training effectiveness evaluation methods, implement a talent training feedback evaluation mechanism, and promote the improvement of talent training quality.

3.2. System construction goals and strategies

As shown in Figure 1, the innovation and entrepreneurship education ecosystem of job training. The producers are the curriculum system and teachers; the decomposers are the supporting institutions, such as entrepreneurship research centers, colleges and departments, etc.; the consumers are the student employment units; the inorganic environment is the school spirit and culture, robot culture, super-fine culture, etc.

Figure 1. Job-training Education Ecosystem.



The core task implicit in the entire education ecosystem is actually talent cultivation. Around this core task, "producers", "consumers" and "decomposers" work together in an "inorganic environment" to follow the "survival of the fittest" principle to achieve a healthy, orderly, virtuous cycle of innovative education ecosystem operations and the cultivation of innovative talents. The specific construction measures are as follows:

(1) Combined with the research on training needs, the current status and needs of UAV technical talents are studied through questionnaires, interviews with employers, and literature research. Establish a communication mechanism between the supply side and the demand side.

(2) Carry out job competency model analysis and design. According to the basic and job requirements of the students, the advantages of the school and the conditions of the teachers, the job ability model is analyzed and designed, and the differentiated training possibilities of different individuals and the space for talent improvement are examined based on the training plan.

(3) Actively promote the reform of teaching concepts and provide a suitable "inorganic environment" atmosphere for the innovation and cultivation of talents; the promoting role and key factors of "decomposers" such as research institutes, departments, and innovation research centers in the "demand-supply" loop.

(4) Encourage the use of information-based teaching methods and models to carry out "producer" behavior, which not only improves students' enthusiasm for learning, but also provides alternatives for teaching implementation for major events such as the new crown epidemic.

(5) Combined with the optimized construction of "inorganic environment", the reform of practical education and teaching will be carried out in depth, and virtual simulation experiments and joint training practice will be actively explored.

(6) Combining scientific literacy and the sustainable development principle of "inorganic environment", it drives students to learn independently, fulfills the principle of "survival of the fittest", and establishes a lifelong learning mechanism for each major based on the MOOC university hall and lifelong virtual tutors.

At the same time, a reasonable evaluation mechanism is constructed, as follows:

(1) Based on the flow of knowledge and demand information, improve the integration of "producers" (curriculum system, teaching staff) in general education + job education and smooth transition with job position capacity building. At the same time, it provides policy support for innovation and entrepreneurship, platform resources, research and training to complete the continuous transformation of the teaching staff.

(2) Based on the transformation of achievements, establish a road construction mechanism for the "demand-supply" loop of industry-university-research integration between "decomposers" (education support institutions, such as colleges and departments) and "consumer" employers.

(3) Based on feedback iterations, fully consider the employer's assessment of the professional position ability of the employed students, through different special training plans, and give feedback to the "producer" (course system, teaching staff) and "decomposer" (education support institutions, departments, etc.) update needs and training deviations.

4. Epilogue

We will build a set of innovative ecological education system-based UAV technology talent innovation ability training system scheme suitable for China's first-class colleges and universities, and propose implementation strategies to improve and innovate talent employment education practices. The final research results are in the form of Project research report. After the research results are obtained, we will first apply it to the training practice of UAV technology in our school. After the modification and improvement, we will formally submit a consultation report to the Provincial Department of Education, and strive to promote it in the whole province, and at the same time to the national education department. The Ministry of Education and the Provincial Department of Education submitted proposals for wider promotion.

References

- Dirk Pons. (2016) Relative importance of professional practice and engineering management competencies, *European journal of engineering education*,41(5),2016,540-547.
- Hossein Ebrahiminejad. (2017) A systematized literature review: defining and developing engineering competencies, *ASEE annual conference & exposition*,95-118.
- The entrepreneurship ecosystem [EB/OL].(2005) <https://www.technologyreview.com/2005/09/01/230391/the-entrepreneurship-ecosystem/>
- Yuhui Ma. (2018) Research on the development path of artificial intelligence education application in my country in the era of smart education, *Electronic Education Research*,3:123-128.
- Zhiming Yan. (2017) The connotation, key technologies and application trends of educational artificial intelligence (EAI), *Journal of remote education*,1: 26-35.

RELATIONSHIP BETWEEN AUTONOMY SUPPORT AND STUDENTS' SCHOOL WELL-BEING: THE MEDIATING ROLE OF NEED FOR COMPETENCE

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Abstract

Within a *Self-Determination Theory* perspective (SDT; Deci and Ryan, 2000), this study aims to examine the relationship between students' perception of autonomy support provided by teachers and their school well-being (439 students, mean age = 12.2 years; 51% male). SDT proposed the existence of three universal, innate psychological needs of all human beings: autonomy, relatedness and competence. In the school context, the need for autonomy refers to students' desires to experience a sense of self-determination of their behavior. The need for relatedness refers to students' desires to experience a sense of connection with teachers and classmates. The need for competence refers to students' desires to interact effectively with the school environment. The satisfaction of these needs plays an important role in several educational outcomes (e.g. school satisfaction and motivation), particularly when teachers support students' autonomy, attempting to understand, acknowledge, and where possible, be responsive to students' perspectives. In the school specific domain, many recent empirical studies have used the SDT as a conceptual framework, to show that an autonomy-supportive teaching style tends to predict adolescents' needs satisfaction and school well-being (Ryan and Deci, 2020). Satisfaction of need for competence seems to be a particularly strong predictor of adolescent students' subjective well-being at school (Tian, Han and Huebner, 2014). According to Tian (2008), subjective well-being in school includes students' school satisfaction and affect, that is the frequency with which students experience positive emotions.

In Italy, research based on the SDT in schools is limited, particularly as regards the effect of students' needs satisfaction on their well-being. The present paper looks carefully at the mediating role of need for competence considering the relation between the support for autonomy provided by teachers and the adolescents' positive and pleasant emotions at school, using a Structural Equation Modelling. The posited model fitted the data quite well: $\chi^2 = 225$ (df = 101), $p < .001$; TLI = .968; SRMR = 0.037; RMSEA = 0.053, 90% CI [.044, .062]. Results show that a greater perception of support for autonomy has a positive effect on the students' positive emotions, and this effect is partially mediated by the satisfaction of the need for competence. This finding suggests that students' psychological needs should be considered and teachers should not only be aware of the importance of autonomy-supportive teaching, but also of how they can improve their teaching style (Vandekerckhove et al., 2019).

Keywords: *Autonomy support, teaching style, students' well-being, self-determination theory, basic psychological needs.*

1. Introduction

In the school specific domain, many recent empirical studies have used the *Self-Determination Theory* (SDT; Deci and Ryan, 2000) as a conceptual framework to show that an autonomy-supportive teaching style tends to predict students' needs satisfaction at school. This can lead to various different educational outcomes, such as students' autonomous self-regulation for learning, academic achievement and well-being at school (e.g.: Bureau et al., 2022; Reeve & Cheon, 2021; Ryan & Deci, 2020).

According to the Organisation for Economic Co-operation and Development (OECD; 2021), well-being is defined as the way people think and feel about their lives. It is a multi-faceted concept that requires careful measurement of people achievements and satisfaction in multiple aspects of their lives. The multidimensional definition of the students' well-being, used in the *Programme for International Student Assessment* in 2015 (PISA; Borgonovi & Pål, 2016; OECD, 2017), includes both objective aspects and subjective aspects of well-being. *Subjective well-being* (SWB; Diener, 2012) reflects people's assessments of their lives in cognitive and emotional terms. Tian (2008) proposes a theoretical model of SWB in the school context, based on two components: cognitive and affective. The first component refers

to students' school satisfaction, in terms of the cognitive assessment that students make of their experience at school. The second component includes two types of emotional experience, referring to the frequency of positive and negative emotions of students at school. Some studies demonstrate the importance of the affective component of well-being as a variable associated with students' motivation to learn and their academic achievement (Alivernini et al., 2019; OECD, 2017, 2021; Tian, Chen & Huebner, 2014).

SDT (Deci & Ryan, 2000; Ryan & Deci, 2017) proposed the existence of three universal, innate psychological needs of all human beings: autonomy, relatedness and competence. The satisfaction of these needs plays an important role in students' well-being at school. In the school context, the need for autonomy refers to students' desires to experience a sense of self-determination of their behavior. The need for relatedness refers to students' desires to experience a sense of connection with teachers and classmates. The need for competence refers to students' sense of success and growth and their desires to interact effectively with the school environment. Autonomy support and the satisfaction of basic needs may become significant factors for students' well-being especially during adolescence (Su, Tian & Huebner, 2021).

Need satisfaction develops in social environments that support the three needs and SDT suggests that teachers' support for autonomy is the best predictor of students' needs satisfaction at school (Reeve, 2016; Reeve & Cheon, 2021). Teachers support students' autonomy when they take the student's point of view, vitalize inner motivational resources, explain the reasons underlying their requests, acknowledge and accept students' expressions of negative affect, use informational, non pressuring language and display patience. Support for autonomy not only satisfies the need for autonomy, but also the need for competence and relatedness.

Satisfaction of need for competence seems to be a particularly strong predictor of adolescent students' SWB at school (Tian, Han & Huebner, 2014). SWB is an important indicator, which reflects not only the quality of life of adolescents but also the quality of school system (Park, 2004).

In Italy, research based on the SDT in schools is limited, particularly as regards the effect of students' needs satisfaction on their well-being. Within a SDT perspective, this study aims to examine the relationship between students' perception of autonomy support provided by teachers and their school well-being.

2. The present study

The present study is part of a larger longitudinal research (still in progress) that aims to define a framework of teachers' Motivational Behaviors, appropriate to the Italian school context and teacher training. This paper presents initial data on the relation between students' perception of autonomy support provided by teachers and their positive emotions at school, assuming that this relation is mediated by the satisfaction of the need for competence at school.

2.1. Participants

The convenience sample is composed by 439 students (mean age = 12.2 years; 51% male) from two middle schools, located in an urban area near Rome (in Lazio, Italy). In Italy, middle school is compulsory, lasts 3 years (grades 6-8), and it is for students aged 11–14 years.

2.2. Measures

Students' perception of autonomy support. Teacher support for autonomy was measured using the Italian version of the *Learning Climate Questionnaire* (LCQ; Alivernini & Lucidi, 2011). In the scale students were asked to answer eight questions using a 7-point Likert scale (from 1 - strongly disagree - to 7 - strongly agree). Questions regard teachers behaviors in class (e.g. "My teachers tries to understand how I see things before suggesting a new way to do things"; "My teachers communicate their confidence in my ability to become what I want to become"; "I feel understood by my teachers").

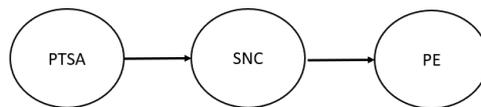
Satisfaction of the need for competence. To assess students' satisfaction of need for competence at school, we administered the subscale *Satisfaction Need for Competence* of the Italian version of the *Basic Psychological Need Satisfaction and Frustration at school Scale* (Buzzai et al., 2021). Students were asked to answer four questions using a 5-point Likert scale (from 1 - strongly disagree - to 5 - strongly agree). Questions regard students' feeling of mastery in academic activities (e.g. "I feel capable at what I do at school").

Positive emotions. To assess Positive emotions we used the subscale *Positive Emotions* (PE) of the *School Well-being Scale* (Alivernini & Manganelli, 2015). Students were asked to indicate how often they have experienced the feelings specified in each item (e.g. "I felt happy") over the past few months at school using a 5-point Likert scale (from 1 -never - to 5 - very often).

2.3. Data Analysis

Data analyses were conducted using the *Jamovi 2.0*¹ software. Firstly, we conducted an Exploratory Factor Analysis (EFA) and a reliability analysis (Cronbach’s alpha) for the validity of instruments. Consequently the process of data analysis was carried out using *Structural Equation Modeling* (SEM) with latent variables in order to examine the association between the relationships hypothesized. The fit of the model was assessed using the corrected chi-squared test statistic and the following fit indices: the Root Mean Square Error of Approximation (RMSEA) the Tucker–Lewis index (TLI), and the Standardized Root Mean Square Residual (SRMR). The results of the fit indices were evaluated following the conventional criteria (Hu & Bentler, 1999). The model (Figure 1) featured one exogenous variable (support for autonomy) and two endogenous variables (satisfaction of need for competence and positive emotions).

Figure 1. Posited Model; PTSA (perceived teacher support for autonomy), SNC (satisfaction of the need for competence, PE (positive emotions).

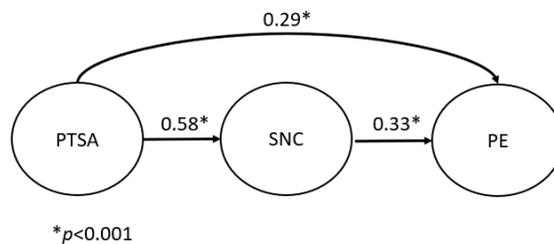


3. Results

The results of the EFA showed good fit indices of the scales with the empirical data. Cronbach’s alpha was 0.88 for the *Learning Climate Questionnaire*, 0.89 for the scale *Satisfaction Need for Competence* and 0.88 for the scale *Positive Emotions*.

The results of the SEM analysis are shown in Figure 2. The posited model fitted the data quite well: $\chi^2 = 225$ (df = 101), $p < .001$; TLI = .968; SRMR = 0.037; RMSEA = 0.053, 90% CI [.044, .062]. As shown in Figure 2, all the hypothesized paths in the model are significant. Results show that a greater students’ perception of support for autonomy has a positive effect on the satisfaction of need for competence ($\beta=0.58$) and students’ positive emotions ($\beta=0.29$). The satisfaction of need for competence increases positive emotions ($\beta=0.33$).

Figure 2. Posited Model: Structural coefficients from the completely standardized solution (β).



Data also highlights that autonomy support has an indirect effect on students’ positive emotions when is partially mediated by the satisfaction of the need for competence (Figure 3). Finally, the overall model explained 33% of the variance in the satisfaction of need for competence and 30% of the variance in positive emotions.

Figure 3. Indirect effect.

Label	Description	Parameter	Estimate	SE	95% Confidence Intervals		β	z	p
					Lower	Upper			
Indirect Effect	AutonomySupport \Rightarrow CompetenceNeedSatisfaction \Rightarrow PositiveEmotions	p17*p18	0.164	0.033	0.099	0.229	0.192	4.931	< .001

¹The Jamovi project (2021). *Jamovi*. (Version 2.0) [Computer Software]. <https://www.jamovi.org>.

4. Conclusions

SDT suggests that a supportive educational context can facilitate the satisfaction of basic psychological needs. A supportive teaching style promotes the satisfaction of students' need for competence by providing them with explicit guidance, optimal challenges and feedback fostering improvement of skills, as well as clarifying teachers' expectations (Ahmadi et al., 2022). A formal intervention program is needed to help teachers improve their teaching style. "What teachers learn during an autonomy-supportive intervention is how to provide instruction in autonomy-satisfying ways" (Reeve & Cheon, 2021, p. 67). Autonomy-supportive teaching interventions have been highly successful in increasing students' satisfaction of basic needs at school. "Most teachers who participate in an autonomy-supportive intervention cognitively assimilate its autonomy-supportive message, respond favorably to the recommended instructional behaviors, and display objective evidence that they have become more autonomy supportive toward students during their classroom instruction" (Reeve & Cheon, 2021, p. 69).

The results of this study highlight the importance of students' need for competence in promoting school well-being. This suggests that students' psychological needs should be considered, and teachers should not only be aware of the importance of autonomy-supportive teaching, but also of how they can improve their teaching style (Vandekerckhove et al., 2019).

Future studies in the Italian school context should implement interventions based on the SDT focused on the satisfaction of student's needs, in order to improve teaching practices and approaches that can enhance students' well-being at school.

References

- Ahmadi, A., Noetel, M., Parker, P., Ryan, R., Ntoumanis, N., Reeve, J., ... & Lonsdale, C. (2022). *A Classification System for Teachers' Motivational Behaviours Recommended in Self-Determination Theory Interventions*.
- Alivernini, F., & Lucidi, F. (2011). Relationship between social context, self-efficacy, motivation, academic achievement, and intention to drop out of high school: A longitudinal study. *The journal of educational research*, 104(4), 241-252.
- Alivernini, F., & Manganelli, S. (2015). First evidence on the validity of the students' relatedness scale (SRS) and of the school well-being scale (SWS). *Procedia-Social and Behavioral Sciences*, 205, 287-291.
- Alivernini, F., Cavicchiolo, E., Manganelli, S., Chirico, A., & Lucidi, F. (2019). Support for autonomy at school predicts immigrant adolescents' psychological well-being. *Journal of Immigrant and Minority Health*, 21(4), 761-766.
- Borgonovi, F. and J. Pál (2016), *A Framework for the Analysis of Student Well-Being in the PISA 2015 Study: Being 15 In 2015*, OECD Education Working Papers, No. 140, OECD Publishing, Paris, <https://doi.org/10.1787/5jlpszwghvnb-en>.
- Bureau, J. S., Howard, J. L., Chong, J. X., & Guay, F. (2022). Pathways to student motivation: A meta-analysis of antecedents of autonomous and controlled motivations. *Review of Educational Research*, 92(1), 46-72.
- Buzzai, C., Sorrenti, L., Costa, S., Toffle, M. E., & Filippello, P. (2021). The relationship between school-basic psychological need satisfaction and frustration, academic engagement and academic achievement. *School Psychology International*, 42(5), 497-519.
- Deci, E.L. & Ryan, R.M. (2000) 'The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior', *Psychological Inquiry* 11: 227-68.
- Diener, E. (2012). New findings and future directions for subjective well-being research. *American psychologist*, 67(8), 590.
- Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural equation modeling: a multidisciplinary journal*, 6(1), 1-55.
- Niemiec, C. P., & Ryan, R. M. (2009). Autonomy, competence, and relatedness in the classroom: Applying self-determination theory to educational practice. *Theory and research in Education*, 7(2), 133-144.
- OECD (2021), *Measuring What Matters for Child Well-being and Policies*, OECD Publishing, Paris, <https://doi.org/10.1787/e82fded1-en>.
- OECD (2017), *PISA 2015 Results (Volume III): Students' Well-Being*, PISA, OECD Publishing, Paris. <http://dx.doi.org/10.1787/9789264273856-en>

- Park, N. (2004). The role of subjective well-being in positive youth development. *The Annals of the American Academy of Political and Social Science*, 591(1), 25–39.
- Reeve J. (2016). Autonomy-supportive teaching: what it is, how to do it. In: Liu W et al, editors. *Building autonomous learners*. Singapore: Springer, pp. 129–52.
- Reeve, J., & Cheon, S. H. (2021). Autonomy-supportive teaching: Its malleability, benefits, and potential to improve educational practice. *Educational Psychologist*, 56(1), 54-77.
- Ryan, R. M., & Deci, E. L. (2020). Intrinsic and extrinsic motivation from a self-determination theory perspective: Definitions, theory, practices, and future directions. *Contemporary educational psychology*, 61, 101860.
- Ryan, R. M., & Deci, E. L. (2017). *Self-determination theory: Basic psychological needs in motivation, development, and wellness*. The Guilford Press.
- Su, T., Tian, L., & Huebner, E. S. (2021). The reciprocal relations among prosocial behavior, satisfaction of relatedness needs at school, and subjective well-being in school: A three-wave cross-lagged study among Chinese elementary school students. *Current Psychology*, 40(8), 3734-3746.
- Tian, L. (2008). Developing scale for school well-being in adolescents. *Psychology Development and Education*, 3(24), 100–107.
- Tian, L., Chen, H., and Huebner, E. S. (2014). The longitudinal relationships between basic psychological needs satisfaction at school and school-related subjective well-being in adolescents. *Soc. Indic. Res.* 119, 353–372.
- Tian, L., Han, M., & Huebner, E. S. (2014). Preliminary development of the adolescent students' basic psychological needs at school scale. *Journal of adolescence*, 37(3), 257-267.
- Vandenkerckhove, B., Soenens, B., Van der Kaap-Deeder, J., Brenning, K., Luyten, P., & Vansteenkiste, M. (2019). The role of weekly need-based experiences and self-criticism in predicting weekly academic (mal) adjustment. *Learning and Individual Differences*, 69, 69-83.

COGNITIVE LOAD AND QUESTION ASKING – THE CASE OF PROSPECTIVE MATHEMATICS TEACHERS COPING WITH HISTORICAL TEXTS

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Abstract

In this study, we examined aspects relating to the impact of integrating question-asking activities and providing answers to these questions while reading historical mathematical texts on prospective mathematics teachers' self-reported cognitive load. The research group included two classes of 20 students each (experimental and control groups). The experimental group was instructed to ask questions while coping with the texts, whereas the control group received no special instructions. The experimental group participants were asked to think aloud while coping with the texts and audio record themselves. These recordings were transcribed into written protocols. In addition, both groups had to respond to a self-esteem index questionnaire in which they had to report the level of difficulty they experienced as an indicator of their cognitive load. The data was analyzed using quantitative and qualitative methods. Two main observations were obtained: the first is that question-asking reduces cognitive load, and the second is that question-asking supports the assimilation of new information up to a specific limit, depending on the gap between existing knowledge and new information.

Keywords: *Cognitive load, historic mathematical texts, prospective mathematics teachers, question-asking.*

1. Introduction

Developing self-regulated learning skills involves, among other things, helping students to develop their capability for self-reading of professional texts. Specifically, in the case of mathematics, the reading of mathematical texts is critical for establishing mathematical knowledge and it includes interpreting and understanding these texts (Österholm & Bergqvist, 2013). Nonetheless, generally, little attention is paid to nurturing such capabilities (Lavy & Shriki, 2020). The present study explores the effect of question asking (QA) by prospective middle and high school mathematics teachers (PMTs) on the cognitive load created while engaging with mathematical texts, as reported by them. Cognitive load refers to the state of memory storage and processing of information while coping with a particular task (Sweller, 1988), where overloaded working memory impedes reading and learning (e.g., Clark, Nguyen, & Sweller, 2005). The created cognitive load indicates the difficulties learners experience while engaging in a task, and can be measured directly using learner self-reports (Paas, Tuovinen, Tabbers, & Van Gerven, 2003; Paas, Van Merriënboer, & Adam, 1994).

Asking mathematical questions is recognized as fostering active learning, knowledge acquisition, mathematical thinking, and metacognition. Thus, focusing on QA stems from its merits and role in acquiring mathematical knowledge and nurturing mathematical thinking. Answering these questions often leads to the emergence of new mathematical insights (Wong, 2015). The current study sought to examine the effect of QA by PMTs on reducing cognitive load while reading historical mathematical texts. The study was conducted within a course focusing on reading mathematical texts, ancient solution methods and algorithms, and their application for solving problems. The solution methods and algorithms were presented to the PMTs in their Hebrew translation version using the currently accepted mathematical language, keeping their original content and format.

2. Theoretical background

2.1. Reading mathematical texts and question asking

Reading and comprehending texts are among the main modes of individual learning in various settings. Readers apply various strategies for dealing with texts, including encoding information and

building a mental representation of the text content, making inferences for connecting different parts of the text, and employing prior knowledge to make sense of the textual information. In general, three factors affect the reading and comprehending of a text: text properties (e.g., content, structure), instructional context (e.g., the reading goals - educational purposes vs. entertainment), and reader characteristics (e.g., working memory - the personal capacity to manipulate information in memory) (Bohn-Gettler & Kendeou, 2014). Students' comprehension of professional texts often affects their ability to solve the problems and constitutes a potential obstacle to learning (Foxman, 1999). Mathematical texts differ from texts in other subjects as they contain complicated concepts; they are written in brief format; and consist of a mixture of different representations, which adds to their complexity.

Asking mathematical questions is acknowledged to foster active learning, knowledge acquisition, mathematical thinking, and metacognition (Wong, 2015). Hence, when the learners are the ones who ask the questions, their mathematics knowledge is enhanced because asking a valid question necessitates exploring the relations embedded in the particular situation. In addition, learning to ask questions also supports students' ability to identify their difficulties and formulate appropriate questions for their instructor (Wong, 2015).

2.2. Cognitive load

The concept of 'cognitive load' was coined by Sweller (1988) to describe the state of memory storage and processing of information in a human's mind while coping with a particular task or complex situation, and it can serve as an indicator of the degree of difficulty learners experience while engaging in the task (Paas et al., 2003; Paas et al., 1994). Sweller, et al. (1998) distinguished between intrinsic, extraneous, and germane cognitive load. The intrinsic cognitive load refers to the mental effort one invests in dealing with a task, which varies from person to person according to expertise in the field related to the task. The extraneous cognitive load refers to how the task is formulated or presented and hence can be controlled by modifying the task formulation. The germane cognitive load refers to schemas processing, construction, and automation (García et al., 2011).

Cognitive load can be measured, among others, by employing learner self-reports (Paas et al., 2003). These reports can be done using real-time reporting, retrospective reporting, and a self-esteem index. Real-time reporting refers to the learner documenting all the thoughts that cross his mind while engaging with a given task. In retrospective reporting, the learner reports his thoughts right after the task completion to avoid forgetting. The self-esteem index is based on measurement scales and the assumption that learners can examine themselves and report on the level of mental effort they have put into performing a particular task (Sweller, 2018). The self-esteem index is commonly used in questionnaires that contain measurement scales, which are relatively sensitive to small changes in cognitive load and are valid, reliable, and non-invasive (Paas et al., 2003). Considering both readings of texts and cognitive load, research indicates that readers with high working memory are more successful in adjusting their processing to their general reading goals (Bohn-Gettler & Kendeou, 2014), while overloaded working memory impedes reading and learning (Clark et al., 2005). Thus, in designing the learning environment, one of our primary goals was to find a way to reduce the PMTs' cognitive load to support the process of independent reading of the texts and understanding the mathematical contents. Therefore, we sought to examine the effect of QA by the PMTs while reading the mathematical texts and then answer the questions on the reduction of cognitive load, as reported by the PSTs.

3. The Study

3.1. The research goal

Given the issues related to reading mathematical texts, reducing cognitive load, and QA, the present study sought to examine the effect of QA by PMTs while reading historical mathematical texts on reducing the self-reported cognitive load.

3.2. The study participants

Forty PMTs participated in the study. They were all in the third year of their undergraduate studies in middle and high school mathematics. The research took place within an annual mandatory course dealing with selected topics from the history of mathematics until the beginning of the Christian era. The forty participants were assigned into two groups of 20 PMTs each (experimental and control) following the matching control technique (Johnson & Christensen, 2014). The experimental group was instructed to ask questions related to the texts and record themselves while coping with the texts.

3.3. The learning environment

The course in which the research took place was a two-semester course dealing with selected topics from the history of mathematics until the beginning of the Christian era and is divided into eleven

chapters: Egyptian mathematics (arithmetic, algebra, and geometry); Babylonian mathematics (arithmetic and geometry); the mathematics of prominent Greek mathematicians (Thales, Pythagoras, and Euclid); and ancient Indian mathematics (three sections of Vedic arithmetic). The course is based on reading the background of the discussed period, mathematical texts that include ancient solution methods and algorithms, and their application for solving problems. All solution methods and algorithms were presented to the study participants in Hebrew as a verbatim translation of the English version of the original texts, using the currently accepted mathematical language and notations. However, it should be noted that the term 'algorithm' did not exist in ancient times, and it is unclear whether the ancient mathematicians were even aware of its existence. To examine the effect of asking questions and answering them while reading the texts, and since the PMTs had no prior experience in QA, the experimental group members were instructed to formulate questions beginning with 'What'/'How'/'Whether' or 'Why', and provide answers. The control group was instructed to cope with the historical texts using any appropriate method.

3.4. Research method and tools, and data analysis

The research design was quasi-experimental (Maciejewski, 2020), employing both qualitative and quantitative approaches and research tools. Four main tools were used: (i) A self-esteem index cognitive load questionnaire (Paas et al., 2003). The statements in the questionnaire were of two types. Statements 'a' to 'f' concern extraneous cognitive load, as they refer to the way the task is presented to the PMTs, while statements 'g' to 'j' concern intrinsic cognitive load as they refer to aspects relating to the mental effort the PMTs invest while engaging with the historical texts. The statements are: (a) Absence of explicit rationale of the algorithm; (b) Transition from step to step in the algorithm; (c) The verbal formulation of the algorithm; (d) The numerical examples presented throughout the algorithm; (e) The mathematical concepts appear in the algorithm; (f) Absence of proof for the algorithm; (g) Applying the algorithm - solving computational problems based on it; (h) Applying the algorithm - solving problems that require high order levels of thinking; (i) The need to generalize the algorithm; and (j) Adapting the algorithm into new situations. These statements reflect the nature of the information the PMTs had to deal with or the mathematical operations they had to perform. The PMTs were asked to report on the level of difficulty they experienced regarding each statement according to a symmetrical scale, ranging from 1 (very very low level of difficulty) to 9 (very very high level of difficulty). Due to the small sample size, the data were analyzed using basic tools of descriptive statistics; (ii) An open-ended questionnaire in which the PMTs were asked to justify their ranking of self-esteem index of cognitive load; (iii) Transcripts of group interviews that were conducted four times throughout the academic year. The group interviews were intended to elicit the PMTs' thinking about issues related to the research questions to allow us to deepen our understanding of their thoughts, opinions, and feelings; and (iv) Think-aloud protocols (Veenman et al., 2004) in which the PMTs were asked to audio record their thoughts while engaging with the mathematical texts. These recordings were transcribed into written protocols. The data received from tools (ii)-(iv) was analyzed using three stages of coding (Creswell, 2012): (1) Open coding, aimed at constructing the initial categories based on prominent words or phrases in PMTs' protocols; (2) Axial coding, in which the initial categories were grouped under more general categories based on their causal conditions; (3) Selective coding, in which we triangulated, refined, and defined the relationships among the categories that surfaced in the axial coding stage.

4. Results and discussion

In this study, we examined the effect of QA on reducing cognitive load. Based on Paas et al. (1994), we distinguished between intrinsic cognitive load (the mental effort one invests in dealing with a task) and extraneous cognitive load (related to the design of the task). The results obtained from the self-reported cognitive load index questionnaire indicate that while the cognitive load reported by the control group remains almost the same for the three texts, the cognitive load reported by the experimental group showed a moderate decrease. In addition, on average, the intrinsic cognitive load was found higher than the extraneous one along with the three texts. Recall that the control and experimental groups differed in the QA engagement and the think-aloud recording while coping with the historical texts. Therefore, it might be inferred that the act of think-aloud also affected the observed decrease in cognitive load among the experimental group. However, a review of 94 studies (involving almost 3,500 participants) comparing the performance in cognitive activities with or without think-aloud indicated little or no reliable difference in performance with or without think-aloud (Fox, Ericsson & Best, 2011). To gain insights into the process of QA and its effect on the reading of the texts and the deciphering of the algorithms, the researchers transcribed the records of the think-aloud processes, representing real-time reporting (Paas et al., 2003).

In what follows, we present the analysis of Rina's protocols produced during her coping with three texts: the Egyptian algorithm for multiplying two numbers; the Babylonian algorithm dealing with the solution of two equations with two unknown variables using geometrical considerations; and the Vedic algorithm for finding the square of a two-digit number. Rina was chosen as her protocols were detailed and reflected the prevalent modes of thinking of the other participants. The analysis of Rina's protocols reveals the existence of two of the reading strategies addressed by Bohn-Gettler & Kendeou (2014): making inferences and employing prior knowledge. As uncovered from the analysis of the three protocols, this was done by asking two types of questions, indicating a two-tier gradual process: The first type of question is related to trying to understand the rationale of the algorithm by examining other numerical examples substituting numbers in the algorithms. From Rina's protocols, it is evident that she relates to this operation as an intuitive action done casually, not involving any cognitive effort. However, this type of question did not lead Rina to comprehend the rationale underlying the algorithms. The second type of question is related to her desire to find compatibility between familiar methods (existing schemas) and the new methods appearing in the texts. That is done through a consistent comparison between the methods. As evident from Rina's protocols, this comparison is made by making inferences and employing prior knowledge (Bohn-Gettler & Kendeou, 2014). From the analysis of Rina's recordings, one can learn about the high intrinsic cognitive effort that was invested to that end. This can be supported by the results indicating that the intrinsic cognitive load is higher than the extraneous one along with the three texts.

The activity of QA (both types of questions) served as an engine of the whole process. Through the process of QA from the first type, Rina progressed in her attempts to understand the texts and not give up right from the beginning. However, realizing it was not enough, she asked the second-type questions during her attempts to assimilate new information into existing knowledge (schema). In case the assimilation was problematic, she experienced difficulties which were reflected by her self-report of high cognitive load. In the last group interview, Rina said: *"The questions I had to ask prevented me from giving up right after the first reading of the texts. Since I was unfamiliar with this technique [QA], I started with questions that helped me repeat the algorithms without necessarily understanding them. Then it occurred to me that I have to cope with different questions that will lead to a breakthrough in my attempts to make sense of the algorithms"*. Thus, it can be concluded that the first type of question neither adds to the cognitive load nor promotes understanding of the texts. Whereas the second type of question promotes understanding but at the same time, adds to the cognitive load. In other words, an increase in cognitive load and the development of insights seem to be interwoven. Nonetheless, questions of the first type help preserve coping with the task and not giving up right away. Although it is evident that QA, and in particular questions of the second type, helps reduce the cognitive load, their effect on the reduction is limited. A possible explanation for this limitation might be attributed to a gap between existing schemas and new information.

From the three think-aloud protocols, we could infer that when Rina had a solid schema (as in the case of the multiplication), she had difficulties understanding the new information (Egyptian multiplication algorithm). Rina's existing schema relates to multiplying two numbers as a whole, while in the Egyptian multiplication method, the multiplicand is decomposed into a sum of numbers represented in powers of 2. Rina's adhering to her solid schema prevents her from deciphering the new algorithm. As to the second think-aloud protocol, there is also a conflict between the existing schema - the algebraic method for solving two equations with two unknown variables, and the Babylonian method, for which the solution is geometric. In this case, the gap between the existing (algebraic) schema and the new (geometric) knowledge has a different nature than the one that is manifested in the first text, a fact that allowed Rina, through asking questions, to progress further in her process of understanding the text at hand. In the third protocol (Vedic method for squaring two-digit numbers), Rina understood the algorithm and provided formal proof. That success can be attributed to the fact that she had no existing schema for squaring two-digit numbers. That brings into discussion the connection between bridging among existing schemas and new information and the cognitive load learners experience. Neumann and Kopcha (2018) indicated the importance of the existence of schemas in learners' minds for the absorption and assimilation of new knowledge. However, studies show that the existence of solid schemas can also interfere with the assimilation of new knowledge (Van Kesteren & Meeter, 2020), as in fact, happened in the present study. The above results are consistent with Van Kesteren and Meeter (ibid.), who claimed that while schemas are presumed to help memory encode and consolidate new data, solid schemas can also lead to unwanted side effects, as was found in the present study. In the think-aloud protocols, we can see both- the positive and negative effects of schema. The positive effect is expressed in recalling data from memory (e.g., how to calculate the area and perimeter of rectangles and squares, short multiplication formula), a knowledge that was crucial for understanding the historical algorithms. The negative effect is expressed in Rina's attempts to prove the new algorithms (Egyptian and Babylonian) holding on to her solid existing schema with no success. For example, referring to the third text (Vedic method for

calculating a square of two-digit natural numbers), the fact that Rina did not have an existing schema for calculating the square of two-digit natural numbers helped her by using QA, to come up with alternative ways of thinking and eventually to provide a formal proof to the Vedic method. Thus, the second observation is that QA supports the process of assimilating new information up to a certain point. Since solid schemas might interfere in bridging existing knowledge and new information, although QA of the second type might be efficient in reducing the cognitive load, its effect is depended on the nature of the gap between existing schema and new information. To conclude, further research is needed to characterize the appropriate questions for reducing the cognitive load generated by the gap between existing schemas and new information. Finally, to examine whether the content of the text influences the cognitive load, further research should be conducted in which the texts will be given in random order to different PMTs.

References

- Bohn-Gettler, C. M., & Kendeou, P. (2014). The interplay of reader goals, working memory, and text structure during reading. *Contemporary Educational Psychology*, 39(3), 206–219.
- Clark, R. C., Nguyen, F., & Sweller, J. (2005). *Efficiency in learning: Evidence-based guidelines to manage cognitive load*. Pfeiffer.
- Creswell, J. W. (2012). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research* (4th ed.). Boston, MA: Pearson.
- Fox, M. C., Ericsson, K. A., & Best, R. (2011). Do procedures for verbal reporting of thinking have to be reactive?: A meta-analysis and recommendations for best reporting methods. *Psychological Bulletin*, 137(2), 316–344.
- Foxman, D. (1999). Mathematics textbooks across the world: Some evidence from the Third International Mathematics and Science Study (TIMSS), National Federation for Educational Research Slough.
- García, M., Llinares, S., & Sánchez-Matamoros, G. (2011). Characterizing thematized derivative schema by the underlying emergent structures. *International journal of science and mathematics education*, 9(5), 1023-1045.
- Johnson, R. B., & Christensen, L. (2014). *Educational research: Quantitative, qualitative, and mixed approaches* (5th ed.). SAGE Publications, Inc.
- Lavy, I. & Shriki, A. (2020). Prospective teachers' coping with mathematical algorithms in a flipped class setting. In Carmo, M. (Ed.). *Proceedings of Education and new developments (END2020)*, Zagreb, Croatia. Pp. 81-85.
- Maciejewski, M. L. (2020). Quasi-experimental design. *Biostatistics & Epidemiology*, 4(1), 38-47.
- Neumann, K. L., & Kopcha, T. J. (2018). The use of schema theory in learning, design, and technology. *TechTrends*, 62(5), 429-431
- Österholm, M., & Bergqvist, E. (2013). What is so special about mathematical texts? Analyses of common claims in research literature and of properties of textbooks. *ZDM-Mthematics Education*, 45(5), 751-763.
- Paas, F. G. W. C., Van Merriënboer, J. G., & Adam, J. (1994). Measurement of cognitive load in instructional research. *Perceptual and Motor Skills*, 79(1), 419-430.
- Paas, F. G. W. C., Tuovinen, J. E., Tabbers, H., & Van Gerven, P.W. (2003). Cognitive load measurement as a means to advance cognitive load theory. *Educational Psychologist*, 38(1), 63-71.
- Sweller, J. (1988). Cognitive load during problem solving: Effects on learning. *Cognitive science*, 12(2), 257-285.
- Sweller, J. (1994). Cognitive load theory, learning difficulty, and instructional design. *Learning and instruction*, 4(4), 295-312.
- Sweller, J., Van Merriënboer, J. J. G., & Paas, F. G. W. C (1998). Cognitive architecture and instructional design. *Educational Psychology Review*, 10(3), 251-296.
- Sweller, J. (2018). Measuring cognitive load. *Perspectives on medical education*, 7(1), 1-2.
- Van Kesteren, M. T. R., & Meeter, M. (2020). How to optimize knowledge construction in the brain. *npj Science of Learning*, 5(1), 1-7.
- Veenman, M. V. J., Wilhelm, P., & Beishuizen, J. J. (2004). The relation between intellectual and metacognitive skills from a developmental perspective. *Learning and Instruction*, 14(1), 89-109.
- Wong, K. Y. (2015). Use of student mathematics questioning to promote active learning and metacognition. In S. J. Cho (Ed.), *Proceedings of the 12th International Congress on Mathematical Education (ICME-12)* (pp. 1086-1100). Cham: Springer International Publishing.

AN OVERVIEW OF SPANISH STUDENTS' PSYCHOLOGICAL ADJUSTMENT DURING COVID PANDEMIC

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Abstract

Introduction. All world had suffered the consequences of a health crisis due to Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2). More specifically, Madrid was one of the cities most affected by this health crisis and where the restrictions have been the harshest. All population suffered psychological consequences of social isolation. Previous research on the effects of social isolation in children shows important effects on aspects, such as feelings of sadness, anger, frustration, and apathy (Biordi and Nicholson, 2013; Brooks et al., 2020). Other indicative aspects of well-being and regulation during childhood have also been found to be altered, such as sleep patterns, potty training, or challenging behaviors (Simon and Walker, 2018). Changes have also been observed in the levels of anxiety (increased fear, worry, obsession, or rumination) and depression (depressed mood, lack of interest and motivation, or sadness; Teo et al., 2013; Urbina, 2020). The objective of the present study was to verify whether the psychological adjustment of Spanish preschoolers and primary students has changed since the health crisis started.

Method. A total of 291 families with children aged between 3.2 and 11.1 years (53,9% girls) participated in the study. These families have a medium socioeconomic background. The sample was divided into two age groups: 76 preschool families (59% girls) and 215 primary families (52% girls). The first measurement point was in February 2020 (just before health crisis started), the second point of measurement was during confinement in Madrid in March 2020 and the last measurement point was in February 2021 (one year after the health crisis started). Some scales of the questionnaire System of Evaluation of Children and Adolescents (SENA, Fernández-Pinto et al., 2015) were used. The selected scales were Attentional Problems, Depression, Challenging Behaviors, Emotional Regulation, Hyperactivity, and Willingness to study.

Results. Comparison between the pretest and posttest scores for the Early Childhood Education group indicated very little variation in the mean scores of the five dimensions between T1-T2. In the same way, no differences between T1-T3 and T2-T3 were found in preschoolers. The situation for primary students were slightly different but in general no differences were found between T1-T3 and some improvement were found between T2-T3.

Discussion. These results show that the children apparently were able to emerge unscathed from the extreme situation that they had to live through.

Keywords: *Preschoolers, primary education, mental health, pandemic, psychological adjustment.*

1. Introduction

All world had suffered the consequences of a health crisis due to Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2). Madrid was one of the cities most affected by this health crisis and where the restrictions have been the harshest. All population suffered psychological consequences of social isolation.

More specifically as the United Nations Committee on the Rights of the Child (2020) points out children and adolescents are one of the most vulnerable populations in the pandemic, as they are exposed to serious physical, emotional and psychological product of the restrictions that mean the closure of

schools and kindergartens; loss of contact with peer groups; limitations for the movement and recreation activities; and difficulties in accessing contexts of protection against situations that threaten their rights.

Previous research on the effects of social isolation in children shows important effects on aspects such as feelings of sadness, anger, frustration, and apathy (Biordi and Nicholson, 2013; Brooks et al., 2020). Other indicative aspects of well-being and regulation during childhood have also been found to be altered, such as sleep patterns, potty training, or challenging behaviors (Simon and Walker, 2018). Changes have also been observed in the levels of anxiety (increased fear, worry, obsession, or rumination) and depression (depressed mood, lack of interest and motivation, or sadness; Teo et al., 2013; Urbina, 2020). Reinoso-Mena (2022) reviewed 52 articles that analyzed the symptoms and conditions that have affected the mental health of children and adolescents under 18 during the pandemic: stress, depression, anguish and anxiety were found.

More specifically in Spanish and Italian population, Orgilés et al. (2020) found that 85.7% of the parents perceived changes in their children's emotional state and behaviors during the quarantine. The most frequent symptoms reported were difficulty concentrating, boredom, irritability, restlessness, nervousness, feelings of loneliness, uneasiness, and worries. The Spanish parents reported more symptoms than Italians.

The objective of the present study was to verify whether the psychological adjustment of Spanish preschoolers and primary students has changed since the health crisis started in March/2020. We have had the opportunity of analyzing changes during confinement but also changes in the "new normality" once confinement finished.

2. Methods

A total of 291 families with children aged between 3.2 and 11.1 years (53,9% girls) participated in the study. These families have a medium socioeconomic background. The sample was divided into two age groups: 76 preschool families (59% girls) and 215 primary families (52% girls). The first measurement point was in February 2020 (just before health crisis started), the second point of measurement was during confinement in Madrid in March 2020 and the last measurement point was in February 2021 (one year after the health crisis started).

The questionnaire used was the System of Evaluation of Children and Adolescents (SENA, Fernández-Pinto et al., 2015), validated and scaled for the Spanish population. The selected scales were Attentional Problems, Depression, Challenging Behaviors, Emotional Regulation, Hyperactivity, and Willingness to study. The score for each item ranged from 1 (never or almost never) to 5 (always or almost always). For all dimensions, except for Willingness to study, the lowest scores indicate absence of problems and scores above 3 indicate the presence of some type of difficulty. For the Willingness to study scale, a score lower than 3 indicates a problem.

3. Results

Comparison between the scores before, during and after confinement for preschoolers indicated very little variation in the mean scores (Table 1). Since the comparison between T1 and T2 has already been published (Giménez-Dasí et al., 2020), only the T1-T3 and T2-T3 comparisons are referred to in this paper. No differences between T1-T3 (Pillai's trace: $F(6, 8) = 0,43, p = .84, \eta_p^2 = .24$) and T2-T3 (Pillai's trace, $F(5, 12) = 0,534, p = .747, \eta_p^2 = .182, 1-\beta = .143$) were found in preschoolers. No gender differences were found.

Table 1. Mean and SD at three measurement points for preschoolers.

Dimensions	T1		T2		T3	
	Mean	SD	Mean	SD	Mean	SD
Challenging behaviors	2.31	0.72	2.55	0.83	2.44	0.89
Depression	1.23	0.28	1.28	0.47	1.23	0.36
Hyperactivity	2.66	0.70	2.79	0.89	2.57	0.84
Attentional problems	2.11	0.69	2.41	0.80	2.12	0.77
Emotion regulation	2.29	0.66	2.48	0.89	2.38	0.65
Anxiety	1.68	0.41	--	--	1.88	0.83

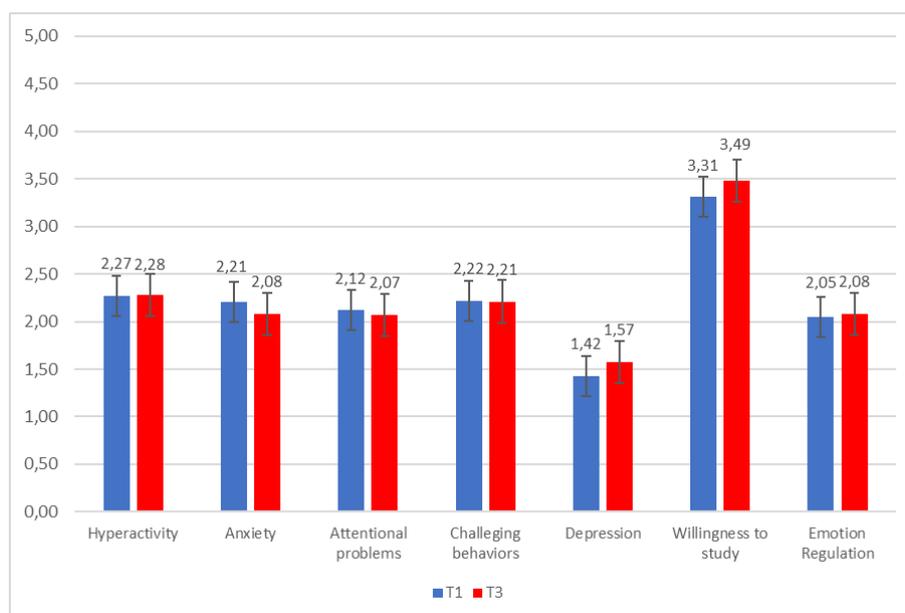
The situation for primary students were slightly different. In first place, results per grade were analyzed. As it can be seen in table 2, there were significant differences between grades in T1: attentional problems, challenging behavior, depression and hyperactivity. Those in third grade showed higher scores in attentional problems, challenging behaviors and hyperactivity. On the other hand, students from fifth grade showed higher scores in depression, In T2 and T3 significant differences per grades were found in attentional problems and hyperactivity. Once more students from third grade showed higher scores in both dimensions. In all cases the effect size was weak ($\eta^2 < .03$).

Table 2. Results for primary schoolers per grade.

Dimension	T1					T2				T3			
	Grade	N	M	SD	F(2, 71)	N	M	SD	F(2, 101)	N	M	SD	F(2, 47)
Anxiety	1º	28	2,05	,69	2,184	This dimension was not assessed during confinement.				19	2,04	,61	2,722
	3º	24	2,55	1,0	$p = .120$	16	2,48	,93		16	2,48	,93	$p = .076$
	5º	22	2,27	,85		15	1,87	,71					
Attentional problems	1º	28	2,02	,72	4,639	40	2,49	,81	4,025	19	1,91	,57	6,312
	3º	24	2,60	,83	$p = .013$	35	2,65	,89	$p = .021$	16	2,55	,84	$p = .004$
	5º	23	1,98	,75		29	2,09	,68		15	1,73	,62	
Challenging behaviors	1º	28	2,26	,61	3,144	40	2,42	,72	1,975	19	2,19	,68	1,022
	3º	24	2,37	,65	$p = .049$	35	2,51	,75	$p = .144$	16	2,43	,83	$p = .368$
	5º	23	2,10	,73		29	2,17	,66		15	2,06	,70	
Depression	1º	28	1,22	,27	4,287	40	1,66	,72	0,155	19	1,42	,41	1,751
	3º	24	1,47	,44	$p = .017$	35	1,59	,72	$p = .857$	16	1,65	,54	$p = .185$
	5º	23	1,58	,57		29	1,57	,62		15	1,85	,97	
Hyperactivity	1º	28	2,34	,66	5,112	40	2,76	,81	6,815	19	2,26	,66	6,864
	3º	24	2,61	,87	$p = .008$	35	2,86	,94	$p = .002$	16	2,66	,90	$p = .002$
	5º	23	1,96	,66		29	2,14	,73		15	1,72	,52	
Willingness to study	1º	28	3,39	,60	2,698	40	2,41	,94	2,241	19	3,54	,52	0,677
	3º	24	3,15	,49	$p = .074$	35	2,63	,90	$p = .112$	16	3,36	,57	$p = .513$
	5º	23	3,54	,52		29	2,07	,88		15	3,55	,48	
Emotion regulation	1º	28	1,96	,69	2,783	40	2,94	,72	2,972	19	1,94	,72	2,706
	3º	24	2,42	,74	$p = .069$	35	3,08	,45	$p = .056$	16	2,48	,996	$p = .077$
	5º	23	2,13	,79		29	3,23	,48		15	1,82	,842	

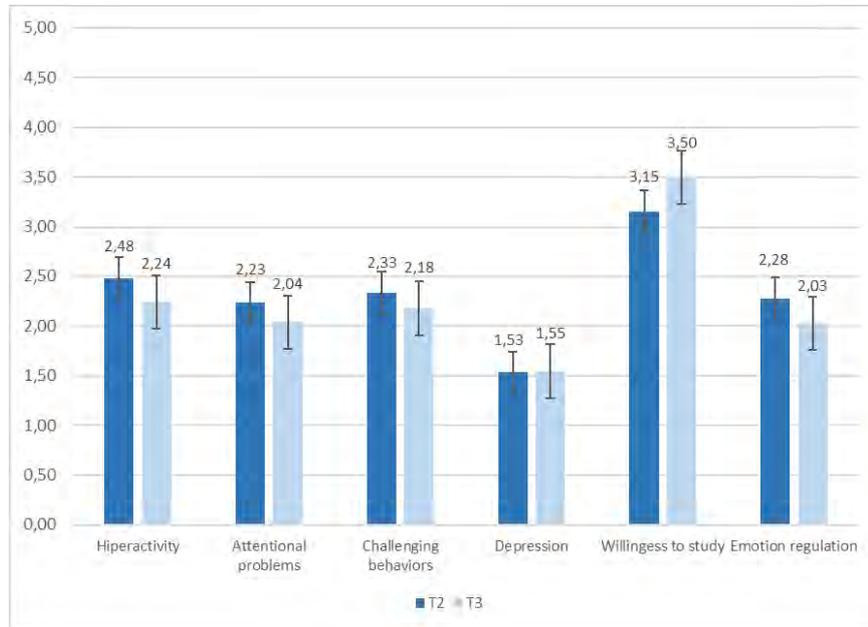
There were significant differences between T1-T2 in the following dimensions: attentional problems, emotion regulation, hyperactivity, and willingness to study (Giménez-Dasí et al., 2020). Although no differences were found between T1-T3 (Pillai's trace, $F(7, 26) = 0,653, p = .708$) there were significant differences between T2-T3 (Pillai's trace, $F(6, 37) = 2,414, p = .045$).

Figure 1. Mean scores for primary students in T1 and T3.



In T2-T3 a score decrease was observed in all dimensions except in willingness to study, which increases slightly (Figure 2). Some statistically significant differences were found indicating a reduction in Hyperactivity in T3 ($F_{\text{Hyperactivity}}(1, 42) = 3,930$, $p = ,028$, $\eta_p^2 = ,110$), decrease in emotion regulation difficulties scores in T3 ($F_{\text{P.Emotion Regulation}}(1, 42) = 3,992$, $p = ,005$, $\eta_p^2 = ,173$) as well as small improvement of willingness to study ($F_{\text{Willingness to study}}(1, 42) = 5,772$, $p = ,021$, $\eta_p^2 = ,121$).

Figure 2. Mean scores for primary students in T2 and T3.



4. Discussion

The objective of the present study was to verify whether the psychological adjustment of Spanish preschoolers and primary students had changed since the health crisis started. In general, the results of allow us to establish two conclusions: 1) preschoolers did not experience changes due to the pandemic. Neither the confinement nor the “new normality” seemed to impact their psychological adjustment; 2) Primary School children in our sample have recovered from the impact of confinement and it does not seem that the pandemic is affecting their psychological adjustment.

The lack of impact on preschoolers is consistent with that obtained in our previous study, where the psychological adjustment was compared in February 2020, before confinement, and in April of the same year after six weeks of confinement (Giménez-Dasí et al., 2020). As already argued in the previous study, it seems that young children are more protected from reality than older ones. This protection comes from external agents such as their family and school environment. On the other hand, it can come from internal factors such as the cognitive system of young children. In this sense, the care that young children receive from their families and teachers has the objective of promoting the stability of their lives and that the restrictions and concerns derived from the pandemic situation affect these minors minimally.

For the primary students we found no differences between T1 and T3 on any scale. The number of restrictive measures to which the children have been subjected seemed not to impact on their psychological adjustment or it has not caused them significant stress. Perhaps these stressors are compensated by other protective factors already mentioned in the scientific literature (Marchi et al., 2021). Regarding the comparison between the time of confinement (T2) and the “new normality” (T3), some improvements have been found, specifically in the reduction of Hyperactivity, Emotional Regulation difficulties and Willingness to study (remember that this scale scores inversely and a higher score indicates fewer problems). It is possible that some protective factors have had an impact on these improvements (i.e. contact with peers, physical exercise, return to certain normal routines and greater social support) and that the reduction of some risk factors has also been positive (i.e. excessive use of devices and exposure to information and news) (Marchi et al., 2021).

In short, the results of this study support the hypothesis that returning to “new normality” would have contributed to improving the psychological adjustment of children and that neither the pandemic nor the restrictive measures had a negative effect on the children in our sample. These results differ from

studies that indicate that the pandemic has brought more social and emotional instability to children. The clearest hypothesis that would explain those results can be attributed to the socioeconomic situation of the sample. Previous studies have shown that socioeconomic status (SES) has proven to be a key protective factor regarding the impact of the pandemic in all settings (Bryant et al., 2020; Panagouli et al., 2021)

This study has some limitations that need to be considered. Firstly, the sample size is small and it is a convenience sample. It would be important to consider studies with more representative and larger samples.

Besides the limitations this study presents, our results show a very positive view of mental health of our students as it seems that preschoolers and primary students apparently were able to emerge unscathed from the extreme situation that they had to live through.

References

- Bryant, D. J., Oo, M., & Damian, A. J. (2020). The rise of adverse childhood experiences during the COVID-19 pandemic. *Psychological Trauma: Theory, Research, Practice, and Policy*, 12(S1), S193-S194.
- Fernández-Pinto, I., Santamaría, P., Sánchez-Sánchez, F., Carrasco, M. A., and del Barrio, V. (2015). *SENA. Sistema de Evaluación de Niños y Adolescentes*. Madrid: TEA Ediciones.
- Giménez-Dasí, M., Quintanilla, L., Molina-Lucas, B., Sarmiento-Henrique, R. (2020). Six Weeks of Confinement: Psychological Effects on a Sample of Children in Early Childhood and Primary Education. *Frontiers of psychology*, 11, 1-7.
- Marchi J, Johansson N, Sarkadi A and Warner G (2021). The Impact of the COVID-19 Pandemic and Societal Infection Control Measures on Children and Adolescents' Mental Health: A Scoping Review. *Front. Psychiatry* 12,711-791.
- Orgilés, M., Morales, A., Delveccio, E. et al. (2020). Immediate psychological effects of the Covid-19 quarantine in youth from Italy and Spain. *Frontiers in Psychology*, Retrieved May 20th, 2022, from <https://www.frontiersin.org/articles/10.3389/fpsyg.2020.579038/full#:~:text=The%20most%20frequent%20symptoms%20were,reported%20more%20symptoms%20than%20Italians>.
- Panagouli, E.; Stavridou, A.; Savvidi, C.; Kourti, A.; Psaltopoulou, T.; Sergeantanis, T.N.; Tsitsika, A. (2021). School Performance among Children and Adolescents during COVID-19 Pandemic: A Systematic Review. *Children*, 8, 1134.
- Reinoso-Mena (2022). Efectos de la COVID-19 en la Salud Mental de Niños y Adolescentes: Una Revisión. *Polo del conocimiento*, 7, 3, 247-264.
- Simon, E. B., and Walker, M. P. (2018). Sleep loss causes social withdrawal and loneliness. *Nat. Commun.* 9, 31-46.
- Teo, A. R., Lerrigo, R., and Rogers, M. A. (2013). The role of social isolation in social anxiety disorder: A systematic review and meta-analysis. *J. Anxiety Disord.* 27, 353-364.
- Urbina, A. (2020). Young children's mental health: impact of social isolation during the COVID-19 lockdown and effective strategies. *PsyArXiv [Preprint]*, Retrieved May 20th, 2022, from <https://psyarxiv.com/g549x/>

QUALIFYING MATHEMATICS TEACHERS TO DESIGN INTERDISCIPLINARY LEARNING ACTIVITIES OF MATHEMATICS AND MUSIC

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Abstract

Interdisciplinary learning of mathematics and arts is often acknowledged as supporting the development of students' problem-solving skills, encouraging student involvement in learning, and fostering students' creativity. However, for teachers to acknowledge the benefits of interdisciplinary learning of mathematics and arts, and express willingness to apply it in their classrooms, they must first experience such learning for themselves. To that end, they have to take part in dedicated training courses.

The study described in this paper followed the experience of twenty-seven elementary school mathematics teachers who participated in an annual professional development program that took place once every two weeks and was designed to qualify them to implement an interdisciplinary approach to teaching mathematics and arts. The course included four interdisciplinary modules: math-music, math-painting, math-photography, and math-dance. None of the teachers had prior knowledge of interdisciplinary teaching and learning. The mathematical topic chosen was fractions, as this topic entails numerous difficulties of various kinds both for the teachers and the students.

In what follows we focus on the teachers' experience with module no. 1, math-music. Before we explicitly exposed the teachers to the rationale of interdisciplinary learning of mathematics and music, they were asked to design learning activities that integrate fractions and music. No specific instructions were given, as we aimed at allowing the teachers to examine their initial perceptions and interpretations regarding interdisciplinarity, and then adapting the contents of the professional development program to the teachers' early perceptions and knowledge. After completing the design of the activities, the teachers presented them, explained their considerations, and provided mutual feedback. They also rated the extent to which interdisciplinarity was expressed in the activity, according to criteria they had developed themselves. The study indicated that teachers who knew how to play a certain musical instrument and read notes produced more mathematically significant content. Moreover, activities based on considerations relating only to common student mistakes in performing arithmetic operations in fractions did not lead to the design of activities characterized as having a high extent of interdisciplinarity. In case the considerations included general mathematical knowledge and knowledge of the mathematics curriculum, the extent of integration increased. Following these findings, the professional development program focused on deepening the teachers' mathematical knowledge and musical knowledge relevant to the subject of fractions. This approach has proven to be effective in terms of teachers' ability to produce meaningful interdisciplinary math-music activities, thus indicating the feasibility of teacher training for implementing an interdisciplinary approach.

Keywords: *Interdisciplinarity, mathematics, music, interdisciplinary learning activities, teacher training.*

1. Introduction

In recent years, there is a growing interest in integrating the STEAM (Science, Technology, Engineering, Art, and Mathematics) disciplines (Chu, Martin, & Park, 2019), recognizing this integrative approach as enhancing cognitive as well as emotional skills (Swaminathan & Schellenberg, 2015). However, since the dominant teacher training programs focus on qualifying teachers to teach one major discipline, the possibility of implementing integrative STEAM education by a single teacher in his/her class seems unworkable (Shriki & Lavy, 2017). But what about the likelihood of implementing a multi-disciplinary approach, namely, studying a specific topic in a specific discipline through the lens of another discipline and solving problems by applying both disciplinary approaches? As mathematics

teacher educators, this pondering led us to examine the feasibility of qualifying mathematics teachers to apply the multi-disciplinary approach in the case of mathematics and arts. For this purpose, we have developed a designated professional development program [PDP] for teachers who teach mathematics in 4th-6th grades. The program included 4 modules, each of which demonstrated the integration between mathematics and a different field of art- music, drawing, photography, and dance, where the mathematical topic incorporated in the modules is concerned with fractions. Since we ascribe importance to designing PDPs based on teachers' preconceptions and knowledge regarding teaching and learning (Shriki & Lavy, 2012), the designated PDP began with exploring the participating teachers' interpretations concerning the concept of STEAM education, in general, and in particular the integration of mathematics and music, drawing, photography, and dance in the case of fractions. In this paper, we describe teachers' preconceptions regarding the nature of the integration between mathematics and music in the case of teaching fractions.

2. Literature background

The STEM (Science, Technology, Engineering, and Mathematics) disciplines are widely acknowledged as the pillars of innovation, which will ensure the future well-being of the world economy (Chu et al., 2019). In recent years, there have been calls for the integration of the arts (A) within the STEM fields to generate the STEAM pedagogy, pointing to the potential of arts in improving spatial reasoning, abstract and divergent thinking, nurturing creativity and curiosity (Swaminathan & Schellenberg, 2015), and fostering skills required for collaboration, communication, and adaptability (Liao, 2016). In general, it is common to refer to four main types of disciplinary integration: transdisciplinarity - fully merged disciplines without boundaries; interdisciplinarity - bringing together some disciplines under a shared theme, but each discipline remains separate; multi-disciplinarity - a collaboration between two or more disciplines; and cross-disciplinarity - studying one discipline through the lens of another (Vilchez-González & Perales-Palacios, 2021). Nonetheless, a review of the literature dealing with STEM and STEAM education indicates a lack of consistency regarding the conceptualization and the implementation of the integrative approaches, leading to the absence of agreed goals and objectives of STEAM education. Furthermore, within the framework of the common teacher training programs, prospective teachers are often specializing in one major discipline, thus making it difficult to implement either a transdisciplinarity or interdisciplinarity approach to teaching and learning (Shriki & Lavy, 2017).

Given the nature of regular teacher training programs, we have chosen to explore the feasibility of implementing the multi-disciplinary approach to teaching mathematics, integrating mathematics with four types of art: music, painting, photography, and dance. The mathematical topic we chose to focus on was fractions. Knowledge and insights concerning fractions comprise a fundamental component of the school mathematics curriculum, however, the topic constitutes one of the central sources of difficulties (OECD, 2016). Therefore, any approach that can help students better understand the topic is important.

In this paper, we focus on integrating mathematics and music. Mathematics and music share common characteristics, such as the use of figurative language and symbolic notations, as well as the use of the part-whole concept and identification of patterns (Papadopoulos, 2002), and in recent years there are various intervention programs integrating mathematics and music (e.g., Azaryahu, Courey, Elkoshi, & Adi-Japha, 2020). Specifically to teaching fractions, Azaryahu et al. (ibid) found that studying fractions combined with studying rhythm, melody, and writing musical notes, contributes to an increase in fourth-grade students' achievement in mathematics, and their ability to transfer knowledge from familiar to unfamiliar fractions.

3. The study

In this section, we present the framework of the study, information about the study participants, the goal of the study, research methods and tools, and means for data analysis.

3.1. The framework of the study

Our premise was that if we want to guarantee the implementation of a multi-disciplinary approach over time, mathematics teachers should be trained to do so on their own so that they would not be dependent on collaboration with music teachers. However, in order for mathematics teachers to possess the required professional knowledge as well as the readiness to apply learning activities that integrate mathematics and art, they should first experience such activities, both as learners and as designers of appropriate activities.

The current study was conducted in the framework of a PDP for teachers who were teaching mathematics in 4th-6th grades. The PDP included exposure to various approaches to STEAM education

and the four main types of disciplinary integration. In addition, the participants experienced genuine learning and designing of four modules of multi-disciplinary teaching units that integrate mathematics and arts: mathematics and music, mathematics and drawing, mathematics and photography, and mathematics and dance. Prior to the formal study of each module, the teachers were asked to design an activity that, in their opinion, constitutes an example of an integrative approach to the teaching of mathematics and music/drawing/photography/dance in the case of fractions. Based on these preconceptions and interpretations we have refined the modules we developed. After experiencing each module as learners, the teachers were asked to develop multi-disciplinary learning units that concern fractions, presented them to their colleagues during the PDP sessions, and provided mutual feedback. Some teachers applied the units in their classrooms and shared insights with their colleagues. In this paper, we relate to the first module - mathematics and music. As mentioned, before explicitly exposing the teachers to content related to STEAM education in general, and the multi-disciplinary approach to the teaching of mathematics and music, the teachers were asked to design a learning activity that integrates mathematics and music in the case of fractions. No specific guidelines were given, and the teachers were allowed to choose any platform and any source of information. In addition, they were asked to document the rationale underlying the activities they designed, as well as their thoughts, feelings, deliberations, and the insights they gained as a result of the process. The purpose of this preliminary phase was to allow the teachers to reflect on their preconceptions about the multi-disciplinarity of mathematics and music and to build on these teachers' preconceptions for further design of the PDP.

3.2. The study methodology

Study participants. Twenty-seven in-service teachers who teach mathematics to fourth-grade students took part in the annual PDP, four of whom had a musical background. None of the teachers had prior knowledge of STEAM education.

Research goals. The study intended to examine elementary school mathematics teachers' perceptions regarding the meaning of multi-disciplinary instruction of mathematics and music prior to being formally exposed to the notion of STEAM education, and how these perceptions are reflected in the characteristics of activities they design for teaching the topic of fractions.

Research methods and tools. For the purpose of the study, we employed a qualitative approach. In particular, we implemented a grounded theory design, which is one of the most common qualitative approaches in the context of educational studies (Chong & Yeo, 2015). Data were collected through four tools: the activities designed by the teachers; teachers' reflective journals in which they documented their thoughts, feelings, and deliberations while designing the integrative activities and the insights they gained as a result; In-depth open-ended personal interviews.

Data analysis. As typical of grounded theory, data collection and data analysis were interwoven throughout the research process. To analyze the data we employed three stages of coding: open coding, axial coding, and selective coding (Creswell, 2012). The categories and subcategories generated throughout the coding process related to the teachers' perceived meaning of multi-disciplinarity, in general, and in particular in the case of mathematics and music, and its connection to teacher pedagogical content knowledge (Ball, Thames, & Phelps, 2008; Shulman, 1987).

4. Results

In this section, we present the characteristics of the activities designed by the teachers before they were formally exposed to the idea of multi-disciplinary instruction of mathematics and art, as well as representative utterances taken from the teachers' reflective journals.

4.1. Teachers' learning activities

The characteristics of the activities developed and the frequency of activities with the same characteristics are presented below (the number of teachers who designed the discussed type of activity appears in parentheses). In addition, the teachers were asked to rate the degree of integration between mathematics and music, according to their perceptions. Below is the ranking, in ascending order, as agreed by the teachers, where "level 1" represents the lack of integration, and "level 7" represents a high level of integration: Level 1- Studying fractions while some classical music playing in the background (2 teachers); Level 2- Learning fractions while watching a video on YouTube in which fractions are taught through a song (3 teachers); Level 3- A workshop in which the students are asked to select a well-known melody, write new lyrics for it that relate to fractions, record it and present it to the class (5 teachers); Level 4- Write lyrics and compose a song about an arithmetic operation related to fractions (5 teachers); Level 5- Engaging the students with tapping on glasses filled with varying amounts of water and exploring the relationship between the resulted melody and the amount of water in the glasses

(8 teachers); Level 6- Presenting concrete examples of connections between fractions and music (e.g. the connections described by Pythagoras) (3 teachers); Level 7- Using music terms to demonstrate the logic behind adding fractions and a common denominator (1 teacher).

As can be seen, the perception of four teachers regarding the integration between mathematics and music concerned listening to music or watching videos of songs about fractions. This type of integration was ranked as 1 or 2. Writing songs (either merely lyrics or lyrics and melody) related to fractions was suggested by 10 teachers, and was ranked as 3 or 4. Activities that were ranked as 5, 6 or 7 used terminology from the field of music (e.g. notes, tune, scale frequency). Among the twelve teachers who suggested such activities, four teachers had a musical background.

4.2. Teachers' rationale underlying the suggested learning activities

Below are selected representative utterances taken from the reflective journals. The utterances are presented according to the degree of integration between mathematics and music, as rated by the teachers: Level 1- "When students have to cope with a new mathematical topic that is considered difficult to understand, such as fractions, most of them get stressed, and this hinders comprehension. So I thought of putting classical music in the background, which would induce a relaxing atmosphere and reduce students' tension."; Level 2- "Since this is a topic [fraction] that is not easy to understand, I thought of incorporating a video where the topic is presented using animations and music. In 4th-grade, students need a concrete mediation, and the video I chose provides the students with a concrete joyful, and simple approach to adding fractions. Students do many mistakes while adding fractions, and this video will facilitate the memorization of this operation."; Level 3- The best way to motivate students to learn math is through their engagement, especially when they collaborate in small groups. So I thought of dividing them into groups, where each group would choose which aspect of fractions to focus on, write a rap song, practice it and present it in class."; Level 5- "I wanted the students to experience something tangible. I came across a video of tapping on glasses filled with different amounts of colored water, representing fractions. It fascinated me, and I started to try it out. I'm sure this will spark students' curiosity to understand what's going on there, and this will increase their involvement in the topic and motivate them to discuss ideas related to fractions, where a full glass represents a unit"; Level 6- "From my experience as a teacher I have realized how important is to connect mathematical topics with their historical origins. Since I have a musical background, I remembered that Pythagoras dealt with fractions in music. So I searched the Internet for information, however, everything was in a very high level of mathematics, so I adapted it to my students. It is so nice!"; Level 7- "After reading about the STEAM education approach, I developed an activity that would start with a musical idea and then lead to the concept of a common denominator. It starts with presenting notes and the various options for playing a note (as a part of a whole) in a complete box (the whole). I'll play notes in different durations and then ask the students to address the difference between the lengths of the sounds. This will naturally lead to the topic of the whole and the sum of its parts, and the need for a common denominator."

5. Discussion and conclusions

The analysis of the teachers' interpretations regarding the integration between mathematics and music for the further development and refinement of the PDP was based on Shulman's (1987) theory of Pedagogical Content Knowledge and the theory of Ball et al. (2008) dealing with Mathematical Knowledge for Teaching. Activities that were ranked as "Level 1" concerned mainly mathematical content knowledge and knowledge about students, and in particular the emotional aspects of learning fractions. However, relying merely on such considerations does not lead to meaningful integration of mathematics and music. Activities that were ranked as "Level 2", were based on both mathematical knowledge and knowledge for teaching associated with selecting examples that will improve students' knowledge of fractions and help them avoid mistakes related to arithmetical operations. Nonetheless, the focus was on mediating the learning through memorization. This approach also did not lead to a high level of integration. Activities that were ranked as "Level 3", considered knowledge about students in addition to mathematical knowledge and knowledge for teaching. In this case, the design of an activity aimed at motivating the learning of fractions through engagement in music was based on choosing the proper format for the experience (collaborative group work) and the type of experience (writing a song about some operation related to fractions). This contributed to the increase in the degree of integration. The same was in the case of the activities that were ranked as "Level 4". The last three utterances presented above were made by teachers with a musical background, and it is evident that they took into account their knowledge of music. The rationale underlying the activities that were ranked at "Level 5" and "Level 6" indicates considerations arising from broad content knowledge, and the reference to the emotional aspects of learning. The desire to generate a meaningful integration and the insight regarding the need to

adapt the information found on the Internet to the students' mathematical knowledge indicates considerations that stem from an amalgamation of content knowledge, knowledge about students, and knowledge about teaching mathematics. The activity that was ranked as "Level 7" is based on several types of teacher knowledge: As a background for preparing the activity, the teacher read about the idea of STEAM education and linked it to the fractions curriculum. This implies a combination of content knowledge and curricular knowledge. Connecting between sound lengths and fractions, and in particular, the relationship between a whole and the sum of its parts indicates considerations derived from general content knowledge and knowledge specific to the teaching and learning of fractions.

To conclude, the results of the study point out the relative advantage of teachers' knowledge in both fields, mathematics and music. Moreover, considerations that were based solely on addressing students' emotional responses to dealing with complex mathematical topics or common student mistakes in performing arithmetic operations in fractions did not lead to the design of activities characterized as having a high extent of interdisciplinarity. When extensive knowledge of mathematics was added to the considerations, the degree of integration increased. However, as can be seen in the case of the activity that was ranked as "Level 7", the teachers ascribed importance to considering both curricular and mathematical knowledge (either the general or specific to the teaching of fractions). These findings led us to focus broadly on the types of Mathematical Knowledge for Teaching that were expressed in the teachers' reflections mentioned above, and in particular, deepening their mathematical knowledge and musical knowledge relevant to the teaching and learning of the topic of fractions. Indeed, upon completion of the math-music module, the activities of 18 teachers were rated 6 or 7, suggesting the feasibility of training teachers to take a multi-disciplinary approach, and in particular, the importance of basing PDPs on teacher preconceptions related to the content of the PDP. It is proposed to conduct a follow-up study that focuses on the impact of teaching and learning fractions in a multi-disciplinary manner on fourth- to sixth-grade students' understanding of the topic.

References

- Azaryahu, L., Courey, S. J., Elkoshi, R., & Adi-Japha, E. (2020). 'MusMath' and 'Academic Music' – Two music-based intervention programs for fractions learning in fourth-grade students. *Developmental Science*, 23(4), Article e12882. <https://onlinelibrary.wiley.com/doi/epdf/10.1111/desc.12882>
- Ball, D. L., Thames, M. H. & Phelps, G. (2008). Content knowledge for teaching: What makes it special? *Journal of Teacher Education*, 59(5), 389–407.
- Chong, C-H., & Yeo, K-J. (2015). An overview of grounded theory design in educational research. *Asian Social Science*, 11(12), 258-268.
- Chu, H-E., Martin, S. N., & Park, J. (2019). A theoretical framework for developing an intercultural STEAM program for Australian and Korean students to enhance science teaching and learning. *International Journal of Science and Mathematics Education*, 17(7), 1251–1266.
- Creswell, J. W. (2012). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research* (4th ed.). Upper Saddle River, NJ: Pearson.
- Liao, C. (2016). From interdisciplinary to transdisciplinary: An arts-integrated approach to STEAM education. *Art Education*, 69(6), 44-49.
- OECD (2016). *PISA 2015 results: What students know and can do—student performance in mathematics, reading, and science*. PISA, OECD Publishing, 2016.
- Papadopoulos, A. (2002). Mathematics and music theory: From Pythagoras to Rameau. *The Mathematical Intelligencer*, 24, 65–73.
- Shriki, A., & Lavy, I. (2012). Problem posing in a dynamic geometry environment and the development of mathematical insights. *The International Journal of Learning*, 18(5), 61-70.
- Shriki, A., & Lavy, I. (2017). Mathematics and sciences teachers collaboratively design interdisciplinary lesson plans: A possible reality or wishful thinking? In K. Berinderjeet, K. H. Weng, & H. C. Ban (Eds.), *Proceedings of the 41st Conference of the International Group for the Psychology of Mathematics Education (PME)*, vol. 4, pp. 201-208. Singapore.
- Shulman, L. (1987). Knowledge and teaching: Foundations of the new reform. *Harvard Educational Review*, 57(1), 1-23.
- Swaminathan S., & Schellenberg, E. G. (2015). Current emotion research in music psychology. *Emotion Review*, 7(2), 189-197.
- Vilchez-González, J. M., & Perales-Palacios, F. J. (2021). In search of a long-awaited consensus on disciplinary integration in STEM education. *Mathematics*, 9, 597, 1-10.

RESEARCH ON THE FORMATION OF TRANSLATORS' COMPETENCE IN UNIVERSITIES FROM THE PERSPECTIVE OF KNOWLEDGE MANAGEMENT

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Abstract

This research intends to analyze the formation of translators' competence in universities from the perspective of knowledge management in the information age. This article follows the translation competence model formulated by PACTE (2003), which is consisted of five sub-competences: the bilingual sub-competence, extra-linguistic sub-competence, knowledge about translation sub-competence, instrumental sub-competence, strategic sub-competence. In order to develop the five translators' sub-competences, this research formulates the teaching model of knowledge management for translators', which includes the curriculum design, and the six rudimentary phases of personal knowledge management (search, identification and acquisition of information, and organization, application and optimization of the knowledge). We carry out an empirical research of the knowledge management teaching mode in translating class. From the students' practice results and surveys, we evaluate its' results in the formation of translators' competences.

Keywords: *Knowledge management, translation teaching, translators' competence, competence formation.*

1. Introduction

In the era of big data, the rich Internet platforms provide large amount of information for the translators; meanwhile, due to the information resources of the sea, the knowledge data shows that the overall body is large, so the knowledge management shows importance. The formation of translators in universities is also beginning to show new features with the fast development of technology and information. The texts to be translated contain information of large amount and rapid-changing. Moreover, the content is of wide range of coverage, and is more professional, more complicated and more difficult to translate. Thus, the universities should explore new ways, like integrating knowledge management (KM) in translation teaching, in order to broaden the knowledge, form students' ability to use computer assisted tools and make them informed of up to date information.

2. Knowledge management

Knowledge is the key resource of the information age. The term "knowledge management" is used to describe everything from the application of new technology to the broader endeavor of harnessing the intellectual capital of an organization. (Sallis & Gary, 2012) KM has gained popularity in both the business and education arenas, and advances in information technology have served to assist in developing and implementing KM strategies.

Making a distinction between two different but important types of knowledge is crucial to KM, and to using knowledge effectively in the organizational context. The two types of knowledge are generally known as explicit and tacit. (Serban & Luan, 2002) Explicit knowledge is documented information that can facilitate action. It's easy to articulate, write down, and share. Because explicit knowledge is the knowledge that can be most easily articulated and transmitted, it is sometimes called codified or declarative knowledge, with translation related examples including language and grammar rules, terminologies, reference material, legal requirements, contact and industry information, and documented information on the subject matter. Tacit knowledge is know-how and learning embedded within the minds of the people in an organization. It involves perceptions, insights, experiences, and craftsmanship. Tacit knowledge is personally and socially embedded. Translation related examples here

include being able to grasp the context of the target communication situations, understanding meanings behind source text utterances and being able to make intuitive decisions in text production. (Risku, 2013)

Thus, based on the basic concepts of KM and our objective of integrating KM in the formation of translators' competence, referring to the definition formulated by Davenport *et al.* (1998) and Galbreath (2000), we define "Knowledge management" as following: Knowledge management combines the processes and application of technological tools to digitize and store, and make universally available, via electronic networks, the ongoing creation and transference of knowledge and wisdom. The knowledge to be managed includes both explicit, documented knowledge, and tacit, subjective knowledge.

3. Translation teaching in universities and translators' competence

In China, the translation teaching for university students has three major objectives: present the nature, the form, the basic concepts and the cognitive process of the translation; cultivate the ability of bilingual thinking and master the basic techniques and strategies of translating; realize the dual responsibility of technical training and bettering the Chinese language and foreign language level.

Nowadays, with the development of the internet technology and the information age, the translation teaching in the universities is beginning to show new features. The texts contain information of large amount and rapid-changing. Moreover, the content is of wide range of coverage, and is more professional, more complicated and more difficult to translate. Thus, the universities should explore new ways in their translation teaching in order to broaden the knowledge, form students' ability to use computer assisted tools and make them informed of up to date information.

This context also requires that universities help to form more professional and integral translators' competencies, in regarding of which, our research follows the translation competence model of PACTE (2003). PACTE starts from the concept of translation as a communicative activity directed towards achieving aims that involves making decisions and solving problems, and requires expert knowledge, like any other activity with these characteristics. According to PACTE, translation competence consists of the ability to carry out the transfer process from the comprehension of the source text to the re-expression of the target text, taking into account the purpose of the translation and the characteristics of the target text readers. It is made up of five sub-competencies:

- **The bilingual sub-competence.** In other words, the translators should have the ability to communicate between the source language and the target language. This sub-competence is made up of pragmatic, socio-linguistic, textual, grammatical and lexical knowledge in the two languages.
- **Extra-linguistic sub-competence.** Predominantly declarative knowledge, both implicit and explicit, about the world in general and special areas. It includes: (1) bicultural knowledge (about the source and target cultures); (2) encyclopedic knowledge (about the world in general); (3) subject knowledge (in special areas).
- **Knowledge about translation sub-competence.** Predominantly declarative knowledge, both implicit and explicit, about what translation is and aspects of the profession. It includes: (1) knowledge about how translation functions: types of translation units, processes required, methods and procedures used (strategies and techniques), and types of problems; (2) knowledge related to professional translation practice: knowledge of the work market (different types of briefs, clients and audiences, etc.).
- **Instrumental sub-competence.** Predominantly procedural knowledge related to the use of documentation sources and an information and communication technologies applied to translation: dictionaries of all kinds, encyclopedias, grammars, style books, parallel texts, electronic corpora, searchers, etc.
- **Strategic sub-competence.** Procedural knowledge to guarantee the efficiency of the translation process and solve the problems encountered. This is an essential sub-competence that affects all the others and causes inter-relations amongst them because it controls the translation process. Its functions are: (1) to plan the process and carry out the translation project (choice of the most adequate method); (2) to evaluate the process and the partial results obtained in relation to the final purpose; (3) to activate the different sub-competencies and compensate for deficiencies in them; (4) to identify translation problems and apply procedures to solve them.

The PACTE translation competence model shows the competences that need to be formed for university students of translation specialty. As we can see from the content above, translators frequently have to be able to translate in a wide range of domains, of large quantity of information and need to be capable of using different instruments and know about the subject matter, therefore, the KM can play an important role in the formation of translators' competence and in the elevation of translating efficiency. In the next section, we will discuss how to form translators' competence based on KM.

4. Formation of translators' competence based on knowledge management

Kastberg (2009a) first introduced the personal knowledge management in translation teaching, and later formulated six rudimentary phases of the knowledge management approach, which are identify, acquire, evaluate, organize, apply, optimize. But Kastberg (2009a, 2009b) only analysis the translator training from the student perspective. Our research intends to combine the personal knowledge management theory of Kastberg (2009a, 2009b) with the perspective of the translation teaching of teachers, and discuss the formation of translators' competence based on knowledge management.

The KM offers a new perspective for translation teaching and learning, which is different from the traditional form of teaching in many ways. In the traditional form of teaching, the focus is on the teaching material and content, the teacher is the knowledge source while the students only receive the knowledge from the teachers, the curriculum design centers on the process of teaching and students learn from the technology. Meanwhile, with the integration of KM, the teaching focuses on the students and the teachers serve as mentors and the curriculum design centers on the learning environment, and the students learn with the technology as a tool. In the translation teaching with the integration of KM, teachers need to help to use information technology to efficiently obtain information, but also train them to learn how to quickly systematize this information to solve practical translation problems. Moreover, it is important to mention that PKM is not taught as a separate and/or additional course but as an integrated part of the translation teaching and exercises.

4.1. Curriculum design

The constructivism emphasizes on the design of the teaching environment instead of the design of teaching process. So, the very first step to implement the integration of KM in translation teaching in universities is to design an environment favorable for the students' research and learning, as well as their capability development. Based on the theory of (Chen, 2007), we think that the curriculum design includes the design of learning environment, the assignment, the resources, the instruments.

Table 1. Curriculum design of translation teaching based on knowledge management.

DESIGN ELEMENTS	CONTENT
assignment design	translation project as translation assignment
environment design	the knowledge supply based on the environment and its acquisition
resources design	the teaching strategies, the knowledge repositories
instrument design	instrument of computer assisted translation, instrument of knowledge management and evaluation, instrument of acquisition of information and instrument of cooperation

In the curriculum design, the translation teaching is based on translation projects in order to motivate the students' ability of creation, research and cooperation. The environment design means creating the knowledge supply based on the environment and its acquisition. The resource design is offering the students the translation cases, the necessary tool and information bank in order to acquire knowledge and solve problems. The instrument design is teach students to use computer assisted translation platforms and other software, the information search engines, the concept map etc., to realize the personal knowledge management.

4.2. Search, identification and acquisition of information

The search, identification and acquisition of information consists of the first three phases formulated by Kastberg (2009b). When teachers given the students an assignment of translation, they need to guide them to acknowledge, recognize and identify the personal information deficit with respect to the assignment at hand, which includes the terminology, the subject matter, the deficiency in the use of translation strategies, etc. Students can use a series of instruments to search and acquire the information they need: search engines like Google, Baidu, Yahoo; database like Scopus, Google scholar, Springer, CNKI; online dictionaries like Dictionary by Merriam-Webster, Collins Online Dictionary for English,

and Xinhua Dictionary for Chinese; online open courses such as MOOC, Coursera, edX; online encyclopedias such as large Encyclopedia Britannica, Bing Encyclopedia, Interactive Encyclopedia, Wikipedia; community question and answer sites, such as Zhihu¹, Yahoo Knowledge, Quora, Stack Overflow, etc.; etc.

Teachers should offer all these resources to the students, teach them the using instructions and, most important of all, guide them to evaluate and select the information carriers which are relevant to them with regard to this particular assignment, in order to accomplish the assignment as a professional translator.

4.3. Organization, application and optimization of the knowledge

With the information identified and collected, the students need to organize, apply and optimize the knowledge so as to enrich their personal knowledge bank. In these phases, the students are also faced with difficult tasks such as how to organize the large amount of knowledge which are not familiar to them, how to select the appropriate solution of the target language when the new acquired knowledge are still fragmented, and how to form an efficient knowledge management procedure in order to accomplish the text revision task after the translation. In order to solve these problems, a series of instruments are necessary. Risku, Dickinson and Pircher (2010) identify different KM tools and instruments for these forms of knowledge in a translation context. The management of explicit knowledge is supported by various instruments and methods, like glossaries, translation memories, style guides, newsletters, handbooks, websites, knowledge portals, topic maps, customer relationship management tools, and project management tools. The non-codifiable, tacit aspects of translation are supported by personal experience with and exposure to different communication situations, access to discussion forums such as mailing lists, online communities, translator associations, courses and collaboration tools, but also by taking part in mentoring and storytelling projects.

The teachers need to guide the students to select the appropriate instrument, in order to solve the translation problems and form their competence at the same time. The personal space of online dictionaries and terminology application such as SDL Trados and memoQ can register the new words and terminology of the students, which is an effective way to enrich the vocabulary of the translators and better their bilingual competence. The concept map and knowledge repositories can help the students to manage different subject matter, open their horizon and form their extralinguistic competence. The translation project management tools offer the students a space for group cooperation and problem-solving practices, in order to form their strategic sub-competence. KM applications such as OneNote or Mar-ginNote can help the students to record and analysis the information of translation theory and techniques, which form their know-about competence.

5. Case study

During the autumn semester of 2021-2022, the author launched a case study to the 23 students of China Foreign Affairs University who specialize in Spanish Philology and Spanish-Chinese Translation, to integrate the smart-classroom teaching, the translation technology and KM technology, in order to analysis the teaching result and its functions in the formation of their translator competence. After one semester of empirical research, the author designed and distributed a questionnaire among the students, and results showed that the students think that the translation technologies that help translation practice from high to low are translation memory (36.36%), terminology management (22.73%), machine translation technology (18.18%), and information retrieval (13.64%). The author also analyzed the translation work of students and found that the result showed the following improvements: first of all, the students showed more acquaintance with the subject matter, including in specialized areas such as diplomacy, energy, finance and industry; secondly, the translation showed more precision of the usage of terminology; thirdly, students domain the procedure of translation management and showed more willing to cooperate with others and more creativity in problem solving; fourthly, students also bettered their bilingual ability, including in the expression in Spanish and the use of translation techniques.

6. Conclusion

In the information age, the integration of KM in translation teaching is necessary to help the students form translator competence and meet the increasing demand of the market for translators. In the present research, we exposed the basic concepts of KM as well as the formation of translators' competence in universities. We also discussed how to form translators' competence based on knowledge

¹<https://www.zhihu.com/signin?next=%2F>

manage from the teaching perspective and the student perspective, namely, the curriculum design, the search, identification and acquisition of information and the organization, application and optimization of the knowledge. In this process, the teachers should play the role of guide, while the students are the main participants of learning. According to the results of the case study, the integration of the KM in translation teaching can notably better the students' bilingual ability, help them domain the translation technology and instruments, widen their extralinguistic knowledge and form the conscience and ability of group work and problem solving.

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References

- Chen, Jinajun, (2007). The curriculum design based on the knowledge management. *Distance Education in China*, (11), 38-41.
- Davenport, T.H., DeLong, D.W. and Beers, M.C. (1998). Successful knowledge management projects, *Sloan Management Review*, 39(2), 43-57.
- Galbreath, Jeremy. (2000). Knowledge management technology in education: An overview. *Educational Technology*, Vol. 40(5), 28-33. Published by: Educational Technology Publications. Retrieved May the 22th, 2022, from: <https://www.jstor.org/stable/44428610>.
- Kastberg, Peter, (2009a), Personal knowledge management. knowledge mapping techniques in the training of LSP translators, in *TRAlinea Special Issue: Specialised Translation I*, Danio Maldussi & Eva Wiesmann (Eds.). Retrived may the 20th, 2022, from: <https://www.intralinea.org/specials/article/1731>
- Kastberg, Peter, (2009b), Personal knowledge management in the training of non-literary translators, *The Journal of Specialised Translation*, (11), 88-102.
- PACTE (2003). Building a Translation Competence Model. In: Alves, F. (Eds.). *Triangulating Translation: Perspectives in Process Oriented Research*. Amsterdam: John Benjamins.
- Risku, Hanna, Dickinson, Angela & Pircher, Richard. (2010). Knowledge in Translation Studies and translation practice: Intellectual capital in modern society. In *Why Translation Studies Matters*, Daniel Gile, Gyde Hansen & Nike Kocijancic-Pokorn (Eds.). 83–96. Amsterdam: John Benjamins.
- Risku, Hanna. (2013). Knowledge management and translation. In Yves Gambier&Luc Van Doorslaer (Eds.), *Handbook of translation studies* (92-97). Amsterdam / Philadelphia: John Benjamins Publishing Company.
- Sallis, E., Gary, J. (2012). Knowledge management in education. Routledge. New York.
- Serban, A. M., & Luan, J. (2002). Overview of knowledge management. *New Directions for Institutional Research*, 113, 5–16.

PROFESSIONAL DEVELOPMENT NEEDS OF FOUNDATION PHASE TEACHERS IN IDENTIFYING LEARNERS WITH LEARNING BARRIERS AT PRIMARY SCHOOLS

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Abstract

South African Department of Education like other countries adopted an inclusive education and Training System Policy in 2001 to improve access to quality education for vulnerable learners and those who experience learning barriers. Training and Professional Development programmes were offered to teachers. Policies and guidelines were reformed to determine how support could be appropriately implemented in schools. The training programmes were perceived as the opportunity for teachers to improve their teaching skills, knowledge, and competences in identifying learners with learning barriers in an inclusive classroom. Although policies were reformed and teachers' received training, teachers still lack experience challenges in identifying learners with learning barriers in an inclusive classroom. Research shows that many professional development programs have failed to improve teaching practice (Birman, Desimone, Porter and Garet, 2000; Newmann, King, and Youngs, 2001; Armour and Yelling, 2004; Hofman and Dijkstra, 2010). The aim of the study is to explore how teacher training and Professional development can be improved in identifying learners with learning barriers in South African primary schools. Twenty-eight participants (N=28) were purposefully selected from four South African rural primary schools. A qualitative interpretive approach was adopted, and data were gathered through four focus group interviews with twenty Foundation Phase teachers (five from each school) and eight individual face-to face interviews with four support teachers and four subject advisors. Data were thematically analysed as suggested by (Babbie and Mouton, Leedy and Ormrod, 2015). Result demonstrated that training and professional development programmes were not effective due to the following aspects: the training focused mostly on reading not the identification of learners and teachers experience challenges in identifying learners with learning barriers in an inclusive classroom. Reports also indicate that teachers lack proper skills and knowledge to implement evidence-based inclusive teaching strategies and practices for facilitating the success and participation of all learners within the inclusive classroom. (Awad, 2016; Ghoneim 2014; Alkhateeb et. al., 2016). Due to ineffective of the training, the current study suggests rethinking of a new strategy for improving teachers training to meet the needs of the teachers and improve learners' performance.

Keywords: *Professional development, teacher training, barriers to learning, foundation phase teachers, foundation phase learners.*

1. Introduction and background

One of the greatest challenges faces the South African education sector is to produce competent Foundation Phase teachers who can identify learners with learning barriers. South African Department of Education has adopted inclusive education and Training System policy in 2001 to improve access to quality education for vulnerable learners (Engelbrecht, Green, Naicker and Engelbrecht, 2014). Policies were reformed and teachers received training to improve their teaching skills, knowledge, and competences in identifying learners with learning barriers in the inclusive classrooms (Forlin, Dinh, 2013). Professional Development were highlighted as a need for promoting teachers' professional learning to improve their teaching skills (Zhang, M., Xu, J., and Sun, C, 2014). But the issue of how to prepare teachers during professional learning experience, seems to have receive little attention. Although the reform of policies and expose teachers to training, teachers still lack skills and knowledge in identifying learners with learning barriers in an inclusive classroom (Chataika, Mckenzie, Swart, Lyner-Cleophas 2012). For curriculum developers to promote teachers' training and professional

development for teachers, there is a pressing need to make them aware of the prevailing situation in our education system. The aim of this study is to explore how teachers training and Professional Development could be improved in identify learners with learning barriers in South African primary schools. Against this background, it was necessary for the researcher to discuss the strategies that could enhance teacher's professional development that could lead to positive changes in teaching and learning and propose a model which might be an effective to overcome the problem.

2. Objectives

To explore how teachers training and Professional Development could be improved in identify learners with learning barriers in South African primary schools.

- To investigate the challenges that teacher training encountered in identifying learners with barriers to learning in the primary schools, in the Free State, South Africa.
- To develop intervention strategies that can improve teachers' training in identifying learners with barriers to learning in primary schools, in the Free State, South Africa.
- To explore the success on improving teachers' training in identifying learners with barriers to learning in the primary schools, Free State, South Africa.

3. Methods

3.1. Design

A qualitative interpretative approach was used to collect data using semi-structured focus group and face-to-face interviews. Twenty-four Foundation Phase teachers with four subject advisors were purposively selected from (rural) three primary schools in the Free State, in South Africa.

3.2. Sample

Twenty-four Foundation Phase teachers with four subject advisors were purposively selected from (rural) three primary schools in the Free State, South Africa.

4. Data analysis

Thematic analysis was used to collect data. Interviews responses were transcribed, coded, and categorized. Themes were constructed, grouped them finding commonalities and differences essential to the study.

5. Results

Table 1. Biographic Results teachers.

School	Pseudonym	Gender	Age	Grade teaching	Highest qualification	Teaching experiences	Teaching subjects	Race	Residential areas
School A	T1	Female	35 years	2	JPTD	14 years	Numeracy	Black	Botshabelo
	T2	Female	35 years	1	Hons	13 years	Sesotho	Black	Botshabelo
	T3	Female	45 years	3	JPTD	20 years	Life Skills	Black	Thaba-Nchu
	T4	Female	50 years	3	ACE	35 years	English	Black	Thaba-Nchu
	H1	Female						Black	
School B	T1	Female	49 years	1	Hons	21 years	Numeracy	White	Bloemfontein
	T2	Female	42 years	3	JPTD	15 years	Sesotho	White	Botshabelo
	T3	Female	45 years	2	JPTD	10 years	Life Skills	Black	Thaba-Nchu
	T4	Female	42 years	3	JPTD	20 years	English	White	Botshabelo
	H2	Female	25 years	3	Hons	8 years		Black	Botshabelo
School C	H3	Female	58 years	1	ACE	31 years	Numeracy	Black	Botshabelo
	T	Female	55 years	2	JPTD	25 years	Sesotho	Black	Botshabelo
	T2	Female	42 years	1	JPTD	11 years	Life Skills	Black	Thaba-Nchu
	T3	Female	57 years	3	PTC	35 years	English	Black	Thaba-Nchu
School D	T4	Female	25 years	1	JPTD	10 years			Botshabelo
	T1	Female	45 years	3	JPTD	15 years	Numeracy	Black	Bloemfontein
	T2	Female	33 years	2	JPTD	5 years	Sesotho	Black	Botshabelo
	T3	Female	40 years	1	Hons	10 years	Life Skills	Black	Botshabelo
	T4	Female	27 years	2	Hons	15 years	English	Black	Bloemfontein
H4	Female	28 years	1	Hons			Black	Thaba-Nchu	
School A	ST1	Female	35 years	3	JPTD	5 years	Numeracy	Black	Bloemfontein
School B	ST2	Female	35 years	4	Hons	8 years	Sesotho	Black	Botshabelo
School C	ST3	Female	45 years	1	JPTD	20 years		Black	Thaba-Nchu
School D	ST4	Female	42 years	3	ACE	35 years		Black	Botshabelo

Table 2. Biographic Results of Subject Advisors.

School	Pseudonym	Gender	Age	Highest qualification	Teaching experiences	Race	Residential areas
School A	SA1	Female	43 years	ACE	ST 8yrs, Gr2 4yrs. Gr5, (6month)	African	Thaba-Nchu
School B	SA2	Female	59 years	BA Hons (Psychology)	(3yrs teaching) (21yrs) SA	African	Botshabelo
School C	SA3	Female	50 years	BA Hons (Psychology)	Gr 1,5 yrs 11 years SA	White	Botshabelo
School D	SA4	Female	46 years	BA Hons (Psychology)	19-year teaching. SA 3 yrs	African	Bloemfontein

Data analysis in table 1, 2 and 3 shows that twenty teachers, four Support Teachers and four Subject Advisors participated during the interviews, all were female residing in different areas. Their ages varied from 33 to 58 and their teaching experience ranged from five to thirty-five. Out of twenty-four, six had Honours Degree, two had ACE while the rest had Junior Primary Teachers Diploma and all of them were teaching Grade 1 to 3. Whereas Subject Advisors were between 43 to 59 years, and all were representing Foundation Phase and had qualifications for primary schools. Three of them had Bachelor of Art and one had Advanced Certificate in Education. Two Support Teachers had Junior Primary Diploma, one Hons and one ACE. The Ages of the support teachers ranged from 35 to 45 years, vary according to teaching experiences.

5.1. Interviews results

The qualitative data analysis was obtained from the interviews held with a sample of teachers (T), HoDs, Support Teachers (SP) and Subject Advisor (SA). The researcher conducted the interviews with the participants to understand whether professional development activities they were involved in meet their needs and enable them to identify learners with barriers to learning. whether those activities improved in identifying learners with learning barriers or not, their challenges, successes and intervention strategies that might be used to overcome the problem.

Table 3. Categories used in this study.

Categories as sensitizing based on research questions	Example of quotes
Professional Development activities undertaken.	<p>"I have attended various workshops such as how to teach learners to read, HIV/AIDS, ANA etc arranged by support advisor" (T1, School B: T3, School C: T2, School C).</p> <p>I've attended curriculum coverage workshop (T2, School B: ST1, School B).</p> <p>"I have attended various workshops such as teaching reading, CAPS etc workshops but without taking part in any activities" (T3, School B: T4 School, HoD, school B: T3, School D: T2, School D). "I have attended various workshops such as how to teach learners to read, HIV/AIDS, ANA etc arranged by support advisor" (T1, School B: T3, School C: T2, School C).</p> <p>I've attended curriculum coverage workshop (T2, School B: ST1, School B).</p> <p>"I have attended various workshops such as teaching reading, CAPS etc workshops but without taking part in any activities" (T3, School B: H4, school B: T3, School D: T2, School D).</p>
Understanding how professional development activities were improved in identifying learners with barriers to learning in the primary schools in South Africa.	<p>"Well..., have never participated during the professional development".</p> <p>"Most of the trainings were focused on how to teach Foundation Phase learners to be able to read" (T1, School A: ST1, School B: H4, School B: T2, School D).</p> <p>"There is no improvement at all, what I can say is that subject advisors must adapt their teaching strategies during the workshops" (T3, School A: T2, School B: Teacher 2, School C: T3, School D: T1, School B:).</p>
Challenges encountered by teachers in identifying learners with learning barriers in an inclusive classroom.	<p>There are cultural challenges, the teacher will say the learner have to attend occupational therapy on the other hand the parent will say the child have to attend cultural ceremony" (T2, School A: T3, School A: T1, School B).</p> <p>The challenge is to teach diverse learners in one class and parents whose children are struggling, they don't want their children to repeat the grade" (T1, School A: T3, School C).</p> <p>"There is no time for intervention of learners, and the SBST do not meet regularly. Learners attending mainstream class are not able to balance work from remedial class and mainstream work and that create a serious challenge. Furthermore, parents do not assist the learners with the work done in the remedial class" (ST2, School C).</p>

<p>Successes on improving teachers' training in identifying learners with learning barriers in an inclusive classroom.</p>	<p><i>What can I say? Ehm..., my success is that last year I had a little girl (Grade 1) in my class she couldn't read even a single word. I tried to support that child but couldn't understand what I want her to do. I kept on supporting her and now she is in Grade 2 and is doing so well" (T2, School A),</i> <i>"...for me I did not achieve any success because I don't know how to identify learners with Learning barriers" (T1, School B: T2, School C: T3, School C).</i> <i>"My success is seen in what is happening in my schools I have pilot school whereby we succeeded in supporting learners. Some of the learners were identified and one of them is the candidate of special school. I took the learner and met with SBST member and work with the learner for the whole day. My objective was to see whether the learner will improve. I assessed the learner. To my surprise the learner I realised that the learner could read. I even got the support from the principal. I use this school as an example and encourage others to cope from it" (SA3: SA 4).</i> <i>I must say, no success because I am still facing challenge to teach diverse learners in the classroom" (T2, School B: T1, School D).</i></p>
<p>Intervention strategies that can improve teachers' training in identifying learners with barriers to learning in the primary schools in South Africa.</p>	<p><i>"Relevant workshops must be arranged by Subject Advisors for teachers to learn on how to identify learners in an inclusive classroom" (T1, School A: T4 HoD, School B).</i> <i>"I think all Foundation Phase teachers must be given the opportunity to attend courses related to the identification of learners with learning barriers other than that, pre-service training programmes should be provided to all student teachers in primary and secondary schools "(ST2, School C).</i> <i>"I believe that that if our Subject Advisors do class visits in our schools to see where problem lies, and they will be able to assist us and come up with intervention strategies" (ST1, school B: SA1: Teacher 2, School C: SA4).</i></p>

6. Discussion

In the interviews conducted, it was revealed that training programmes that teachers attended before were all based on reading not on identification of learners with barriers to learning. Previous reading workshops were of lecturing, teachers were not engaged in all the activities they were just listening because learners are still struggling to read or write. It can be noted of the present study that teachers prefer to attend workshops relevant to the identification of learners with barriers to learning. Thus, teachers training and Professional Development that do not focus only on reading are better preferred by South African primary teachers. The challenges faced by most of the teachers is the attitude of parents, they do not want their struggling children to repeat the grade. Sending struggling learner to the next grade frustrate teachers. The issue of progressed learners to the next grade was common in South Africa that often led to learners' unable read, write. Thus, affect learners' performance. Participants reported that they lack skills and knowledge to identify learners with barriers to learning. All expressed a need for relevant training workshops and follow-up support from subject advisors. Few had attended workshops but claimed that they are still struggling to identify learners.

7. Conclusion

Teaching learners with different learning styles in an inclusive classroom requires teachers who received special training to meet the needs of individual learners within the classroom. Because majority of teachers in the current study struggle to teach and identify learners with learning barriers in an inclusive classroom. Thus, rethinking of new model focusing on the improvement of teachers' training in identifying learners with learning barriers is needed.

8. Recommendations

The study recommends several actions for improving teachers training and professional development in identifying learners with barriers to learning in South African primary schools.

- Teachers' needs must be considered prior the training.
- The study proposed new model for improving teachers training to meet the needs of the teachers and improve learners' performance.

References

- Alkhateeb, J. M., Ghoneim, S., Hadidi, M. S., & Alkhateeb, A. J. (2016). *Inclusion of children with developmental disabilities in Arab countries: A review of the research literature from 1990 to 2014*. *Research in Developmental Disabilities*, 49-50, 60-75. doi: 10.1016/j.ridd.2015.11.005
- Babbie, E., & Mouton, J. (2015). *The practice of social research*. Cape Town: Oxford University Press.
- Awad, N. E., & Ali, H. (2016). *Students with disability and the quest for inclusive education: A case study of private schools in greater Cairo (Unpublished master's thesis)*. The American University in Cairo.
- Chataika, T., McKenzie, J., Swart, E. & Lyner-Cleophas, M., (2012). 'Access to Education in Africa: Responding to the United Nations Convention on the Rights of Persons with Disabilities', *Disability and Society* 27(3), 385–398.
- Department of Education (2001). *White Paper 6: Special Needs Education - Building an inclusive education and training system*. Pretoria: Department of Education.
- Engelbrecht, P., Green, L., Naicker, S. and Engelbrecht, L. (2014). *Inclusive education in action in South Africa*. Pretoria: Van Schaik.
- Forlin, C. and Dinh, N. T., (2013). 'A national strategy for supporting teacher educators to prepare teachers for inclusion', in C. Forlin (ed.), *Teacher Education for Inclusion: Changing Paradigms and Innovative Approaches*. Abingdon: Routledge.
- Leedy, P. & Ormrod, J. E. (2015). *Practical Research Planning and Design*. (10th ed). Edinburgh: Pearson Educational Inc
- Zhang, M., Xu, J., & Sun, C. (2014). *Effective Teachers for Successful Schools and High Performing Students: The Case of Shanghai* In S. K. Lee, W. O. Lee, & E. L. Low (Eds.), *Educational Policy Innovations* (pp. 143–161). Singapore: Springer Singapore. Retrieved from http://link.springer.com/10.1007/978-981-4560-08-5_9

THE EFFECTS OF ASYNCHRONOUS ONLINE PEER-TEACHER FEEDBACK IN A THAI EFL PUBLIC SPEAKING CLASS

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Abstract

The teaching and learning of English speaking has recently posed several challenges due to the coronavirus pandemic. One of the challenges is that it is nearly impossible to conduct the teaching and learning in the physical classroom, affecting how students are given immediate feedback to. Teachers have to find different methods and techniques to use in their speaking classes during this situation, for example, giving live virtual presentations, pre-recording video clips and uploading them to online classrooms, giving online comments and feedback, and so on. In this mixed-methods study, the purposes were to investigate the effects of giving asynchronous online peer and teacher feedback to students after they had uploaded their three types of speech video clips, i.e., informative, persuasive, and entertaining, to the Google Classroom and to explore the students' attitudes toward the two types of feedback. Participants were 25 fourth-year undergraduate students, majoring in English for International Communication at a university in northeastern region of Thailand. It was found that although the second speech video clip scores were higher than the first speech video clip scores, students still had difficulties in providing sufficient and specific peer feedback on the areas of organization and research citations, impacting growth in their speaking skills. Moreover, findings from the semi-structured interviews revealed that students viewed the two types of feedback positively. It helped them to gradually develop thinking and critiquing skills, and they also demonstrated increased confidence in speaking after they had received both types of feedback. This study proposes opportunities for discussion, i.e., providing sufficient peer feedback training and meaningful writing assignments, to hone students critiquing skills, especially on the areas of organization and research citations.

Keywords: *Peer feedback, teacher feedback, asynchronous feedback, EFL speaking.*

1. Introduction

1.1. Background

The use of feedback in public speaking classrooms has been known to enhance students' English speaking performances. Whether the feedback is given to students immediately or later, it does help to sharpen their skills to revise and improve their future speeches as well as boost their confidence in learning and speaking (Smith & King, 2004). However, due to the coronavirus pandemic, giving face-to-face peer and teacher feedback has been switched to online to avoid students and teachers contacting with the disease. Although the feedback has to be given online, it still offers a number of benefits, for example, providing less threatening environments, overcoming time and place constraints, and reducing pressure from peers and teachers (MacLeod, 1999; Yeh, Tseng & Chen, 2019). Because of these benefits, it can be interesting to study the effects of giving asynchronous online peer and teacher feedback to students in an EFL public speaking class where students can take more time at their own pace to evaluate their peers' work, while the teacher can also provide additional feedback to students so that they can learn and benefit more from such feedback to help them improve their speaking skills.

1.2. Purpose of study

Giving either synchronous or asynchronous online peer feedback is beneficial to students when the feedback is given clearly and honestly (Ene & Upton, 2018). However, students may find it difficult to provide peer feedback that is specific, straightforward and clear on different areas and the feedback may not be much beneficial to their peers. Hence, the purposes of this study were to investigate the effects of giving asynchronous online peer feedback followed by teacher feedback to students after they

had uploaded their speech video clips to the Google Classroom and to explore the students' attitudes toward the two types of feedback so that it might help teachers to understand better of how to apply these two types of feedback in any public speaking classes.

2. Methods

2.1. Research design and participants

This research employed a mixed-methods design. First and second speech video clips of the three types of speeches, i.e., informative, persuasive, and entertaining, were utilized as tools to investigate the effects of the asynchronous online peer-teacher feedback given to the students. Moreover, a semi-structured interview was used to find out the students' attitudes toward the two types of feedback. The participants in the study were 25 fourth-year undergraduate students, majoring in English for International Communication at a university in the northeastern region of Thailand. The students had taken an English Public Speaking Course for a period of 15 weeks in the first semester of the academic year 2020. The participants were both male and female, aged 21-24. Their English abilities were mixed.

2.2. Data collection

To collect the data, the participants attended the 15-week course of study where the first week (3 hours) was devoted to training the students to give feedback. Peer feedback checklist, examples of peer feedback, and speaking rubric were introduced and given to the students to aid them during the training. The students then watched the three types of speech video clips and attempted to provide feedback along with the teacher's help. The following 7 weeks were devoted to learning informative, persuasive, and entertaining speeches. After the students had learned each type of speech, they were asked to make their first and second speech video clips. To make video clips, the teacher assigned the students to prepare each of their first speech video clips one week prior to uploading them to the Google Classroom. After uploading their first speech video clips to the Google Classroom for first evaluation, at least two students gave feedback to their peers and followed by teacher feedback. After receiving the feedback from both peers and the teacher, the students revised and improved their first speech video clips as well as their speaking scripts (if any) and re-uploaded them to the Google Classroom for second evaluation within the same week. The teacher marked the students' first and second speech video clips using an adapted speaking rubric from Rooney (1998). It was worth noting that not all of the students gave peer feedback and submitted their speaking scripts to the Google Classroom. For the last 7 weeks of the course were related to debating and interviewing, which were not included in this study.

Moreover, the semi-structured interview was conducted with 6 students including 2 high, 2 intermediate, and 2 low-proficiency students. The interviewees were asked to address about problems with giving asynchronous online peer feedback, methods to cope with problems when giving peer feedback, and attitudes toward using both peer and teacher feedback.

2.3. Data analysis

Descriptive statistics were employed to calculate the data obtained from the first and second speech video clips. The statistical methods used to analyze the data were percentage, mean, and standard deviation. The total score of each type of speech video clip was 10 points.

In addition, data obtained from the interviews were analyzed using content analysis. It was used to probe into three main areas as mentioned earlier. After that, data were transcribed, tallied, and reported.

3. Results

To determine the effects of asynchronous online peer-teacher feedback on students' speaking skills, the scores from the students' first and second speech video clips were analyzed and compared. The results showed that the students' average scores were increased after they had received asynchronous online peer and teacher feedback. Table 1 shows a comparison between the first and second informative speech video clip scores.

Table 1. Comparison between the first and second informative speech video clip scores.

Informative speech video clip scores	Mean	SD	Percentage
First speech video clip	5.36	0.74	53.60
Second speech video clip	6.46	1.13	64.60

From Table 1, it shows that the average score of the students' second speech video clips was increased 1.10 points (11%), from 5.36 to 6.46. Although the increased average score was not high, it shows that the feedback helped to improve the students' speaking skills.

As for the average score of the students' second persuasive speech video clips, it was also increased 0.98 points (9.8%). The average score of the first video clip was 6.52, while the average score of the second video clip was 7.50. It shows that the students slightly improved after they had received the feedback. Table 2 shows a comparison between the first and second persuasive speech video clip scores.

Table 2. Comparison between the first and second persuasive speech video clip scores.

Persuasive speech video clip scores	Mean	SD	Percentage
First speech video clip	6.52	0.91	65.20
Second speech video clip	7.50	0.83	75.00

Moreover, the average score of the students' second entertaining speech video clips was slightly increased 0.36 points (3.6%), from 7.60 to 7.96. Although the increased score was not very high at all, it was evident that there was an improvement in the students' public speaking skills because of the feedback. Table 3 shows a comparison between the first and second entertaining speech video clip scores.

Table 3. Comparison between the first and second entertaining speech video clip scores.

Entertaining speech video clip scores	Mean	SD	Percentage
First speech video clip	7.60	1.05	76.00
Second speech video clip	7.96	0.35	79.60

Regarding the results of the interviews, generally, the students viewed the asynchronous online peer and teacher feedback positively. The feedback was beneficial and essential as it helped them to develop thinking and critiquing skills. It also helped them to see their strengths and weaknesses which could boost their confidence to speak in public. The following are results of the interviews.

In terms of problems with giving asynchronous online peer feedback, the students, irrespective of proficiency level, addressed that giving online peer feedback was quite difficult. Although they were trained to provide peer feedback in the first week of the course of study, they revealed that they did not have enough experience and knowledge to comment and give feedback to others. It was difficult to detect errors and areas to suggest to their peers for improvement, especially on the areas of organization and research citations. Moreover, some of the students addressed that they did not want to offend their peers as giving peer feedback might cause loss-of-face. In some cases, the downside of peer feedback itself was that the feedback was not constructive and straightforward, making it too difficult for them to improve their speeches. The following are examples of the students' responses on giving peer feedback that could represent the majority of the students.

Giving peer feedback was difficult. I could not tell what areas that my friends should improve, especially on the areas of organization and research citations. (Student #1 – Low)

I think the problem of giving online peer feedback was that I did not dare to give honest feedback to my friends. They would know that I was the one who gave the feedback because they could see my name when I left comments. I did not want to hurt their feelings. (Student #2 – Intermediate)

I think giving peer feedback was not easy because I did not have enough experience and knowledge to comment others. It was difficult to provide feedback on the area of organization as I did not know the differences between the preview and the introduction of the speech clearly. (Student #3 – High)

Regarding methods the students used to cope with problems when giving asynchronous online peer feedback, they addressed that they re-watched the speech video clips, re-read the writing scripts, used peer feedback checklist, and asked their peers for content clarification directly.

As for the low-proficiency students, they revealed that they used peer feedback checklist to help them give feedback. They highlighted that the checklist was an essential tool for them to use to provide feedback, especially when they did not know what feedback they should give to their peers.

As for the intermediate and high-proficiency students, they revealed that they re-watched the speech video clips and re-read the speaking scripts several times. By re-watching the clips and re-reading the scripts a few times, they would be able to detect some problems on the areas of content and ideas and delivery in particular. However, they also revealed that if they still could not find any problems from the

clips, they would ask their peers for clarification directly. This would help them cope with problems with giving feedback better. The following are examples of the students' responses on how they coped with problems when giving online peer feedback that could represent the majority of the students.

I used peer feedback checklist that the teacher gave to me at the beginning of the course. It was a beneficial tool that helped me to follow and give feedback to my friends. (Student #4 – Low)

I usually re-watched the clips or re-read the speaking scripts several times to help me detect errors from my friends' work. But before I gave feedback to my friends, I would ask them for permission to give feedback first so that I did not upset their feelings. (Student #5 – Intermediate)

When I did not understand the video clips, I re-watched them a few times. If I still could not find any problems in the clips, I would ask my friends for clarification directly. This helped me understand the content and ideas in their work better and I could give feedback to them. (Student #6 – High)

In terms of students' attitudes toward using both asynchronous online peer and teacher feedback, the students, irrespective of proficiency level, reported that the combination of using peer and teacher feedback was useful. Giving peer feedback helped them to develop thinking and critiquing skills. They had to think carefully and critically to provide useful feedback to their peers. Moreover, with receiving peer feedback, which was most emphasized the areas of delivery and content, the students knew about problems with their performances and ideas, while additional teacher feedback helped them learn more about problems related to speech organization and research citations. This aided them to fix their problems occurred in their work more accurately and directly. Although the students revealed that teacher feedback was more valuable and trustable than peer feedback, the combination of the two types of feedback did help them see their strengths and weaknesses, which could boost their confidence to revise their work and to speak in public. The following are examples of the students' responses on using both peer and teacher feedback that represent the majority of the students.

I could see problems with my performances such as pronunciation and body gestures when I got feedback from peers. Besides peer feedback, I could fix my problems with speech organization from teacher feedback. The combination of peer and teacher feedback was useful because it helped me feel more confident to revise my work and to speak in public. (Student #1 – Low)

The combination of using peer and teacher feedback was useful. I had to think a lot to come up with useful feedback to give to my friends. Although some feedback that I received from my friends was useful too, I preferred feedback from the teacher because it was constructive and direct to the point. I was more confident when I received feedback from the teacher than peers. (Student #2 – Intermediate)

I think it was good to have both types of feedback. Giving peer feedback helped me learn to think and critique others. Although the feedback from peers might not be very useful, it helped us to be aware of the areas that might cause problems in the future. If I could not use feedback from peers, I could still use feedback from the teacher. Thus, receiving both types of feedback was good. (Student #6 – High)

In short, asynchronous online peer and teacher feedback were beneficial methods to employ in this public speaking class. The students could benefit from both types of feedback, leading to a slight improvement on their speaking skills and having more confidence to revise their work and to speak in public. Although, in some cases, students might find it difficult to provide constructive and straightforward peer feedback on the areas of organization and research citations in particular, peer feedback was still necessary and should be employed in any public speaking classes as it helped students to develop thinking and critiquing skills, which would benefit them more in the long-run.

4. Discussion

This study investigates the effects of asynchronous online peer-teacher feedback on students' speaking skills in the EFL Public Speaking Class as well as their attitudes toward the combination of the two types of feedback. Results from the students' speech video clips indicate a slight improvement on their speaking skills. Results from the semi-structured interviews also indicate positive attitudes of the students toward the combination of the two types of feedback. This suggests that asynchronous online peer-teacher feedback should be employed in any public speaking classes.

4.1. Exposing to sufficient peer feedback training

Evidence from the students' scores indicated a slight improvement on the students' speaking skills. This suggests that the students might not have exposed to peer feedback training long enough. Despite being trained, the training period might not be sufficient to help them feel confident to give constructive and straightforward feedback to their peers on the areas of organization and research citations in particular. Studies (Min, 2016; Weerathai & Belardo, 2020) revealed that students should be exposed to sufficient and explicit peer feedback training in order to be confident and have experience in giving feedback to their peers. Although they did not state clearly for how long the training should be

given to students, it is suggested that the students should be given explicit and sufficient peer feedback training long and early enough to hone their critiquing skills so that they would be able to provide more honest and explicit feedback to their friends.

4.2. Providing sufficient and meaningful writing assignments

Regarding the evidence from the interview where the students revealed that, although they coped with the problems by using different methods, they still had difficulties in providing feedback on the areas of organization and research citations suggests a need for providing sufficient and meaningful writing assignments to students. As writing speaking scripts, in this study, was one of the tasks that the students had to prepare before speaking, this suggests that the students might not have been exposed to enough writing practices that enabled them to learn to organize and cite their work effectively, affecting how they provided feedback on these particular areas. Research on enhancing undergraduate students' research and writing (Lumpkin, 2015) found that students demonstrated enhanced research and writing skills when they were exposed to sufficient writing assignments in a continuous period of time. Hence, providing sufficient and meaningful writing assignments, especially on research writing is essential as it is prone to improve on the areas that the students are weak, i.e., organization and research citations.

4.3. Renewing the belief of collaborative learning

Evidence from the interview where most students revealed that feedback from peers was not very useful and they preferred feedback from the teacher because it was constructive and straightforward. This shows that the students might have improper understanding that the teacher was the only center of knowledge where they had to depend on the teacher support all the time. In fact, the students could learn from each other to improve their speaking skills as well. Research on the effects of using collaborative learning to enhance students' English speaking achievement (Pattanpichet, 2011) found that the students demonstrated speaking improvement from the use of collaborative learning activities including receiving peer feedback. This suggests that renewing the belief of collaborative learning to students is very important. Students can actually learn from one another to improve their speaking skills without depending on the teacher support all the time.

5. Conclusion

This study has shown that asynchronous online peer-teacher feedback slightly improved the students' speaking skills. Although the feedback somewhat improved their speaking skills, the students were satisfied with coupling peer with teacher feedback in general. Despite the several challenges when coupling the two types of feedback in the classroom, where the students could have been exposed to sufficient peer feedback training and meaningful writing assignments and where the students' beliefs of collaborative learning should be renewed, combination of peer and teacher feedback should be introduced to students in any public speaking classes to help them improve thinking and critiquing skills and to boost their confidence in speaking and revising their work.

References

- Ene, E., & Upton, T.A. (2018). Synchronous and asynchronous teacher electronic feedback and learner uptake in ESL composition. *Journal of Second Language Writing*, 41, 1-13.
- Lumpkin, A. (2015). Enhancing undergraduate students' research and writing. *International Journal of Teaching and Learning in Higher Education*, 27(1), 130-142.
- MacLeod, L. (1999). Computer-aided peer review of writing. *Business Communication Quarterly*, 62(3), 87-94.
- Min, H.T. (2016). Effect of teacher modeling and feedback on EFL students' peer review skills in peer review training. *Journal of Second Language Writing*, 3(1), 43-57.
- Pattanpichet, F. (2011). The effects of using collaborative learning to enhance students' English speaking achievement. *Journal of College Teaching & Learning*, 8(11), 1-10.
- Rooney, D. (1998). *Public Speaking and Oral Presentation Component*.
- Smith, C.D., & King, P.E. (2004). Student feedback sensitivity and the efficacy of feedback interventions in public speaking performance improvement. *Communication Education*, 53(3), 203-216.
- Weerathai, T., & Belardo, R. (2020). Teacher and peer feedback in an EFL writing course: What do students need? *International Conference on Education and New Developments 2020, 27-29 June 2020*, 339-343. doi:10.36315/2020end072.
- Yeh, H.C., Tseng, S.S., & Chen, Y.S. (2019). Using online peer feedback through blogs to promote speaking performance. *International Forum of Educational Technology & Society*, 22(1), 1-14.

FAMILY INVOLVEMENT IN ECE THROUGH THE FIQ (FAMILY INVOLVEMENT QUESTIONNAIRE) IN SPAIN

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Abstract

Family-school involvement in the education of children under 6 years of age is a complex and multidimensional area of study. In this regard, there is a great deal of research that examines the extent to which such involvement affects the development and learning of their children. The research consulted indicates that high levels of involvement and family-school collaboration in children are associated with better academic performance and socio-emotional functioning at school among other outcomes, but also with benefits for families and teachers. In the case of the present study, the Spanish adaptation of the FIQ (Family Involvement Questionnaire) (Fantuzzo et al., 2000) was applied to a sample of 659 parents of children who have attended ECE between 0 and 3 years of age in different autonomous communities of Spain during the 2020-2021 academic year. The FIQ is a specific questionnaire to study the Early Childhood stage, and collects information from parents on the ways in which they participate in their children's educational experiences, in order to establish different degrees of involvement in the three subscales that comprise it; Home-Based Involvement, School-Based Involvement and Home-School Conferencing. It is a 42-item self-report Likert scale, scored from 1 to 4, with 1 being rarely and 4 being always. The results of this study show that the subscale with the highest scores is "home-school communication", with a score of 60, which is rated as high, with item 1 (I attend meetings with my child's teacher to discuss my child's teaching or behaviour) and item 3 (I talk to my child's teacher about my child's daily routine) receiving the highest scores. The other two subscales show average scores, with items 16 (I participate in planning school trips for my child) and 26 (I go on class trips with my child) scoring the lowest. It can be concluded that, given the importance of family school involvement, it is important to know what actions can be implemented by Early Childhood schools to achieve greater and better family participation.

Keywords: *ECE, education quality, family engagement, family involvement questionnaire, home-school conferencing.*

1. Introduction

In order to understand what involvement is and the different ways in which it can be carried out in Early Childhood Education (ECE), the first step is to define both concepts.

ECE is the first stage of the education system. In most countries it runs from shortly after birth until the start of compulsory schooling at around 6 years of age.

Family involvement is a relevant concept in the educational field, since it is considered an indicator of quality in children's education (European Commission, 2000; Hong et al., 2018), being in Spain a right of families, given that the Spanish Constitution, in Article 27, paragraphs 5 and 7 states that it is a constitutional right. The regulation allows families to be involved in both the Parents Association, and the School Council. Recent research in Spain indicates that families have a positive attitude towards establishing and improving relationships with teachers and the school (García, 2015), but what is meant by family involvement? Trying to specify what we mean by family involvement is not a simple task, as it is a complex and multidimensional concept (Fantuzzo et al., 2013; Lara & Naval, 2012; Livingstone & Markham, 2008). Many authors talk about proactive involvement, but focus on family involvement in school and its influence on children's academic performance (Fantuzzo et al., 2000; Gadsden, 2013). Other authors have a broader conception (Fan & Chen, 2001; Epstein, 2001 and 2009; Fantuzzo et al., 2004; Jeynes, 2007) as they understand that involvement has to take place both at school and at home, and what they observe are improvements in the cognitive and socioemotional domains. The study by Waanders et al. (2007) includes the concept of educational co-responsibility, referring to the role played

by both families and teachers for this involvement to take place. This article takes the definition provided by Castro et al. (2015), who define family involvement as the active involvement of parents, in collaboration with the school institution, in all aspects concerning the social, emotional and academic development of their children. In addition, various studies point to the implication that this participation has, not only on children, but also on teachers and families (García-Bacete, 2003; Garreta-Bochaca, 2015).

Over the last 20 years, there has been a great deal of research on the implications of school-family involvement. Meta-analytic studies by Castro et al. (2015), Fan and Chen (2001) and Ma et al. (2016), affirm the idea that high levels of family involvement in their children's education are associated with achievement and social and emotional functioning. Moreover, when parents are involved in school life, positive effects are achieved for the child, for the teachers, for the parents and also for the school (Martínez González, 1996). In Spain, we can observe that family-school collaboration has been measured through this FIQ questionnaire (Dueñas et al., 2021) adapted to the university population.

Given the involvement that family-school involvement has on pupils and their families, the aim of this paper is to analyse through the FIQ the type of involvement that is established between families and schools in the first cycle of Pre-school Education in a sample of schools in Spain.

2. Methods

In order to carry out this research, a non-experimental quantitative study was carried out, using a descriptive approach to the data. Statistical analyses were carried out using SPSS27, including descriptive techniques (central tendency and dispersion) for the analysis of results, and inferential techniques for the contrast of hypotheses.

2.1. Sample

A non-probabilistic incidental sampling has been carried out. For a previous study, for the 20/21 school year (Otero-Mayer et al., 2021), a database of ECE schools in 5 autonomous communities in Spain was created. The centres that were involved in this research were asked to send the FIQ questionnaire (Family Involvement Questionnaire, Fantuzzo et al., 2000) to the families. As a preliminary step, we contacted the first author of the questionnaire and asked for permission to use it. The sample obtained is 659 families with children in the first cycle -0 to 3 years- of ECE. It is made up of 84% of mothers and 15% of fathers. Almost half of the families answering the questionnaire have two children (48.2%). The average age of the parents is 36 years old, 100% of whom have at least primary education, 67.5% of whom have university studies, 19.7% have post-compulsory non-university studies and 12.7% have primary or compulsory secondary education. In terms of employment, 2.5% of the sample were unemployed at the time, 9% were engaged in domestic work at home, while at the other extreme, 35.1% of the sample were technicians, professionals, scientists or 27.8% were small businessmen or administrative employees. With regard to working hours, it was found that only 19.5% finished their working day before 15:00h, being in Spain the usual timetable for schools from 9:00h to 16:00h. 21.2% of the families surveyed finish work after 18:00h. With regard to ICT access at home, 99.1% have an Internet connection at home, 95.1% of households have a computer at home, 84.6% have a digital TV and 65.9% use ICT as reference material or school support. With regard to the number of books in the home, the majority (41.8%) have between 26 and 100 books. Most of the children whose families responded to this questionnaire were born in 2018, which means that they were between 2 and 3 years old and were in the last year of this cycle.

2.2. FIQ -family involvement questionnaire - (Fantuzzo et al., 2000)

The FIQ is a specific questionnaire for the Early Childhood stage, which collects information from parents or caregivers about the ways in which the family is involved in the educational experiences of their children and thus establishes varying degrees of involvement in the three subscales that comprise it; "(1) Home-Based Involvement. This dimension includes behaviors describing the active promotion of a learning environment at home for children, such as providing a place in the home for learning materials and creating learning experiences for children in the community. (2) School-Based Involvement. This dimension is defined by activities and behaviors parents engage in at school with their children, such as volunteering in the classroom, going on class trips, and meeting with other parents in or out of school to plan events or fundraisers. (3) Home-School Conferencing. This dimension describes communication between parents and school personnel about a child's educational experience and progress, including talking with the teacher about a child's difficulties or accomplishments at school and educational activities to practice at home" (FIQ, pp. 2). It consists of a 42-item self-report Likert scale, scored from 1 to 4, with 1 being almost never and 4 being always.

The reliability and validity of the instrument have been studied by the authors among others (Bulotsky-Shearer et al., 2016; Xia et al., 2021), with the reliability of the questionnaire being analysed through its internal consistency - Cronbach's alpha - with values of .85, .85 and .81 for each dimension respectively. With respect to validity, the authors analysed both concurrent validity and predictive validity, obtaining high values in both cases.

2.3. Results

The results of this study show that in the Home-Based Involvement subscale the items in which parents have answered "rarely" have obtained scores above 10% in 5 of the 13 items that make up the subscale, with the following being the least to the most: (25) I bring home learning materials for my child - tapes, videos, books, (31) I spend time with my child working on reading/writing skills, (24) I talk to my child about how much I enjoy learning new things, (13) I share stories with my child about when I was at school, with item 42 I spend time with my child working on numeracy skills being the only item whose rating "rarely" is above 30%.

With respect to the School-Based Involvement subscale, we see that the majority of parents in the sample, over 60%, responded "rarely" to 5 of the 12 items. These are: (19) I volunteer in my child's classroom, (20) I get involved in fundraising activities at my child's school, (26) I go on field trips with my child, (35) I talk to people at my child's school about training or professional development opportunities for me and (38) I meet with other parents in my child's classroom outside of school. In this subscale, item 16, I get involved in planning school trips for my child, stands out, with 72% of the sample answering "rarely".

Finally, in the subscale Home-School Conferencing, it can be observed that 13% and 33% of the families responded "rarely" to 3 of the 11 items that make up the subscale, from least to most, (21) The teacher and I write notes to each other about my child or school activities, (37) I talk to my child's teacher about our personal and family matters, (36) I talk to my child's teacher about our personal and family matters and finally the item to which the highest percentage of families responded "rarely" (15) I talk to my child's teacher on the phone.

The overall scores for each of the three subscales show that it is in this last subscale that the highest scores were obtained, with 60 points, which is understood as high, with item 1 (I attend conferences with the teacher to talk about my child's learning or behaviour) and item 3 (I talk to my child's teacher about my child's daily school routine) receiving the highest scores. The other two subscales show average scores, with items 16 (I talk to my child's teacher about my child's daily school routine) and 26 (I go on outings with my child) scoring the lowest.

3. Discussion and conclusions

The implications of family involvement in their children's Early Childhood stage, as well as the effects that this involvement has on the different agents -children, families and teachers- shows the need to know and understand the degree of family involvement. The results obtained in the sample analysed, made up of 659 parents of children who have attended the first cycle of Infant Education (0-3) in Spanish public, private and subsidised ECE schools in the 2020/2021 academic year, show that there is room for improvement, although the results are generally good. It is interesting to note that it is in the subscale Home-School Conferencing, which deals with the communication established between schools and families, where the best scores are obtained. These results show that there is good involvement in a period (0-3 years) in which the role of families is so important for the optimal development of children.

A limitation of the study is the application of the observation subscales in a school year marked by the restrictions of the COVID-19 pandemic. This may have influenced the way and degree of collaboration between families and teachers, so it would be interesting to re-apply this questionnaire when the situation has been reversed, and to analyse possible variations.

References

- Aytac, P., Demirbas-Celik, N., & Kiracioglu, D. (2019). Effectiveness of family involvement activities in pre-school education. *Global Journal of Guidance and Counseling in Schools: Current Perspectives*, 9(3), 131-137- DOI:10.18844/gjgc.v9i3.4489.
- Bulotsky-Shearer, R. J., Bouza, J., Bichay, K., Fernandez, V. A., & Gaona Hernandez, P. (2016). Extending the validity of the family involvement questionnaire—short form for culturally and linguistically diverse families from low-income backgrounds. *Psychology in the Schools*, 53(9), 911-925.

- Castro, M., Expósito-Casas, E., López-Martín, E., Lizasoain, L., Navarro-Asencio, E., & Gaviria, J. L. (2015). Parental involvement on student academic achievement: A meta-analysis. *Educational research review*, 14, 33-46.
- Comisión Europea. (2000). *Informe europeo sobre la calidad de la educación escolar. Dieciséis indicadores de calidad*. Bruselas, Dirección General de Educación y Cultura.
- Dueñas, J. M., Morales-Vives, F., Camarero-Figuerola, M., & Tierno-García, J. M. (2021). Spanish Adaptation of the Family Involvement Questionnaire-High School: Version for Parents. *Educational Psychology*, 28(1), 31-38
- Epstein, J. L. (2001). *School, family, and community partnerships: Preparing educators and improving schools*. Boulder, CO: Westview Press.
- Epstein, J.L. (2009). School, family, and community partnerships: caring for the children we share. En J. L. Epstein, M. G. Sanders, B. S. Simon, K. Clark, N. Rodriguez y F. L. Van Voorhis (Coords.), *School, family, and community partnerships. Your handbook for action*. Third Edition (pp. 7-29). London: Sage Publications.
- Fan, X., & Chen, M. (2001). Parental involvement and students' academic achievement: A meta-analysis. *Educational psychology review*, 13(1), 1-22. <https://doi.org/10.1023/A:1009048817385>
- Fantuzzo, J., Gadsden, V., Li, F., Sproul, F., McDermott, P., Hightower, D., & Minney, A. (2013). Multiple dimensions of family engagement in ECE: Evidence for a short form of the Family Involvement Questionnaire. *Early Childhood Research Quarterly*, 28(4), 734-742
- Fantuzzo, J., McWayne, C., Perry, M., & Childs, S. (2004). Multiple dimensions of family involvement and their relations to behavioral and learning competencies for urban, low-income children. *School Psychology Review*, 33(4), 467-480.
- Fantuzzo, J., Tighe, E. & Childs, S. (2000). Family Involvement Questionnaire: A multivariate assessment of family participation in ECE. *Journal of School Psychology*, 92(2), 367-376. doi.org/10.1016/j.ecresq.2013.07.001
- Gadsden, V. L. (2013). *Evaluating family and neighborhood context for PreK-3*. Foundation for Child Dev. New York, NY. Google Scholar
- García, M. P., Gomariz, M., Hernández, M. Á., & Parra, J. (2015). La comunicación entre la familia y el centro educativo, desde la percepción de los padres y madres de los alumnos. *Educatio Siglo XXI*, 28(1), 157-187.
- García-Bacete, F. J. (2003). Las relaciones escuela-familia: un reto educativo. *Infancia y Aprendizaje*, 26(4), 425-437. <http://dx.doi.org/10.1174/021037003322553824>
- Garreta-Bochaca, J. (2015). La comunicación familia escuela en educación infantil y primaria. *Revista de la Asociación de Sociología de la Educación, RASE*, 8 (1), 71- 85.
- Hong, J., Bales, D. W., & Wallinga, C. R. (2018). Using Family Backpacks as a Tool to Involve Families in Teaching Young Children about Healthy Eating. *ECE Journal*, 46(2), 209–221.
- Jeynes, W. (2007). The relationship between parental involvement and urban secondary school student academic achievement. *Urban education*, 42(1), 82-110.
- Lara, S. & Naval, C. (2012). *Social Networks, Civic Participation and Young People: A Literature Review and Summary of the Educational Challenges*. En Manoharan, Aroon, and Holzer, Marc (eds.). *Active Citizen Participation in E-Government: A Global Perspective*. IGI Global: Hersey, PA., pp. 197-205.
- Livingstone, S. & Markham, T. (2008). The Contribution of M3edia Consumption to Civic Participation. *British Journal of Sociology*, 59(2), pp. 351-371.
- Ma, X., Shen, J., Krenn, H.Y., Hu, S., & Yuan, J. (2016). A Meta-Analysis of the Relationship Between Learning Outcomes and Parental Involvement During ECE and Early Elementary Education. *Educational Psychology Review* 28, 771–801 <https://doi.org/10.1007/s10648-015-9351->
- Martínez González R. A. (1996): *Familia y educación* (Oviedo, Servicio de publicaciones de la Universidad de Oviedo).
- Otero-Mayer, A., Vélaz-de-Medranpo, C., & Expósito-Casas, E. (2021). Strengthening teaching competencies in ECE: a look at classroom activities. *Revista de educación*, 393, 181-206. [doi: 10.4438/1988-592X-RE-2021-393-490](https://doi.org/10.4438/1988-592X-RE-2021-393-490)
- Waanders, C., Mendez, J. L., y Downer, J. (2007). Parent characteristics, economic stress and neighborhood context as predictors of parent involvement in pre-school children's education. *Journal of School Psychology*, 45(6), 619-636.
- Xia, X., Hackett, R. K., & Webster, L. (2021). A multidimensional examination of Chinese family involvement in ECE: validation of the Chinese version of the Family Involvement Questionnaire. *International Journal of Early Years Education*, 29(2), 124-138.

LITERACY, LANGUAGE AND LINGUISTICS: STRUCTURING ENGLISH TEACHING PROGRAMS IN RURAL COMMUNITIES

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Abstract

This study will examine English learning environments and methods in rural settings in Europe and the United States, assessing their contributions to language learning, both written and spoken. This is a pilot project and will evolve into a rigorous comprehensive study suitable for publication as a chapter and part of an edited volume. This study will compare and contrast educational systems, including two different styles of English education structured in a comparative analysis using five focal areas. These focal areas include the definition and structure of rural education, English language learning modalities, linguistic environment, academic leadership, educational outcomes and indicators of success. For the purpose of this paper, the definition and structure of rural education and English language learning modalities will be addressed. The opportunity to investigate the experiences of teachers who are active in rural communities and focus on the multidimensional aspects of the education of multilingual learners will provide valuable information that will contribute to expert teaching and learning. Embracing English language learning, new technologies, and initiating change through proactive educational strategies including a paradigm shift to incorporate a translanguaging pedagogy for emergent English speakers will lead to relevant and purposeful accomplishments in rural school settings.

Keywords: *Rural education, multilingual English learners, comparative research.*

1. Introduction

Rural education is distinctly different from educational settings and schools in urban and suburban locations. Often definitions of education focus on urban expectations and do not capture the entire landscape that includes and values rural educational environments. It is often acknowledged that education and the opportunity to learn in an educational setting is tantamount to economic prosperity. While the educational attainment in rural areas has improved, it continues to lag behind that of urban areas and it is time to invest in rural education. Schools in these settings certainly do more than provide educational opportunities during the school day. They are often integral parts of the community and serve as gathering places for social, recreational, and cultural endeavors. Therefore, home-school partnerships are critical to success and educational outcomes can be strengthened by positive school, community and family relationships. Rural schools are also key to providing employment for members of smaller towns and villages.

English language learning throughout the State of Idaho and Europe is an ongoing factor linking leadership, teacher education and a wide range of intellectual disciplines. English language teaching in rural areas has a unique set of challenges and provides an overarching opportunity to impact success and serve as a catalyst for the expansion of learning. Strong programs in English language teaching in rural settings leading to quality educational experiences designed to meet the unique needs of learners are particularly valuable. Successfully delivering programs in English language acquisition in rural schools has become a challenging endeavor that is critical to the future of young people. Green and Corbett consider this topic by addressing the four areas of a) conceptualizing rural literacies, b) literacy/pedagogies, c) place and sustainability, and d) mobilities and futures (Green & Corbett, 2013). The goal of this pilot study focuses on investigation and implementation of quality instructional programs in English language acquisition (English as a Second Language or ESL in Idaho and English as a Foreign Language or EFL in Europe) that provide numerous opportunities and meet the needs of students in rural schools. This study will evolve to an in-depth investigation to provide detailed data regarding the educational outcomes and indicators of success in a comparative study with multilingual learners. How do these programs help students in rural settings speak, read, write, and understand English to communicate

more effectively? Meeting with education leaders from multiple locations, in person and online, particularly those from rural settings will establish working relationships for future research and information gathering.

2. Methodology

This manuscript represents the initial stages of a comprehensive and ongoing study that utilizes a multi-case design for the purpose of conducting comparative research in English language learning in rural schools in Europe and the State of Idaho. Authentic accounts and visits to assess English language learning in rural schools will be gained through interviews of educational leaders, observations, and review of selected relevant literature. Further collaboration with colleagues at Boise State and throughout Europe and the USA will lead to in depth exploration of the topic and systematic collection of data. Additionally, presentations at professional meetings will provide opportunities to gain further access to resources, methodological tools, and best practices. The pedagogical potential including meaningful research opportunities and analytics, as well as strategies for educators to frame best practices focused on the diverse learning needs of rural students strengthens success. The data will be used and analyzed to construct a matrix comparison between the two learning environments.

3. Definition and structure of rural education

Rural settings as well as English acquisition differ widely between Idaho in the United States and individual European countries. Rural education in the United States has been described in numerous ways. The focus is on students attending schools and living in a rural setting with fewer than 600 students in the school district or 2,500 people living in the town (U.S. Economic Research Service). Rural is considered by the U.S. Census Bureau as all population, housing, and territory not included within an urbanized area or urban cluster (Ratcliffe, M. et. al., 2016). Four in ten public schools in Idaho are located in rural communities and almost one in four students attend a school located in a rural district. Statewide, 72.9 percent of the districts are considered rural (Idaho State Department of Education, 2020). Heller points out that rural students make up at least 20% of public school enrollments in the United States, yet continue to be marginalized, and rural areas often generate low tax revenues, and therefore cannot afford to pay teachers competitive salaries (Heller, 2022). Rural schools continue to experience a variety of educational challenges that directly affect student academic progress. Rural communities in Idaho tend to be poor, and a considerable number of their families are experiencing homelessness, but “relatively few students qualify for specialized educational instruction.” (Stockard, J., 2011). Teachers in rural communities often operate in isolation, salaries are low, and they tend to lack educational opportunities due to geographical isolation (Showalter et. al., 2019). Indeed, the need to improve their teaching skills has been clearly documented. According to the *Why Rural Matters 2018-2019* report, the school population in Idaho’s rural districts is “a mixed bag” in terms of diversity (Showalter et. al., 2019). The national average per rural pupil is \$6,367. Idaho rural expenditure per pupil is \$4,118 ” (Showalter et. al., 2019). This does not represent adequate funding to meet the needs of these students and provide quality educational services, particularly considering that many of these diverse students need additional assistance with English language acquisition and their teachers need further professional development and resources.

In Europe, studies have been conducted to address rural education and the impact on learning. Europe certainly cannot be categorized as one location since unique circumstances exist within each country and educational system. The book *Educational Research and Schooling in Rural Europe: An Engagement with Changing Patterns of Education, Space and Place* (Gristy et al. 2020) discusses and outlines the effects of the revolutionary political reform experienced in the past half century on rural education in Europe from a variety of perspectives and educational settings. The information provided and reforms addressed include the liberation of the Baltic and Eastern European states from Soviet communist domination, the ‘eurozone’ economic crises, and the current and future migration of people fleeing war and poverty from the Middle East and Africa. The authors point out that “trapped in this distal whirlwind of change are thousands of small and/or rural elementary schools and the life chances of thousands of young children” (Gristy et. al., 2020). Unfortunately, based on recent developments in Ukraine, another chapter of tumultuous challenges is facing Europe fraught with a multiplicity of tragic circumstances certain to reshape and redefine education.

4. English language learning modalities

In the State of Idaho, numerous programs exist within school districts to provide quality programs for English language learning. Throughout the state, it is the belief that every student should know how to read, write, speak, listen and use language effectively. The Idaho State Department of Education supports this philosophy by providing professional development, instructional strategies, and resources for Idaho educators to accomplish these goals. However, it is often up to school districts to support this learning by funding programs and opportunities for multilingual learners to excel and succeed. Often, this comes down to funding formulas and availability of resources to support English acquisition programs within each district. Rural districts function on considerably less resources than the larger urban districts. It is difficult to find educators in rural districts who hold endorsements in bilingual or English as a New Language (ENL) teaching.

Educators in Idaho realize that English language proficiency is based on the four modalities of listening, speaking, writing and reading, and they focus on determining individual student needs in each area in order to challenge students and encourage them to excel and become proficient in each of these areas. It isn't enough just to teach these individual strategies, but educators must become culturally responsive and relate positively to students encouraging them to excel by lowering the affective filters. The use of technology to strengthen language learning and incorporate interesting tasks and methods can be a tremendous asset. By teaching language skills across the curriculum, students are able to strengthen their knowledge and understanding of English in a variety of subject areas and topics. Using multiple modalities of teaching and learning will support a variety of learners all with unique learning styles that will help them relate and gain language proficiency. Some students are visual learners and will benefit from visual clues while others may be auditory or kinesthetic learners. Best practices for challenging English language learners in Idaho include focusing on students' educational needs. In addition to the strategies mentioned above, educators need to speak slowly and patiently wait for responses. Students need time to think through what they are speaking and writing. When they feel comfortable asking questions, English acquisition will come easier. By incorporating students' native languages and valuing their experiences at home, they will be encouraged to tackle the challenges of learning English. Rural schools may not have the technology or labs that are found in urban settings, but many of these strategies can be incorporated into lessons and will highly benefit English language learners.

In the rural areas of Europe, the dynamics are certainly different because the purpose for learning English is not the same as in the State of Idaho. Students continue to use their home language throughout the day and the use of English is an additional asset that they are endeavoring to acquire. The pressure associated with being thrust into a new setting and surrounded by English on a permanent basis is not present in Europe. The disadvantage is that they do not have the reinforcement of being surrounded by the English language and have to rely on English speaking counterparts along with teachers and texts or computer programs in English. In rural areas of Europe with limited budgets and supplies, the teachers often do not speak English as a native or dual language and are also limited in their English speaking abilities. Materials may not be accessible and professional development to strengthen educators' knowledge of instructional strategies is not always available in rural areas. In Norway and Finland, globalization has strongly impacted rural education. Legislative changes in both countries have transferred power to local municipalities and rural villages and communities are willing to fight hard to retain their local schools. (Solstad & Karlberg-Granlund, 2020). Post socialist decentralization in Poland significantly affected the operation of rural schools and transformed the supervision of schools to local governments (Bajerski, 2020).

Multilingual learners provide excellent opportunities for educators to strengthen their instructional skills, confidence and outreach to students, families and the community particularly in rural settings. The interrelatedness of the school, home and community is complex and key to student success. Students and teachers in rural communities are often challenged by a variety of unique and diverse factors, and classroom teachers have to address unique situations to make a significant impact by taking approaches that will meet the wide range of student needs—cognitive and affective. In order to engage students, rural educators are moving beyond the standard methodologies and best practices within the classroom to provide high levels of student achievement through outreach and making positive connections. TEFL/TESL teachers are expected to meet a multiplicity of student needs in rural areas, and getting to know the community and students' families provides insight that will help build relationships and strengthen educators' knowledge, skills and dispositions.

5. Conclusions and future implications

As this study expands and develops through visits to rural areas in Europe and Idaho including interviews with educators and students who are engaged in English language learning, the data will multiply, and the picture will come into clearer focus. What we do know at this point, is that the number of English language learners in Idaho and throughout Europe is on the rise, the need for increased funding and resources is clear, and the value of professional development for these educators is significant. Authentic accounts and ongoing study that utilizes a multi-case design for the purpose of conducting comparative research in English language learning in rural schools in Europe and the State of Idaho will provide valuable knowledge as we pursue this topic in further detail. Sadly, the political situation in Europe and the increase in refugees from Ukraine and beyond will continue to challenge the situation as we grapple with serving students of all ages and their families. As educators, we seek to serve and provide quality programs for students that will meet their needs and challenge them to excel.

References

- April 23, 2021. US Economic Research Service. Rural education at a glance. Retrieved March 3, 2022. <https://www.ers.usda.gov/topics/rural-economy-population/employment-education/rural-education/>
- Bajerski, A. (2020). Rural schools in Poland in the period of post-socialist decentralization and demographic decline. *Educational Research and Schooling in Rural Europe: An Engagement with Changing Patterns of Education, Space, and Place*. Charlotte, N.C.: Information Age Publishing.
- Green, B. & Corbett, M. (2013). *Rethinking Rural Literacies: Transnational Perspectives*. New York, New York, Palgrave Macmillan.
- Gristy, Cath & Hargreaves, Linda & Kučerová, Silvie. (2020). *Educational Research and Schooling in Rural Europe: An Engagement with Changing Patterns of Education, Space, and Place*. Charlotte, N.C.: Information Age Publishing.
- Heller, R. (2022). Time to invest in rural education. *Spotlight on Rural Education. Kappan*. Vol. 103 N4. December/January 2022. p. 4.
- Idaho State Department of Education, 2020. *Consolidated State Performance Report Part I, School Year 2019-2020*.
- Ratcliffe, M. Burd, C., Holder, K. & Fields, A. (December, 2016). Defining rural at the U.S. Census Bureau. Retrieved March 1, 2022. Defining Rural at the U.S. Census Bureau
- Showalter, D., Hartman, S., L., Johnson, J., & Klein, B. (2019). *Why rural matters 2018-2019. The time is now*. A Report of the Rural and Community Trust. Retrieved February 10, 2022 from <http://www.ruraledu.org>
- Solstad, K. & Karlberg-Granlund, G. (2020). Rural education in a globalized world: The cases of Norway and Finland. *Educational Research and Schooling in Rural Europe: An Engagement with Changing Patterns of Education, Space, and Place*. Charlotte, N.C.: Information Age Publishing.
- Stockard, J. (2011). Increasing reading skills in rural areas: An analysis of three school districts. *Journal of Research in Rural Education*, 26(8), Retrieved from <http://jrre.psu.edu/articles/26-8.pdf>.

CRITICAL THINKING WITHIN THE INFORMATICS TEXTBOOK OF THE SECOND CLASS OF THE GREEK LYCEUM

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Abstract

It cannot be denied that there are always problems societies and individuals have to deal with. To confront these problems in living conditions that seem to be constantly and rapidly changing, specific competencies are needed. Critical thinking is indispensable in developing such competencies effectively. It can support identifying, constructing and evaluating arguments. It can also contribute in improving problem solving skills. Critical thinking is essential to develop decision making competencies and communication skills. Furthermore, people can use critical thinking in order to confront their biases, prejudices and stereotypes. It is clear that critical thinking is useful and necessary in multiple areas. For that reason, critical thinking is considered to be a key pedagogical goal in many levels of education. For this reason, modern education seeks to promote the cultivation of critical thinking. In particular, education of Informatics is strongly related to critical thinking. Students cannot develop skills related to Informatics if they cannot think critically. Therefore, critical thinking is essential for teaching Informatics subjects. Consequently, within the Informatics textbooks the cultivation of critical thinking skills should be promoted. The present research aims to determine whether there are critical thinking skills whose cultivation is equally promoted within the Informatics textbook of the second class of the Greek Lyceum. The method used in this paper is Qualitative Content Analysis, which is established in the social sciences for texts analysis. The findings of the present research revealed that within the examined textbook there are no critical thinking skills whose cultivation is equally promoted.

Keywords: *Critical thinking, content analysis, informatics, textbooks.*

1. Introduction

Critical thinking can be defined as “reflective and reasonable thinking that is focused on deciding what to believe or do” (Ennis, 1985, p. 85). Critical thinking helps develop independent thinkers and it is the key competency for economic survival in the 21st century (Matthews & Lally, 2010). Critical thinking lessons can contribute in improving a range of skills namely solving problems, gathering and analyzing information, drawing conclusions, communicating ideas with clarity and effectiveness (Bassham et al., 2011). Education seeks to cultivate critical thinking (Kennedy, Latham & Jacinto, 2016), because of its multiple benefits.

1.1. Critical thinking and Informatics

Some aspects of Informatics include: understanding and promoting effective organization, analysis, management, and use of information; decision making relying on knowledge or evidence; integration of data, information and knowledge (Collins & Weiner, 2010). Information literacy is a set of skills for recognizing, evaluating and effectively using necessary information (American Library Association, 1989). Hence Information literacy is essential in Informatics. Students cannot cultivate Information literacy unless they have developed critical thinking skills (Paul & Edler, 2006). Therefore, critical thinking, Informatics and Information Literacy are strongly related.

Logic constitutes an intellectual standard of critical thinking (Paul & Elder, 2013) and critical thinking is a reasonable thinking itself (Ennis, 1985; Lipman, 1988). Informatics is a science of computers, algorithms, data structures, mechanical symbol, data processing, computer automation, computer simulation, and mechanization of thinking (Rechenberg, 1999). Logic is strongly related to many subjects of Computer Science (Martel, 2018), hence it is also related to Informatics. Thus, logic

interrelates Informatics with critical thinking. From the aforementioned, it becomes clear that critical thinking and Informatics have a very strong relationship.

1.2. Critical thinking and curricula

The previously mentioned strong linkage between the critical thinking and Informatics indicates that within curricula, cultivation of critical thinking should be promoted. In curricula of the primary, the secondary and the higher education, learning objectives underline the development of critical thinking (Thompson, 2011). Thinking skills or critical thinking programs have been incorporated into the curricula of several countries (Matthews & Lally, 2010). As stated in the Analytical Curriculum for Information and Computer Technology in Education, one of the skills that should be promoted is critical thinking (Weert & Anderson, 2002). According to the Hellenic Pedagogical Institute (2009), the cultivation of critical thinking is presented in the new curricula as a teaching objective. Consequently, within the school textbooks of Informatics the cultivation of critical thinking skills should be promoted. The purpose of this paper is to determine whether there are critical thinking skills whose cultivation is equally promoted within the Informatics textbook of the second class of the Greek Lyceum.

1.3. Research questions

In order to examine the content of the second class Informatics textbook of the Greek General Lyceum, concerning the promotion of cultivating critical thinking skills in its content, the following research questions were posed which are answered in the present research.

Within the second class Informatics textbook of the Greek General Lyceum:

1. Which are the critical thinking skills whose cultivation is promoted, and which are the ones whose cultivation is not promoted?
2. If there are critical thinking skills whose cultivation is promoted, does this promotion occur equally per skill?
3. Are there critical thinking skills which are represented by all their sub-skills?

2. Method

In this research the examined material is the content of the second class Informatics textbook of the Greek General Lyceum. This textbook is divided into three thematic units (Doukakis et al., 2014): Basic concepts, Theoretical Computer Science topics, Applied Computer Science topics. Each unit is divided into chapters ranging from one to five. All the chapters of the textbook were examined.

2.1. Research design

The method used in this research is the Quantitative Content Analysis. Quantitative Content Analysis is a systematic, objective and quantitative analysis of the characteristics of a message (Neundorff, 2002). The main idea of Content Analysis is the inclusion of elements of a text into categories (Creswell & Clark, 2007; Krippendorff, 2004; Huntemann & Morgan, 2001; Rustermeier, 1992). The recording unit determines which parts of the text fall into the category system (Krippendorff, 2004). In this research the recording unit is defined as any reference that promotes the cultivation of a critical thinking skill. In the beginning of the Content Analysis, an initial category system is used to help classify parts of the text in the categories of this system. In the present research the initial category system that was used consists of the following skills (categories) and sub-skills (subcategories) of the critical thinking as defined by the American Philosophical Association (Facione, 1990):

1. Interpretation skill
 - 1.1. Categorization sub-skill
 - 1.2. Decoding significance sub-skill
 - 1.3. Clarifying meaning sub-skill
2. Analysis skill
 - 2.1. Examining ideas sub-skill
 - 2.2. Identifying arguments sub-skill
 - 2.3. Analyzing arguments sub-skill
3. Evaluation skill
 - 3.1. Assessing claims sub-skill
 - 3.2. Assessing arguments sub-skill
4. Inference skill
 - 4.1. Querying evidence sub-skill
 - 4.2. Conjecturing alternatives sub-skill
 - 4.3. Drawing conclusions sub-skill

5. Explanation skill
 - 5.1. Stating results sub-skill
 - 5.2. Justifying procedures sub-skill
 - 5.3. Presenting arguments sub-skill
6. Self-regulation skill
 - 6.1. Self-examination sub-skill
 - 6.2. Self-correction sub-skill

2.2. Data collection and analysis

In the examined text, each reference that promotes the cultivation of a critical thinking skill falls into a corresponding subcategory. In this way, the members of the subcategories were determined. A basic category consists of the members of its subcategories. The frequency of a category is the number of its members. The frequencies and the relative frequencies of the categories were computed.

3. Results and discussion

Within the examined text, no references promoting the cultivation of the self-regulation skill were found. On the contrary, the cultivation of the interpretation skill, the analysis skill, the evaluation skill, the inference skill and the explanation skill is promoted. The relative frequencies of the critical thinking skills whose cultivation is promoted are displayed in table 1.

Table 1. The critical thinking skills whose cultivation is promoted in the examined text and their relative frequencies.

Critical thinking skills	Relative frequencies (f%)
Interpretation skill	7,8%
Analysis skill	18,8%
Evaluation skill	3,1%
Inference skill	68,8%
Explanation skill	1,5%
Total	100,0%

From the final category system, it is clear which subcategories represent each category. Interpretation skill is represented by categorization sub-skill, decoding significance sub-skill and clarifying meaning sub-skill. Analysis skill is represented by examining ideas sub-skill. Evaluation skill is represented by assessing claims sub-skill. Inference skill is represented by drawing conclusions sub-skill. Explanation skill is represented by presenting arguments sub-skill.

The findings of the present research show that in the examined text, the cultivation of the critical thinking skills is not promoted sufficiently since this promotion does not occur with equal frequency per skill. This is consistent with the results of other relevant researches which examined textbooks and revealed that in their content, critical thinking is not promoted sufficiently (Khademi, 2020; Peyró et al., 2020; Samiee et al., 2020; Al-Qahtani, 2019; Es-Salhi & Elfatih, 2019; Irafahmi et al., 2018; Maki & Horita, 2018; Solihati & Hikmat, 2018; Aybek & Aslan, 2016; Sobkowiak, 2016).

The insufficient promotion of cultivating critical thinking within the examined textbook could be attributed to a variety of reasons such as the difficulties of cultivating critical thinking (Brookfield, 2013; Willingham, 2007), the lack of training in the methodology of critical thinking, the lack of information about educational material that promotes critical thinking, the personal beliefs and prejudices of educators about the content of the curriculum and the way they teach it (Snyder & Snyder, 2008), the fact that typical school teaching does not encourage high-level thinking skills (Paul, 1992), the teaching inefficiency and lack of knowledge about what critical thinking is and how it could be promoted (Aliakbari & Sadeghdaghighi, 2013), the inability of many adults to think critically under many circumstances (Halpern, 1998), the lack of fundamental reasoning skills of many adults (Kennedy, Fisher & Ennis, 1991; Gelder, 2005). Moreover, there are barriers to critical thinking namely egocentrism, sociocentrism, unwarranted assumptions, stereotypes, relativistic thinking and wishful thinking (Bassham et al., 2011).

4. Conclusions

From the present research it was emerged that the critical thinking skills whose cultivation is promoted within the examined text are the interpretation skill, the analysis skill, the evaluation skill, the inference skill and the explanation skill. On the contrary, the cultivation of the self-regulation skill is not promoted in the examined material. Furthermore, the cultivation of the critical thinking skills is not promoted equally per skill. The critical thinking skills of analysis, evaluation, inference and explanation are represented by only one of their sub-skills and the interpretation skill is the only one which is represented by all of its sub-skills. A limitation of the present research is that the findings cannot be generalized to refer to other books. It is suggested that research be conducted where the content of the school textbooks and a range of cognitive subjects are studied, with regard to the cultivation of critical thinking skills in them. These types of research may shed light on the quality of the existing textbooks and how they can potentially be used as far as the critical thinking and the promotion of its cultivation is concerned and also provide useful insights that may help the authors in compiling textbooks where the cultivation of critical thinking skills is adequately promoted.

References

- Aliakbari, M., & Sadeghdaghighi, A. (2013). Teachers' perception of the barriers to critical thinking. *Procedia-Social and Behavioral Sciences*, 70, 1-5.
- Al-Qahtani, E. M. (2019). Critical thinking pedagogy: using textbooks evaluation and content analysis techniques for Saudi University students. *International Journal of Linguistics, Literature and Translation*, 2(5), 239-244.
- American Library Association. (1989). American library association presidential committee on information literacy. Retrieved from <http://www.ala.org/ala/acrl/acrlpubs/whitepapers/presidential.htm>. Accessed February 9, 2021.
- Aybek, B., & Aslan, S. (2016). An analysis of the units "I'm learning my past" and "the place where we live" in the social studies textbook related to critical thinking standards. *Eurasian Journal of Educational Research*, 16(65), 35-54.
- Bassham, G., Irwin, W., Nardine, H., Wallace, J. (2011). *Critical Thinking: A student's Introduction*. New York: King's College.
- Berelson, B. (1952). *Content analysis in communications research*. New York: Hafner Press.
- Brookfield, S. (2013). Teaching for critical thinking. *International Journal of Adult Vocational Education and Technology (IJAVET)*, 4(1), 1-15.
- Collins, J. W., & Weiner, S. A. (2010). *Proposal for the creation of a subdiscipline: Education informatics*. Teachers College Record.
- Creswell, J. W., & Clark, V. P. (2007). *Designing and Doing Mixed Method Research*. Thousand Oaks, CA: Sage Publications.
- Doukakis, S., Douligieris, X., Carvounidis, T., Koilias, C., Perdos, A. (2014). *Introduction to the Principles of the Computer Science*. Athens: Diophantos.
- Ennis, R. H. (1985). A logical basis for measuring critical thinking skills. *Educational leadership*, 43(2), 44-48.
- Es-Salhi, A., & Elfatihi, M. (2019). Evaluating critical thinking skills in Moroccan EFL textbooks: Gateway to English 2 as a case. *Higher Education of Social Science*, 17(1), 13-22.
- Facione, P. (1990). Critical thinking: A statement of expert consensus for purposes of educational assessment and instruction (The Delphi Report). Retrieved from <http://www.qcc.cuny.edu/socialsciences/ppecorino/CT-Expert-Report.pdf>. Accessed September 18, 2021.
- Gelder, T. V. (2005). Teaching critical thinking: Some lessons from cognitive science. *College teaching*, 53(1), 41-48.
- Halpern, D. F. (1998). Teaching critical thinking for transfer across domains: Disposition, skills, structure training, and metacognitive monitoring. *American psychologist*, 53(4), 449.
- Hellenic Pedagogical Institute (2009). Interdisciplinary Committee on Educational Autonomy of the Lyceum and Dialogue on Education: Curriculums. Retrieved September 12, 2021, from http://www.pi-schools.gr/paideia_dialogos/analitika-programata.pdf. Accessed September 12, 2021.
- Holsti, O. R. (1969). *Content analysis for the social sciences and humanities*. Reading, MA: Addison-Wesley.

- Huntemann, N., & Morgan, M. (2001). Mass media and identity development. *Handbook of children and the media*, 309-322.
- Irafahmi, D. T., Nuris, D. M. R., Zahroh, F. & Nagari, P. M. (2018). Critical Thinking in Accounting Textbooks. *Journal of Education and Learning (EduLearn)*, 12(1), 21-29.
- Kennedy, I. G., Latham, G., & Jacinto, H. (2016). The Literature Review. In *Education Skills for 21st Century Teachers* (pp. 11-20). Springer, Cham.
- Kennedy, M., Fisher, M. B., & Ennis, R. H. (1991). Critical thinking: Literature review and needed research. *Educational values and cognitive instruction: Implications for reform*, 2, 11-40.
- Khademi, S. (2020). Content analysis of "Religion and Life" curriculum in the high school program in Iran in terms of the emphasis on creativity, critical thinking, and self-assertiveness in students. *Biannual Journal of Education Experiences*, 3(2), 121-132.
- Krippendorff, K. (2004). *Content Analysis: An Introduction to Its Methodology*. Thousand Oaks, CA: Sage.
- Lipman, M. (1988). Critical Thinking--What Can It Be? *Educational Leadership*, 46(1), 38-43.
- Maki, S., & Horita, T. (2018). Comparative Study of the Categorization of Items of Statistical Literacy in Mathematics textbooks of elementary, junior high, and high schools in Japan. *International Journal of Learning Technologies and Learning Environments*, 1(1), 79-92.
- Martel, M. (2018). *Conservative Extensions and Satisfiability in Fragments of First-Order Logic: Complexity and Expressive Power* (Doctoral dissertation, Universität Bremen).
- Matthews, R., & Lally, J. (2010). *The Thinking Teacher's Toolkit: Critical Thinking, Thinking Skills and Global Perspectives*. Bloomsbury Publishing.
- Neundorf, K. (2002). *The Content Analysis Guidebook*. Sage Publications Inc., Thousand Oaks, CA.
- Paul, R. (1992). Critical thinking: What, why, and how. *New directions for community colleges*, 1992(77), 3-24.
- Paul, R., & Elder, L. (2006). *Critical thinking competency standards*. Dillon Beach, CA: Foundation for Critical Thinking.
- Paul, R., & Elder, L. (2013). Critical Thinking: Intellectual Standards Essential to Reasoning Well within Every Domain of Human Thought, Part Two. *Journal of developmental education*, 37(1), 32.
- Peyró, M. C. R., Herrero, E. C., & Llamas, E. (2020). Thinking skills in Primary Education: An Analysis of CLIL Textbooks in Spain. *Porta Linguarum: revista internacional de didáctica de las lenguas extranjeras*, (33), 183-200.
- Rechenberg, P. (1999). *Introduction to Informatics: A complete presentation* (P. Drepaniotis, Trans). Athens: Klidarithmos.
- Rustermeyer, R. (1992). *Practical-methodical steps of the content analysis*. Münster: Aschendorff.
- Samiee Zafarghandi, M., Seadatee Shamir, A., & Shamsolahi, M. (2020). A Comparative Study of Fifth Grade Mathematics Textbooks in Iranian and International Schools based on Critical Thinking Components. *Iranian Journal of Comparative Education*, 3(1), 624-635.
- Snyder, L. G., & Snyder, M. J. (2008). Teaching critical thinking and problem solving skills. *The Journal of Research in Business Education*, 50(2), 90.
- Sobkowiak, P. (2016). Critical thinking in the intercultural context: Investigating EFL textbooks. *Studies in Second Language Learning and Teaching*, 6(4), 697-716.
- Solihati, N., & Hikmat, A. (2018). Critical thinking tasks manifested in Indonesian language textbooks for senior secondary students. *Sage Open*, 8(3), 2158244018802164.
- Thompson, C. (2011). Critical thinking across the curriculum: Process over output. *International Journal of Humanities and social science*, 1(9), 1-7.
- Weert, T. V., & Anderson, J. (2002). *Information and Communication Technologies in Education. A curriculum for schools and Programme of teacher Development*. UNESCO. France.
- Willingham, D. T. (2007). Critical thinking. *American educator*, 31(3), 8-19.

WHAT ABOUT “THE” SCIENTIFIC METHOD? A SURVEY APPLIED TO MIDDLE AND SECONDARY GEOSCIENCE TEACHERS

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Abstract

The debate over whether there is a single unifying scientific method or a variety of methods, each of which is applied to a different discipline of science, is still a difficult one. Popper idea of refutation was a criticism to the inductive method and claimed the need to submit theories to falsification. His thesis ended up being a demarcation of science and pseudoscience. But the question remains: do all sciences follow the same scientific method? Namely because discoveries in geology have to overcome time and space enormous scales, geologist have been called by Lord Kelvin as “stamp collectors”. Having started as a field science, and even having been denied by Hutton as an experimental science, modelling in geology only took place at the end of the 19th century by the hand of Sir James Hall. The need to mirror scientists’ methods is a demand of inquiry-based teaching, but few geology teachers have correct knowledge about the method used by geologists. In the present study, a survey was undertaken online with the main objective of investigating what is teachers’ knowledge about the (geo)scientific method. Participants were 108 geology middle and secondary teachers in Portugal. The majority of respondents were women (n=79; 73.1%) and the average age was 46 years old. All participants were graduated, but 51 (47.2%) had a master and 5 (4.6%) had a Ph.D. The results showed erroneous conceptions that are commonly reflected in inquiry-based teaching classrooms, namely regarding the scientific method but also about investigative competencies and geology as an experimental science. The majority of the teachers’ said that there only exists one scientific method for all sciences (n=49; 45.4%) and that it has a fundamentally linear nature from observation to conclusion (n=54; 50.0%). The scientific method was claimed as needed to allow the confirmation of hypothesis by many teachers (n=44; 40.7%). Some participants referred Uniformitarianism as a principle that justifies the historical and interpretive reasoning of geologist (n=48; 44.4%), but not so many referred the analogic reasoning (n=28; 25.9%). Teachers also referred to critical and systemic thinking as scientific competencies (n=72; 66.7%) and gave less importance to others like observation and argumentation (n=27; 25.0%). Results analysis corroborate that an inquiry-base teaching methodology requires history of geology and an epistemological reflection to be integrated in teachers’ initial training and professional development. The epistemology behind geology classes has to be taught to eradicate alternative conception about the scientific method.

Keywords: *Scientific-inquiry, scientific reasoning, investigative competencies, geology, teaching sciences.*

1. Introduction

Scientific method is still described in science texts as if it is a rigid, linear, and unique process. This discussion, whether it is a single unifying scientific method or if there are variety of methods applied to different disciplines of science, is well developed in educational literature. The present study specifically focuses on science teachers’ views about scientific method and how they use the scientific inquiry in sciences (geology) classrooms. According to Lederman (2009) and Lederman and collaborators (2014), scientific inquiry is the processes of how scientists do their work and how the resulting scientific knowledge is generated and accepted, being the combination of general science process skills with traditional science content, creativity, and critical thinking to develop scientific knowledge. Inquiry-based teaching is claimed as the most preferable methodology to teach science aiming to develop students’ knowledge and investigative competences. Inquiry-based teaching is defined as a pedagogical approach that models the scientific method. But to resort to that methodology, teachers need to have to have a clear understanding of the scientific method (or preferable named as scientific inquiry). Nevertheless, some critiques have already arisen regarding the use of the scientific inquiry in schools because it has been represented as an inflexible, rigid rendering of the actual processes of the scientific method (the scientific inquiry in science proper) leading learning to desocialization of knowledge (Emden, 2021). Within this

theoretical framework the purpose of this study is to diagnose geology science teachers' knowledge of the geological scientific method and how they teach it in their inquiry-based classrooms.

2. Scientific method and models in geoscience research and teaching

At the beginning of textbooks, we regularly find accounts of scientific method designed to assist the beginner student in getting an idea of how scientific investigation may differ from inquiry in other areas (Blachowicz, 2009). These parts of the introduction to textbooks provide a relatively quick account of scientific method that is standardized, avoiding controversies, but also making no particular clarification regarding the scientific method and a particular discipline. The scientific method, as it has been portrayed in popular and introductory textbooks, has been declared a myth (Rowbottom & Aiston, 2006). According to Woodcock (2014) the use of the definite article 'The' implies that there is one and only one, a single and unique method. Nevertheless, historically there are at least two most influential views: inductivism and hypothetico-deductivism, that sometimes are both used in the same discipline. On the other hand, some authors claim the scientific method as having a fixed and linear number of steps, but no consensus is found in literature review about it. Woodcock (2014) mentions that beside no agreement being found in the number of steps, there is also no agreement in the starting point. For some authors the beginning is recognizing a problem (Marshak, 2022), for others it is by making observations (Bailey, 2021; Edmund, 2000; Pilar, 1979). For some authors the end is publishing (Edmund, 2000), but for many others it ends before reaching this point. This ambiguity among what is the scientific method may raise a question in middle and secondary teachers: What about the scientific method we have to teach in our science classrooms? Besides that, not yet well clarified issues, the geological method, and reasoning has many unique and singular particularities. Geology is a historical and interpretative science that has as its main principle the Uniformitarianism, popularized by Charles Lyell in the beginning of the 19th century. This principle reflects the assumption that the same natural laws and processes that operate in our present-day are the same that operated in the past and can be applied everywhere. Based on that methodological principle the geological scientific reasoning is not only historical an interpretive, but also resorts to analogies. Another problem that makes teaching the scientific and the nature of geology even more difficult, is the fact that it started as a field science and only in the middle of the 19th century was it also recognized as an experimental science. The use of models in geological research started by the hands of James Hall, but only after the death of James Hutton, a vigor's opponent to investigate geology in a laboratory mainly due to the enormous space and time scale geologists need to operate. The use of models in the classroom plays key roles in developing scientific understanding (Oh & Oh, 2011) of geological processes and are believed to support science instructions in eradicating students' alternative conceptions. Nevertheless, it is necessary for science teachers to understand the features of models used in geological research and in geological education before using them in inquiry-based classrooms.

3. Inquiry-based teaching

Scientific inquiry is one crucial component of scientific literacy and necessary for the science learning process (Chen, Pan, Hong, Weng & Lin, 2020). The term inquiry is generally used throughout the science education literature to describe approaches to science teaching. The inquiry-based teaching methodology sets knowledge and beliefs that guide the teaching of science (Abell & McDonald, 2006). According to Deboer (2006), there is a tendency to treat inquiry-based teaching as if it is a new methodology and innovative, but in the middle of the nineteenth century it was already integrated in the educational landscape. In other words, it mirrors scientific inquiry by emphasizing investigative competences: questioning, observation, investigation, problem solving, and many others. Inquiry-based teaching uses the general processes of the scientific method as its teaching methodology. The aims of that methodology highlight the students' involvement in scientific questions, use of evidences in their answers, the establishment of explanations and the capacity to communicate and argue justifications (Lotter, Smiley, Thompson & Dickenson, 2016). It resorts to laboratory activities and to field work, but also to tasks in library to engage students to model the process by which scientists conduct their research. Wallace and Kang (2004) discovered that teachers' perceptions of good science learning were strongly linked to their perceptions of laboratory and inquiry implementation. Those teachers who believe that successful science teaching is deep conceptual understanding are more likely to use verification laboratories in their teaching, while teachers who believe that successful science teaching is to enculturate students into scientific thinking practices focused more on inquiry-based laboratories. Although being used since the middle of the nineteenth century, today natural science teachers (biologists and geologists) forget its essence and resort to textbook and lecture to teach science in primary and secondary schools (Capps & Crawford, 2013). These results, as often mentioned by teachers, are due to a lack of familiarity with inquiry-based learning (Harrison, 2014). However, according to research, the main issues include a lack of proper curriculum, a lack of resource resources, and a lack of professional development regarding

assessment practices (Chen et al., 2020). Many teachers, according to Vhurumuku (2015), fail to educate about the nature of scientific inquiry because they either do not comprehend it or do not have the pedagogical abilities to do so. Explicit instruction, according to Abd-El-Khalick and Lederman (2000), is required for teachers to effectively educate about the nature of scientific inquiry.

4. Methodology

A survey resorting to a questionnaire was applied to 108 geology middle and secondary teachers in Portugal. Most respondents were women (n=79; 73.1%) and the average age was 46 years old. All participants were graduated, but 51 (47.2%) had a master and 5 (4.6%) had a Ph.D. The average years of service was 21 but ranging from 1 year to 48 years. The questionnaire (Appendix 1) had four demographic questions, nine multiple choice questions and one open question. Although the instrument was not timed, 6 minutes was the average time needed for the survey to be answered. The application was done online resorting to familiar teachers' websites and answers were collected for four months. The informed consent to use the gathered information in the investigation was explicitly written in the introduction of the questionnaire as well as the voluntary participation and the confidential treatment of data. The quantitative data were analyzed in the IBM SPSS Statistics version 27 and was mainly descriptive. The open question was subject to content analysis allowing its categorization and codification.

5. Results and discussion

A relevant number of the teachers' said that there only exists one scientific method to all sciences (n=49; 45.4%) and that it has a fundamentally linear nature from observation to conclusion (n=54; 50.0%). Only 16 teachers (14.8%) mentioned that each scientific area has a specific scientific method in accordance with its object of study. The scientific method was claimed as needed to allow the confirmation of hypothesis by many teachers (n=44; 40.7%), but most participants (n=51; 47.2%) referred that it is needed to ensure the replicability of the experiences. When specifically asked about the geological scientific method, participants referred that geology was just a field science (n=2; 1.9%), others that it is only an experimental science (n=1; 0.9%), the majority mentioned it was both a field and experimental science (n=103; 95.4%), and some that its method can never be used in the laboratory (n=2; 1.9%). Those answers were not expected since geology was first recognized as a field science and generally geology teachers do not realize that simulations can be done in the laboratory or that geology became an experimental science since the end of the 19th century. However, more than 50% of the sample had a master or a Ph.D. and that specialization could have eliminated those erroneous conceptions. Nevertheless, many alternative conceptions emerged when asked about the experimental geology. As such, a huge number of participants considered Hutton as the father of experimental geology (n=38; 35.2%) when indeed he was its greatest opponent. Almost the same number of teachers referred that experimental geology started at the end of the 19th century (n=37; 34.3%), or that it started with the work of the naturalist in the 17th century (n=33; 30.6%). Regarding the use of models in geology only 2 participants (1.9%) referred to them as not accepted by the scientific community and many of the teachers claimed they are needed to discover new knowledge in geological research (n=63; 58.3%). When asked about the Uniformitarianism, 48 teachers (44.4%) referred that this principle justifies the historical and interpretive reasoning of geologist but not so many referred the analogic reasoning (n=28; 25.9%), nor the scientific (n=18; 16.7%). Teachers also referred to critical and systemic thinking as scientific competencies (n=72; 66.7%) and gave less importance to others like observation and argumentation (n=27; 25.0%). Regarding the open question and after a careful content analysis, researchers group them in four categories expressed in table 1. Many of these results are corroborated by other studies (Cigdemoglu & Köseoğlu, 2019) reflecting that the understanding of scientific inquiry is a critical element of teachers' professional development.

Table 1. Questions to be addressed about the scientific method and reasons.

Questions about the scientific method	Teachers' justifications
How can it be used in the classroom?	Difficulty to understand some questions.
Do not know the geological scientific method?	Interest in knowing more about the theme.
What are models in geology?	Not knowing how to teach the scientific method.
How can we build models to teach?	Lack of information about that subject.
How to promote innovation with inquiry-based approach?	

The results and the questions referred by teachers to be explored in teacher training or professional development, justifies a more profound intervention with epistemological and historical contents allowing the teacher to have more knowledge, and to use the inquiry-based teaching methodology in a more fruitful way. As teachers need to understand how to implement inquiry-based teaching, the scientific method and the nature of science justifies the need for developing, implementing, and sustaining more professional development activities.

6. Conclusion

The survey results showed teachers' erroneous conceptions that are commonly reflected in inquiry-based teaching classrooms, namely regarding the scientific method but also about investigative competencies and geology as an experimental science. Main conclusions indicate that the epistemology behind geology classes has to be taught to eradicate alternative conception about the scientific method. As such the inquiry-base teaching methodology requires history of geology and an epistemological reflection to be integrated in teachers initial training and professional development. If we learn from researchers, we may create learning experiences that are tailored to the requirements of teachers, resulting in improved instructional practice, and creating a mind-set of continuous professional development. If we do so we can discover about what professional development content is really needed to be approached so as to irradiate teachers' alternative conceptions about the scientific method.

References

- Abd-El-Khalick, F., & Lederman, N. G. (2000). Improving science teachers' conceptions of nature of science: a critical review of the literature. *International Journal of Science Education*, 22(7), 665-701. doi:10.1080/09500690050044044
- Abell, S.K., & McDonald, J.T. (2006). Envisioning a Curriculum of Inquiry in the Elementary School. In: Flick L.B., Lederman N.G. (Eds.) *Scientific Inquiry and Nature of Science. Science & Technology Education Library*, vol 25. (pp.249-261). Dordrecht. doi:10.1007/978-1-4020-5814-1_12
- Bailey, R. (2021, September 7). Scientific Method. Retrieved January 28, 2022, from <https://www.thoughtco.com/scientific-method-p2-373335>
- Blachowicz, J. (2009). How Science Textbooks Treat Scientific Method: A Philosopher's Perspective. *The British Journal for the Philosophy of Science*, 60(2), 303-344. doi:10.1093/bjps/axp011
- Capps, D.K., & Crawford, B.A. (2013). Inquiry-Based Instruction and Teaching about Nature of Science: Are They Happening? *Journal of Science Teacher Education*, 24(3), 497-526. doi:10.1007/s10972-012-9314-z
- Chen, Y.C., Pan, Y.T., Hong, Z.R., Weng, X.F., & Lin, H.S. (2020). Exploring the pedagogical features of integrating essential competencies of scientific inquiry in classroom teaching. *Research in Science & Technological Education*, 38(2), 185-207. doi:10.1080/02635143.2019.1601075
- Cigdemoglu, C., & Köseoğlu, F. (2019). Improving Science Teachers' Views about Scientific Inquiry. *Science & Education*, 28(3), 439-469. doi:10.1007/s11191-019-00054-0
- Deboer G.E. (2006). Historical Perspectives on Inquiry Teaching in Schools. In: Flick L.B., Lederman N.G. (Eds.) *Scientific Inquiry and Nature of Science. Science & Technology Education Library*, vol 25. (pp.17-35). Dordrecht. doi:10.1007/978-1-4020-5814-1_2
- Edmund, N.W. (2000). *The Scientific Method Today: Your Guide to the Complete Method of Creative Problem Solving and Decision Making. SM-14*. Fort Lauderdale.
- Emden, M. (2021). Reintroducing "the" Scientific Method to Introduce Scientific Inquiry in Schools? *Science & Education*, 30(5), 1037-1073. doi:10.1007/s11191-021-00235-w
- Harrison, C. (2014). Assessment of Inquiry Skills in the SAILS Project. *Science Education International*, 25(1), 112-122.
- Lederman, J.S. (2009). Teaching scientific inquiry: Exploration, directed, guided, and opened-ended levels. *Best Practices in Science Education*, 1-4.
- Lederman, J.S., Lederman, N.G., Bartos, S.A., Bartels, S.L., Meyer, A.A., & Schwartz, R.S. (2014). Meaningful assessment of learners' understandings about scientific inquiry—The views about scientific inquiry (VASI) questionnaire. *Journal of Research in Science Teaching*, 51(1), 65-83. doi:10.1002/tea.21125
- Lotter, C., Smiley, W., Thompson, S., & Dickenson, T. (2016). The impact of a professional development model on middle school science teachers' efficacy and implementation of inquiry. *International Journal of Science Education*, 38(18), 2712-2741. doi:10.1080/09500693.2016.1259535
- Marshak, S. (2022). *Essentials of Geology (7th Edition)*. New York: W.W. Norton & Company, Inc.

- Oh, P.S., & Oh, S.J. (2011). What Teachers of Science Need to Know about Models: An overview. *International Journal of Science Education*, 33(8), 1109-1130. doi:10.1080/09500693.2010.502191
- Pilar, F.L. (1979). *Chemistry: The Universal Science*. Glenview: Addison-Wesley Educational Publishers Inc.
- Vhurumuku, E. (2015). Pre-service Teachers' Beliefs about Scientific Inquiry and Classroom Practices. *International Journal of Educational Sciences*, 10(2), 280-286. doi:10.1080/09751122.2015.11917659
- Woodcock, B.A. (2014). "The Scientific Method" as Myth and Ideal. *Science & Education*, 23(10), 2069-2093. doi:10.1007/s11191-014-9704-z

Appendix 1

SCIENTIFIC METHOD QUESTIONNAIRE

This questionnaire is intended to collect data for research, and it is aimed at middle and secondary school teachers of Natural Sciences and Biology and Geology. When answering it, you are giving your informed consent to let the researchers use the answers for the study being undertaken. The anonymity and confidentiality of the data collected are guaranteed. Please, voluntarily tick as many answers as you consider correct.

I. Personal data

Q1. Age (on 31st December 2021)

Q2. Sex

Q3. Area of expertise (e.g., geology, biology, among others)

Q4. Academic degree (the highest)

II. The scientific method

The scientific method is referred to by many scientists as the best contribution humanity has made to itself. So, we can refer that:

Q1. We consider that...

- a) there is only the (unique) scientific method that applies the same in all areas of knowledge.
- b) there is only the (unique) scientific method that is suited to the specificities of each area of knowledge.

- c) each area of knowledge has its scientific method (not unique) defined according to the object of study.
- d) each area of knowledge has its scientific method (not unique) defined according to the experimentation to be carried out.

Q2. The steps of the scientific method in geology are:

- a) 1st Observe; 2nd Design a testable Forecast; 3rd Elaborate Hypothesis; 4th Experiment; 5th Conclude.
- b) 1st Observe, 2nd Hypothesis, 3rd Draw a Testable Prediction, 4th Experiment, 5th Conclude.

- c) 1st Observe; 2nd Elaborate Hypothesis; 3rd Experiment; 4th Conclude.
- d) There is no linear sequence, the order of the steps is flexible.

Q3. The scientific method in geology must make it possible to obtain results that...

- a) confirm the hypothesis.
- b) are replicable.
- c) reject the hypothesis.
- d) are predictable.

Q4. The investigation method of geology is...

- a) a field-only method.
- b) an experimental method only.
- c) a field and/or experimental method.
- d) a method impossible to be carried out in the laboratory.

Q5. The experimental geology...

- a) has existed since the time of the naturalists.
- b) appears in the 19th century.
- c) was advocated by Hutton.
- d) It does not exist.

Q6. Models in geology are...

- a) used only to monitor and predict geological processes in the laboratory.
- b) fundamental to discovering new geological knowledge in the laboratory.
- c) undeniably accepted in the scientific community.
- d) recognized as not valid in the process of scientific discovery.

Q7. The principle of Uniformitarianism justifies geological reasoning to be...

- a) scientific.
- b) historical and interpretive.
- c) by analogy.
- d) None of the above.

Q8. If geology is an experimental science, this justifies geological reasoning being...

- a) scientific.
- b) historical and interpretive.
- c) by analogy.
- d) None of the above.

Q9. Inquiry-oriented teaching of geology requires the development of investigative skills, such as:

- a) Scientific reasoning, critical thinking, and systems thinking.
- b) Observe, measure, argue, and communicate.
- c) Systems thinking and environmental insight.
- d) Observation and systems thinking.

Q10. What questions about the geology scientific method would you like to be seen clarified?

SUSTAINABLE DEVELOPMENT GOALS & VIOLENCE PREVENTION IN HOSPITALS: CONTRIBUTIONS FROM PSYCHOLOGY STUDENTS

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Abstract

Ideally, all individuals should be involved in the sustainable development goals attainment. Even though frequently ignored, Psychology can have a considerable impact in this context. Psychology students can also make an important contribution as such. Additionally, an area in desperate need of attention, even before the hardships related to the COVID-19 pandemic, is violence prevention in healthcare settings. Consequently, the aim of this study is to present the rationale, process and results of a project on violence prevention in hospitals undertaken by Psychology undergraduates. The 61 students enrolled in a 3rd-year compulsory course enthusiastically accepted the challenge to develop a brief training session for violence prevention in a hospital setting as part of their grading system. The theme and the possibility to develop a training session were proposed and not imposed. A total of 22 work groups were formed: 4 decided to focus on patients, 4 on nurses, 3 on mental health professionals/psychiatrists, 2 on psychologists, 2 on obstetrics/gynecology; almost all of the remaining groups chose health professionals in general. Only 4 groups decided to take the challenge one step further and direct their training for outside of the class, via Zoom. The sessions were scheduled to begin on the 7th December 2021. Among the sub-themes chosen by the groups (with no constraints from the teacher), there is: burnout (3 groups), psychological well-being, depression, communication, resilience, and optimism. Globally, the groups were keen on complementing the psycho educational component with a skills training approach. Consequently, during undergraduates' skills training, students can become more aware of the sustainable development goals and experience simple ways they can contribute to them (e.g., Goals 3, 4, 5, 8, 10, 16, and 17).

Keywords: *Sustainable development goals, psychology, undergraduates, violence prevention, hospital settings.*

1. Introduction

Since “the 17 Sustainable Development Goals (SDGs) are the world’s best plan to build a better world for people and our planet by 2030” and “they recognize that action in one area will affect outcomes in others, and that development must balance social, economic and environmental sustainability” (United Nations – United Nations in Western Europe, n.d.), ideally, all individuals should be involved in the SDGs attainment. Even though frequently ignored, Psychology can have a considerable impact in this context (e.g., Eloff, 2020; Jaipal, 2014; Meneses, in press, 2019a,b). For instance, “psychology can ... be relevant to sustainable development by helping to shape social policies that foster mental health and well-being in both developed and developing countries” (Jaipal, 2014). Psychology students can also make an important contribution as such (Meneses, 2019a,b).

Certainly the goal more easily associated with Psychology is Goal 3 – “Ensure healthy lives and promote well-being for all at all ages”, especially “promote mental health and well-being” (3.4) and “strengthen the prevention and treatment of substance abuse, including narcotic drug abuse and harmful use of alcohol” (3.5) (Global Compact Network Portugal, n.d.a). But Psychology can have an important role regarding most other components of Goal 3 too, since they relate to behaviour change (regarding health risks, from those related to road traffic accidents to sexual and reproductive health, including pollution).

Psychology can also be connected to many other goals, namely Goals 1 – No poverty, 2 – Zero hunger, and 11 – Sustainable cities and communities (Eloff, 2020). Regarding Goal 4 – “Quality Education”, Psychology can promote “effective learning outcomes” (4.1) and “relevant skills, including

technical and vocational skills, for employment, decent jobs and entrepreneurship” (4.4), literacy and numeracy (4.6), “the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture’s contribution to sustainable development” (4.7), “safe, non-violent, inclusive and effective learning environments for all” (4.a), and contribute to “the supply of qualified teachers, including through international cooperation for teacher training” (4.c) (Global Compact Network Portugal, n.d.b).

Goal 5 – “Achieve gender equality and empower all women and girls” encompasses several aspects where Psychology can be relevant, namely “eliminate all forms of violence against all women and girls in the public and private spheres” (5.2) and “all harmful practices” (5.3), “the promotion of shared responsibility within the household and the family” (5.4), “access to sexual and reproductive health and reproductive rights” (5.6), “enhance the use of enabling technology, in particular information and communications technology, to promote the empowerment of women” (5.b) (Global Compact Network Portugal, n.d.c).

Even if less obviously, the same holds true for Goal 10 – “Reduce inequality within and among countries”, with relevant examples being “empower and promote the social, economic and political inclusion of all” (10.2) and “ensure equal opportunity and reduce inequalities of outcome, including by eliminating discriminatory laws, policies and practices and promoting appropriate legislation, policies and action in this regard” (10.3) (Global Compact Network Portugal, n.d.e).

Concerning Goal 17 – “Revitalize the global partnership for sustainable development”, psychologists can, for instance, provide their knowledge to enhance “cooperation on and access to science, technology and innovation and enhance knowledge sharing” (17.6), “enhance the use of enabling technology, in particular information and communications technology” (17.8), and “to develop measurements of progress on sustainable development that complement gross domestic product” (17.19) (Global Compact Network Portugal, n.d.g).

Similarly, the practice of Psychology can have a significant impact when one aims to reduce/end “all forms of violence” (16.1 and 16.2), improve decision-making (16.7) and “public access to information” (16.10), i.e., achieve Goal 16 – “Promote just, peaceful and inclusive societies” (Global Compact Network Portugal, n.d.f).

A certain context is particularly relevant in this regard, even more so during the COVID-19 pandemic: the occupational context. It is also the core of Goal 8 – “Promote inclusive and sustainable economic growth, employment and decent work for all” (Global Compact Network Portugal, n.d.d). Psychology can give a helping hand when it comes to promoting “development-oriented policies that support productive activities, decent job creation, entrepreneurship, creativity and innovation” (8.3), achieving “full and productive employment and decent work for all” (8.5), and protecting labor rights and promoting “safe and secure working environments for all workers” (8.8). In fact, “the psychology of sustainability and sustainable development ... calls for managerial styles and leadership that recognize and respect the importance of relationships in organizational contexts for the well-being of workers” (Di Fabio, 2017).

Additionally, an area in desperate need of attention, even before the hardships related to the COVID-19 pandemic, is violence prevention in health care settings. For the purposes of the Convention No.190 of the International Labour Organization (ILO, 2019, p. 5), “the term “violence and harassment” in the world of work refers to a range of unacceptable behaviours and practices, or threats thereof, whether a single occurrence or repeated, that aim at, result in, or are likely to result in physical, psychological, sexual or economic harm, and includes gender-based violence and harassment”.

In Portugal, where (a) enjoying decent work and a healthy and safe working environment is a fundamental right according to the Constitution, (b) the notifications’ trend of situations of violence against health care professionals has been increasing, and (c) violence is considered a crime in the Penal Code, a Action Plan to Prevent Violence in the Health Sector was developed (Direção-Geral da Saúde DGS, 2020). Unfortunately, violence against health care workers is not limited to Portugal: it is a worldwide phenomenon (DGS, 2020; Ma et al., 2022; Vento, Cainelli, & Vallone, 2020).

While strong evidence of the efficacy of preventive interventions is still lacking, several measures have been advocated, including quality courses for healthcare professionals (covering communication, identification of early signs that someone may become violent, dangerous situations’ management, and self-protection), well-being promotion and psycho social risks (including stress and burnout) prevention, and education of the general population (DGS, 2020; Ma et al., 2022; Vento et al., 2020).

Consequently, the aim of this study is to present the rationale, process and results of a project on violence prevention in hospitals undertaken by Psychology undergraduates.

2. Method

When, as part of the grading system of a 3rd-year compulsory course, the possibility to develop a brief training session for violence prevention in a hospital setting was presented (and not imposed), the students enrolled enthusiastically accepted the challenge. It was decided bilaterally that the training session (role-play) would represent 50% of the grade in the course.

Students were allowed to focus more on the causes/risk factors, protection factors and/or consequences of violence in hospitals. In order for students to invest their time mostly on literature review and oral communication skills development, the report they had to present was the PowerPoint presentation they would use for their session. Complementing psycho-education with skills training and developing additional materials for the training session (e.g., printed or digital hand-outs, posters) were stimulated since the beginning.

Among the 61 students enrolled, a total of 22 work groups were formed. Consequently, each student was given 10 minutes for his/her training session. Due to the COVID-19 pandemic, as a preventive measure, students were allowed from the beginning to do their presentation through video recording or in person.

3. Results

Only 21 work groups (composed by a total of 55 students) ended up implementing their role-play training session. Of those, 4 focused on patients, 4 on nurses, 4 on health professionals in general, 3 on mental health professionals/psychiatrists, 2 on psychologists, 2 on obstetrics/gynecology professionals, 1 on operational assistants and 1 on geriatrics professionals.

Just 4 work groups decided to take the challenge one step further and direct their training for outside of the class, via Zoom.

The sessions began on the 7th of December 2021 and ended on the 4th of January. The sub-themes chosen by the groups (with no constraints from the teacher - RFM) were: bullying (4 groups), burnout (3 groups), obstetric violence (3 groups), violence, violence against patients, violence between patients, psychological determinants of the professionals' violence, identification of violence against older individuals & mindfulness, mental health, depression, psychological well-being, communication, resilience, and optimism.

Some students/work groups opted, *a priori*, for the video recording even though they were not facing health restrictions. Consequently, there were 8 role-plays using video, although the students were in the classroom. One group did a hybrid presentation, using the recording of one of its three members, and another one decided to use Zoom when confronted with a positive test for COVID-19 the day before the day scheduled for the presentation.

Twelve work groups developed additional materials, mostly posters and hand-outs. Globally, the work groups were keen on complementing the psycho educational component with a skills training approach. The grades obtained reflect the generally high investment from students, since they ranged from 12 to 19, with a mean of 16.

4. Discussion

One might easily agree that, if successful, challenging students to develop a brief role-play training session for violence prevention in a hospital setting could be related to SDGs 3 (skills training in the context of (good) health promotion and well-being) and 4 (a way to improve the learning process) (Global Compact Network Portugal, n.d.a,b).

Considering specifically the sub-themes and targets chosen by students, and the contents/skills they explored in class, it becomes clear this experience had some potentialities in terms of SDGs 5 (raising awareness regarding gender equality, considering some statistics on violence they presented), 10 (raising awareness leading to reduced inequalities), and 17 (underscoring the importance of partnerships for the goals) (Global Compact Network Portugal, n.d.c,e,g).

The training students planned and implemented focused intensely on SDGs 16 (making them more sensitive to the key place peace, justice and strong institutions have) and 8 (more clearly realizing the role psychologists can have in promoting decent work and economic growth) (Global Compact Network Portugal, n.d.d,f).

In sum, students became (more) conscious of a worldwide phenomenon (DGS, 2020; ILO, 2019; Ma et al., 2022; Vento et al., 2020) and familiar with some of the contributes Psychology can give in the context of SDGs and particularly in violence prevention in healthcare settings like hospitals (Di Fabio, 2017; Eloff, 2020; Jaipal, 2014; Meneses, in press, 2019a,b).

5. Conclusions

This experience indicates that, during undergraduates' skills training, Psychology students can become more aware of the SDGs and experience simple ways they can contribute to them (e.g., Goals 3, 4, 5, 8, 10, 16, and 17). It is the first author's conviction this can lead to a stronger participation in the future, as citizens and Psychology professionals, bearing in mind (inter)national data and suggestions, and in line with the national Action Plan to Prevent Violence in the Health Sector (DGS, 2020; Ma et al., 2022; Vento et al., 2020). In time, they can play an important role in increasing the evidence of preventive interventions' efficacy (Vento et al., 2020).

References

- Di Fabio, A. (2017). The psychology of sustainability and sustainable development for well-being in organizations. *Frontiers in Psychology*, 8. doi:10.3389/fpsyg.2017.01534
- Direção-Geral da Saúde. (2020). *Plano de Ação para a Prevenção da Violência no Setor da Saúde* Action Plan to Prevent Violence in the Health Sector. Lisbon, Portugal: Author. Retrieved April 4, 2022, from <https://www.dgs.pt/documentos-em-discussao-publica/plano-de-acao-para-a-prevencao-da-violencia-no-setor-da-saude-pdf.aspx>
- Eloff, I. (2020). Psychology and the Sustainable Development Goals. *Journal of Psychology in Africa*, 30(1), 86-87. doi:10.1080/14330237.2020.1712810
- Global Compact Network Portugal. (n.d.a). *Goal 3: Ensure healthy lives and promote well-being for all at all ages*. Retrieved April 4, 2022, from <https://globalcompact.pt/index.php/en/2-uncategorised/244-goal-3-ensure-healthy-lives-and-promote-well-being-for-all-at-all-ages>
- Global Compact Network Portugal. (n.d.b). *Goal 4: Quality Education*. Retrieved April 4, 2022, from <https://globalcompact.pt/index.php/en/2-uncategorised/245-goal-4-quality-education>
- Global Compact Network Portugal. (n.d.c). *Goal 5: Achieve gender equality and empower all women and girls*. Retrieved April 4, 2022, from <https://globalcompact.pt/index.php/en/2-uncategorised/246-goal-5-achieve-gender-equality-and-empower-all-women-and-girls>
- Global Compact Network Portugal. (n.d.d). *Goal 8: Promote inclusive and sustainable economic growth, employment and decent work for all*. Retrieved April 4, 2022, from <https://globalcompact.pt/index.php/en/2-uncategorised/249-goal-8-promote-inclusive-and-sustainable-economic-growth-employment-and-decent-work-for-all>
- Global Compact Network Portugal. (n.d.e). *Goal 10: Reduce inequality within and among countries*. Retrieved April 4, 2022, from <https://globalcompact.pt/index.php/en/2-uncategorised/251-goal-10-reduce-inequality-within-and-among-countries>
- Global Compact Network Portugal. (n.d.f). *Goal 16: Promote just, peaceful and inclusive societies*. Retrieved April 4, 2022, from <https://globalcompact.pt/index.php/en/2-uncategorised/257-goal-16-promote-just-peaceful-and-inclusive-societies>
- Global Compact Network Portugal. (n.d.g). *Goal 17: Revitalize the global partnership for sustainable development*. Retrieved April 4, 2022, from <https://globalcompact.pt/index.php/en/2-uncategorised/258-goal-17-revitalize-the-global-partnership-for-sustainable-development>
- International Labour Organization. (2019). *Eliminating Violence and Harassment in the World of Work: ILO Convention No. 190, Recommendation No. 206, and the accompanying Resolution*. Retrieved April 4, 2022, from https://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/---publ/documents/publication/wcms_721160.pdf
- Jaipal, R. (2014, June). Psychological contributions to sustainable development. *Psychology International*. Retrieved April 4, 2022, from <https://www.apa.org/international/pi/2014/06/psychological-contributions>
- Ma, Y., Wang, L., Wang, Y., Li, Z., Zhang, Y., Fan, L., & Ni, X. (2022) Causes of hospital violence, characteristics of perpetrators, and prevention and control measures: A case analysis of 341 serious hospital violence incidents in China. *Frontiers in Public Health*, 9, 783137. doi:10.3389/fpubh.2021.783137

- Meneses, R. F. (2019a). Construção de um recurso de lazer e objectivos do desenvolvimento sustentável. Construction of a leisure resource and sustainable development goals. In A. C. Madeira, A. C. Freitas, A. T. Marques, C. A. V. Costa, J. M. Dias, M. F. Pereira, P. C. Rego, S. Mendes, & R. T. Gaspar (Eds.), *Livro de Resumos – 1ª Conferência Campus Sustentável – Desenvolvimento Sustentável: Instituições de Ensino Superior como Agentes de Mudança*. Book of Abstracts – 1st Sustainable Campus Conference – Sustainable Development: Higher Education Institutions as Agents of Change (pp. 159-160). Porto, Portugal: Universidade do Porto – Faculdade de Engenharia.
- Meneses, R. F. (2019b). Implementar objectivos do desenvolvimento sustentável: Contributos de uma unidade curricular de Psicologia. To implement sustainable development goals: Contributions of a Psychology course. In A. C. Madeira, A. C. Freitas, A. T. Marques, C. A. V. Costa, J. M. Dias, M. F. Pereira, P. C. Rego, S. Mendes, & R. T. Gaspar (Eds.), *Livro de Resumos – 1ª Conferência Campus Sustentável – Desenvolvimento Sustentável: Instituições de Ensino Superior como Agentes de Mudança*. Book of Abstracts – 1st Sustainable Campus Conference – Sustainable Development: Higher Education Institutions as Agents of Change (pp. 85-86). Porto, Portugal: Universidade do Porto – Faculdade de Engenharia.
- Meneses, R. F. (in press). Objectivos de Desenvolvimento Sustentável e intervenção psicológica *online*: Uma experiência educativa. Sustainable Development Goals and online psychological intervention: An educational experience. *Saber & Educar*, 31.
- United Nations – United Nations in Western Europe. (n.d.). *Sustainable Development Goals*. Retrieved April 4, 2022, from <https://unric.org/en/united-nations-sustainable-development-goals/>
- Vento, S., Cainelli, F., & Vallone, A. (2020). Violence against healthcare workers: A worldwide phenomenon with serious consequences. *Frontiers in Public Health*, 8, 570459. doi:10.3389/fpubh.2020.570459

THE NEEDS OF WOMEN-MOTHERS WITH CHRONIC MENTAL ILLNESS IN THE FIELD OF SHARED CHILDCARE – A HEALTH LITERACY RESEARCH STUDY

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Abstract

The study, which is presented in the contribution, is carried out with the support of the Charles University Grant Agency in the Czech Republic. Its objective is to identify the obstacles that arise when carrying out daily parental activities of women with chronic mental illness, caring for a child or children under the age of 7. The women admitted to this study are diagnosed with mental illness in category F 00-99, are aged 19 to 49, and have their child or children in their own care, whether in a complete or incomplete family. The comparative sample consists of women-mothers without a mental health disorder. Both groups of women with comparable demographic characteristics participated in a questionnaire survey, the results of which are presented in the contribution. Subsequently, 22 women-mothers with a chronic mental illness will take part in semi-structured interviews, and the corresponding demographic sample of 22 women without a mental health disorder will again be used for the comparison. The results of the study will contribute to the knowledge of the needs of a numerically significant minority of women - mothers with mental health disorders, which is currently growing not only in the Czech Republic. From a psychosocial point of view, the results will also contribute to the destigmatization of these women.

Keywords: *Mental health disorders, women with mental illness, health education, health literacy, shared childcare.*

1. Introduction

Mental Illness represents an unimaginable chronic condition which is frequently accompanied by an unknown prognosis and adult women experience this condition in various ways (Craig, 2004). Research hasn't unambiguously proven whether certain mental illnesses influence the coping with the maternal role more than others. Regarding the effect on maternal care of children, the frequency and extent of the relapsing disorders seem to play a more significant role than a specific type of mental illness (Rampou, Havenga, Madumo, 2015). Several up-to-date research studies illustrate that chronic mental condition in women is usually connected to interpersonal, social, and economic factors which influence their parental abilities and can have an impact on the healthy development of their children (Plattner, 2017). When the woman's mental illness shows an increased activity and lasts longer, the close ones – usually family members – feel a higher responsibility for saturating the needs of her children. The quality of sharing and well organised provision of care for children in the families of women with chronic mental illness represent an important aspect of successful coping with the mental condition and its limiting consequences (Jessop, De Bond, 2012). In our opinion, the above-mentioned knowledge deserves further research investigation which would contribute to the identification of the needs the significant minority of women with mental illness has. In the Czech Republic, the statistic records show that 53 212 women with chronic mental illness are registered as disabled, out of which 25% are in the fertile age group 20 - 39 years old (UZIS, 2018). Therefore, the research team from the Department of Special Education at the Faculty of Education, Charles University decided to describe the needs of women with chronic mental illness as to the shared care of a child or more children in the family as well as strategies these women-mothers knowingly use in order to secure a healthy development of their children. The research study has been carried out since 2021 and with support of the GA UK (Grant Agency of Charles University, under the number 251891).

2. Methods

289 women showed interest to participate in the first part of the research focused on a questionnaire survey in 2021. Health organisations, non-profit organisations, centres for mothers and children, family and kid centers had invited them to participate. The study was based on a purposive sampling, inclusive criteria for selecting 70 women with chronic condition were: diagnostic spectrum of the illness F00-99 according to ICD-10, the duration of the illness since its diagnosing min. 1 year, age between 18 and 49 years, min. 1 child aged up to 7 years. 61 respondents mentioned a lighter mental illness treated only in an outpatient clinic, 9 respondents have severe mental illness requesting permanent treatment or therapy and occasional hospitalizations. 168 women without a diagnosed mental illness which completed the set didn't have any symptoms of mental disorder and fulfilled all other inclusive criteria (physical age, age of children in their own care). Family status, achieved education or occupation weren't amongst the inclusive criteria. Altogether, 238 women-mothers participated in the questionnaire part of the survey. Basic demographic data on the participants with and without mental illness (below referred to as MI) have been gained with its help, parameters of shared caretaking of the participants' children in the families have been followed. In its specific parts, attention was paid to how women with and without MI had been ensuring healthy development of children (including health-beneficial behaviour of mothers towards their children).

2nd phase of the study (continuing until the end of 2022) is dedicated to qualitative research. It uses the technique of the problem-centered semi-structured interview according to Witzel (2000) based on the anchored theory (Rihacek, T., Cermak, I., Hytych, 2013). 24 women with diagnosed chronic mental illness (more than 1 year since its first occurrence) who take care of a child or children under the age of 7 years have been participating in this phase of the study. These women expressed in the questionnaire their willingness to participate in the interview. A comparable number of women-mothers without a diagnosed mental illness, who participated in the 1st part of the study and are willing to continue, have been invited to participate in the interviews as well.

The interviews find out the specific importance mental health has for the research participants and their family members. The same applies to the specific burden taking care of children represents for women with mental illness. The recorded interviews have been completely transferred into a text form according to transcription guidelines. All names of people and places have been changed in order to respect the anonymity of the research. The interviews are being analysed using software XLSTAT Basic+ for coding and data modelling. Subsequently, the comparison method will be used to distinguish the needs of women with and without mental illness in the fields of health literacy and shared caretaking of child or children in their families. The outcomes will be confirmed by using members check and peer debriefing (Brantlinger et al. 2005) where the partial conclusions will be given to several independent researchers for assessment and comments.

3. Results

The educational spectrum of women involved in the research was similar in both samples ($N_{MI+} = 70$ and $N_{MI-} = 168$): MI+ women had university education in 77%, in 21% high school education and only 1.42% lower education. Amongst MI- women, 63% of them had a university degree, 37% high school or higher secondary education, nobody stated lower education than the last-mentioned category. Regarding the marital status, numbers of women living in marriage were comparable in both samples, the proportion of single or divorced women or women living in registered partnership were also similar. The highest numbers of women in both samples are currently on maternity or parental leave, numbers of women working full-time or part-time are even too. Self-employed women were rather rare in both samples. A little less than 3% of MI+ women and 2% of MI- women receive disability pension. A significantly higher number of women living by themselves can be found in the MI+ sample (37%), MI- women stated such situation only in 6% of cases. Only 51% of MI+ women share their household with another adult person, whereas in MI- women this was stated in 89% of cases. On the other side, living with more than one adult person was mentioned more frequently in MI+ women. The data concerning people helping women with children in their shared household aren't surprising. In 96% of MI+ women help is provided by partner or husband if he lives in the same household. For MI- women this percentage was 87%. If the partner or husband doesn't live in the same household (after divorce, separation or for other reasons), he helps MI+ women only in a little less than 3% of cases, in MI- women in 30% of cases. The difference in the involvement of husband's parents (with regard to caretaking of children in the family) is also significant in the cases where the parents don't share the same household where the children grow up. In MI+ women the husband's parents help only in a little less than 9% of cases, in MI- women in almost 27% of cases. The involvement of the woman's parents in the

caretaking of children – if the parents don't share the same household where the children grow up – has been balanced in both samples. The frequency of help offered to MI+ women and MI– women also constitutes an important question. MI– women stated help done by a family member in 17% as every-day, in 13% as more frequent than once a week but not every-day, and in 27% of the responses as occasional. In 29% such help was classified as rare or exceptional and in 14% of responses such help was never made use of. Compared to that, MI– women stated that a family member helps them every day in little less than 8%, more than once a week but not every day in 15.5% and occasionally in 30% of responses. Such help is made use of only rarely or exceptionally in 32% and in 14% it's never made use of. From this data, it is obvious that every-day, frequent or occasional help with caretaking of children is provided to MI+ women in more cases than to MI– women.

In order to document the concrete burden mental illness represents for parental behaviour of women and for family functioning, we have chosen (from the selective protocol which has served as a base for data modeling in the 2nd part of the study) the following descriptions of how their illness influences their every-day life with a child: *"It's hard for me to be overcoming the illness and be with her (daughter). She wants something and I can't manage right away, I am not capable of doing it with her immediately. It's hard to tell a small child when I am tired that I have to rest and that it isn't her fault but it's caused by my illness".* (24VTTP)

The women have described their fluctuating readiness to deal with their children which has to do with the course of MI: *"When I am OK, it's good and we do something together. When I am not well, I keep driving her away, I want peace and quiet and I am unpleasant"* (16LZLP).

In most statements, we can find overlapping descriptions of the direct impact MI has on maternal functioning and family life: *"I wish that motherhood and caretaking of a child didn't exhaust me so much. I have a feeling that on one hand I do it quite well, but on the other hand, it takes all my energy"* (1VŠLP). MI+ women have also confirmed the need to rest as well as the need of being taken care of: *"Even when I have the darkest day and I don't feel like doing anything, I feel depressed and would need to be taken care of, it's not possible and I have to focus on the children. I am pushed to the background"* (23MKTP). Their statements have also been corresponding with regards to the alternation of better and worse days caused by their illness: *"Roughly every second day I experience some symptoms. I overcome them but the next day I am finished. I have no patience. I don't feel like it. I am irritated. I can't cope. On other days, I am an exemplary mother"* (16LZLP).

Most MI+ women assume that frequent changes of their mood can have an impact on their children: *"My daughter is very talkative, so I sometimes stop listening. For example, I am not listening fully when she is trying to attract my attention. Or sometimes I get angry"* (23MKTP). *"I find it difficult, with the mental illness, to fully experience the activities with the child, not to be distant. It's hard to find spontaneity"* (17LŠLP). Mothers are afraid of being separated from their child during hospitalization, they are afraid of losing their bond: *"... I am really lucky that I haven't been hospitalized for two years. At the beginning, the first two years, I used to be hospitalized four times a year before the medication got adjusted. I keep telling myself that it is much better to watch fairy tales with her for a while than being in hospital."* (24VTTP) The need of being replaced in some parental tasks which contribute to the healthy development of the child is obvious in MI+ women: *"My partner had to substitute me in feeding – even now my son wakes up twice a night – so, my partner gets up so that I can get at least some sleep to compensate my mental state somehow because if I don't sleep enough, it starts worsening..., recently I haven't been able to cook, I don't feel like cooking or preparing anything. So, that is also done by my partner, it's been making me angry that I can't even do some real cooking. I see this as a big limitation caused by the mental illness"* (23MKTP). *"...this playing with the child and his intellectual development I rather leave, for example, to my husband because I have a feeling that he is able to enjoy it more"* (17LŠLP).

Most MI+ women have been worried that they could lose the central maternal role in the life of their children if not frequently replaced in the interaction with the child by their partner or another close person. All 24 MI+ women participating in the interviews described their feeling of failure with regard to their maternal role and they mentioned the situations in which these feelings arise. The women have emphasized the importance of motherhood for their lives as well as for coping with MI and they have recommended other women with MI to have children. They usually protect themselves from being stigmatized by keeping silent about their illness and they entrust its symptoms to a very limited circle of close people, doctors, psychologists and therapists.

4. Conclusion

The researchers have been pursuing the topic of women-mothers with and without mental illness in their study for two years, using mixed methodology. In the first research part, they gained the data through quantitative research and by doing that, they also got insights into the family functioning and needs of women with MI+. The qualitative research part (still ongoing) is focused on acquiring deeper knowledge of needs of women in particular situations and unique life contexts for which the technique of interviews has been used. The research shows the everyday burden mental illness represents not only for the woman herself but also for her close ones who share her maternal duties with her. The study has revealed that MI+ women perceive the difficulties incorporated in the caretaking of children in the circumstances of mental illness, but they regard motherhood as an important life opportunity.

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References

- Craig, E., A. (2004). Parenting programs for women with mental illness who have young children: a review. *Australian and New Zealand Journal of Psychiatry*, 38 (11–12), p.923-928.
- Jessop, M., E, De Bondt, N. (2012). A consultation service for Adult Mental Health Service clients who are parents and their families. *Advances in Mental Health*, 10 (2), p.149-156.
- Plattner, A. (Ed.). (2017). *Erziehungsfähigkeit psychisch kranker Elternrichtig einschätzen und fördern*. München: Ernst Reinhardt Verlag. ISBN 978-3-497-02713-2.
- Rampou, A., M., Havenga, Y., Madumo, M. (2015). Parenting experiences of mothers living with a chronic mental illness. *Health SA Gesondheid*, 20(1), p.118-127.
- Řiháček, T., Čermák, I., Hytych, R. (2013). *Kvalitativní analýza textů: čtyři přístupy*. Brno: MUNI Press. ISBN 978-80-210-6382-2.
- Institute of Health Information and Statistics of the Czech Republic. (2018). *Psychiatrická péče 2017*. Prague: IHIS CR. ISBN 978-80-7472-178-6.
- Witzel, A. (2000). Das problemzentrierte Interview. *Forum Qualitative Sozialforschung*, 1(1), art.22.

HIGHER EDUCATION STUDENTS' KNOWLEDGE AND OPINION ABOUT GEOETHICS AND SUSTAINABLE DEVELOPMENT

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Abstract

Geoethics is a scientific area that has as its main concern the investigation of ethical conduct of humans with the Earth. Given that, geoethics has the potential to contribute to the achievement of the sustainable development. Geoscientists are professionals that investigate the Earth and have various professional responsibilities when performing their work. As such, geoethics started its emergency in the last decade and initially was focused on the geoscientists' conduct. Afterwards, geoethics evolved to be concerned about every interaction of mankind with the Earth system, like mining, geoheritage conservation, and climate change. The present study aimed to understand students' perceptions concerning geoethics and its relationship with Sustainable Development Goals of the 2030 Agenda of United Nations. The present study was developed under the scope of a Ph.D. thesis project with the aim to investigate and implement an innovative syllabus for teaching geoethics in higher education. Before the implementation of classes aligned with the mentioned syllabus, we conducted a survey that gathered data from 90 students studying geosciences higher education courses. Ages ranged between 18 and 58 years (mean=22.7) including 48 females and 42 males. The survey questionnaire comprised of 11 closed questions related to the importance of learning geoethics in higher education. The analysis of the closed questions' answers allowed us to understand that students consider important to have and follow an ethical conduct (n=87, 96.7%) and think that geoscientists have responsibilities towards the planet (n=83, 92.2%). The majority of the participants assumed to have already heard the term geoethics (n=53, 58.9%). When confronted with the meaning of geoethics most of the respondents stated that its knowledge is essential to the future professional work (n=87, 96.7%), and gave importance to the teaching of geoethics in higher education (n=82, 91.1%). Concerning the 2030 Agenda for Sustainable Development, the majority of the students showed having some knowledge about the goals and considered them relevant due to the current state of the world and the need for citizen intervention on society (n=83, 92.2%; n=68, 75.6%; n=77, 85.5%). Most of the participants assumed that geoethics can contribute to sustainable development (n=89, 98.9%) and were able to point out three Sustainable Development Goals that they considered as related with geoethics. As our main conclusion, we can say that the participants of the study appraised geoethics as a relevant matter to be learned in higher education and grant it as a path for planetary sustainable development.

Keywords: *Ethics, geosciences education, survey, sustainability, syllabus.*

1. Introduction

The Earth-related challenges society currently faces are serious problems and need urgent solutions to guarantee the future of the planet, including the human species. To find the way to govern the planet is necessary to establish a better relationship between humans and the Earth system. The developing field of geoethics investigates and reflects on how to change the referred relationship to resolve environmental, social, and economic problems (Peppoloni & Di Capua, 2020; Vasconcelos & Orion, 2021). For this, geoethics seeks ethical conduct to be followed by everyone whenever they interact with the planet. Initially, it was aimed at ethical conduct only for geoscientists, but later it expanded and should be followed by every citizen. It is important to understand that not only geoscientists are accountable for the damage inflicted on the planet in the past and present. This responsibility is great for geoscientists mainly because they work directly with the Earth system, but every citizen contributes to its state (Bohle, 2021; Peppoloni & Di Capua, 2020; Peppoloni & Di Capua, 2021).

Hereupon is fundamental to recognize that geoethics must be taught (Mogk, 2018; Peppoloni & Di Capua, 2021; Vasconcelos & Orion, 2021) and it would start to educate future geoscientists first. However, geoethics is not integrated into higher education curricula. Additionally, some assume that

geoethics should even be taught at young ages (Cardoso, Ribeiro & Vasconcelos, 2021). Thanks to the international Erasmus+ project Geoethics Outcomes and Awareness Learning (GOAL — ref. 2017-1-PTO1-KA203-035790) there is now a syllabus for teaching geoethics in higher education “Teaching Geoethics Resources for Higher Education” (Vasconcelos, Schneider-Voß, Peppoloni, 2020). The survey presented in this study was done before the first implementation of a syllabus about geoethics for future geoscientists. Also, the educational resources provided by the referred book for the syllabus implementation were about diverse subjects of geoethics related to thematic that require a sustainable approach to the resolution of the problems posed.

On the subject of geoethics education, it is important to refer to the “Geoethical Promise”. It intends to make future geoscientists, before their professional careers, declare their duties with society and the planet, and assume its commitment with the content of the promise (Di Capua & Peppoloni, 2017).

If geoethics cares about the relationship of humans with the planet, it is natural that it can contribute to various aspects of sustainable development. Geoethics can play a key role if applied to decisions of different natures, like environmental, social, economics, politics (Bohle & Marone, 2021; Peppoloni & Di Capua, 2020; Peppoloni & Di Capua, 2021). If we can teach future geoscientists about applying geoethics in their work it will be a great step for future generations to influence the way the world develops, increasing the chances of reaching sustainability. Also, every citizen plays a role so geosciences and geoethics need to be disseminated more broadly. The “Agenda 2030 for the Sustainable Development” is currently the guide for seeking sustainability until 2030, having the aim to solve severe problems from environmental, social, and economic natures (United Nations, 2015). If we consider the 17 Sustainable Development Goals, we can see that every one of them has connections to geosciences (Gill & Smith, 2021) meaning geoethics can help to reach these vital goals promoting the sustainability of the Earth system.

2. Methodology

The present study followed a quantitative approach through the descriptive statistics analysis of the results obtained in a survey, using the IBM SPSS Statistics version 27. The data collection instrument was composed of 11 closed questions. The administration of the survey occurred before a Ph.D. intervention program, which consisted of the application of a geoethics syllabus in higher education developed as part of an international Erasmus+ project GOAL.

The administration of the survey occurred before the classes about geoethics and sustainable development. The aim was i) to diagnosticate students’ perceptions about the thematic mentioned and ii) evaluate the potential of teaching geoethics and its connections with the SDGs of the 2030 Agenda for Sustainable Development for the professional development of the future geoscientists. This task fulfillment took an average of 20 to 30 minutes. The respondents participated voluntarily and with the information of the confidential nature of the data collected, both of these facts were explicitly written in the introduction of the survey.

The sample of this study comprised of 90 higher education students (n=90) from the northern region of Portugal, enrolled in geosciences-related courses. Most of the students (n=57; 66.3%) were attending the first degree in geology. Their ages ranged between 18 and 58 years (mean=22.7 years old), including 48 females (53.3%) and 42 males (46.7%).

3. Results

We grouped the questions into three domains for better reading and analysis: i) geoethics (Q1 to Q6), ii) sustainable development (Q7 to Q9), and iii) connections between both (Q10 and Q11) (table 1).

Table 1. Domains and questions/statements of the survey applied.

Domains	Questions/statements
D1. Geoethics	Q1. I consider important the existence of an ethical conduct for the professional practice of geosciences.
	Q2. Geoscientists have an increased responsibility towards planet Earth due to the nature of their professional activity.
	Q3. Have you ever heard of the term geoethics?
	Q4. Geoethics “consists of research and reflection on the values which underpin appropriate behaviors and practices, wherever human activities interact with the Earth system”, do you consider it to be an important scientific area for the future of society?
	Q5. Considering the definition of geoethics explained above, I think that the incorporation of geoethics in the higher education curriculum of courses in the geosciences area is important.

	Q6.	According to your previous answer, would you be in favor of the existence of a “Geoethical Promise” (analogous to the “Hippocratic Oath” of the medicine) to be assumed by future geoscientists?
D2. Sustainable development	Q7.	Are you familiar with the sustainable development?
	Q8.	Have you ever heard about the United Nations' “2030 Agenda for Sustainable Development” and its goals?
	Q9.	Do you consider the “2030 Agenda for Sustainable Development” and its goals relevant to the current panorama of our society?
D3. Connections between geoethics and sustainable development	Q10.	Bearing in mind the formal definition of geoethics, do you consider that this is a scientific area with the potential to contribute to sustainable development?
	Q11.	If you have answered affirmatively to the previous question, what are the three goals of the “2030 Agenda for Sustainable Development” that most integrates, in your perspective, the role of geoethics?

3.1. Questions about the geoethical domain

The following table allows to demonstrate that the students, in a five-point scale, mostly totally agree that ethical conduct is important in geosciences (Q1 – n=71, 78.9%), also believe that geoscientists have a higher responsibility concerning the Earth system (Q2 – n= 52, 57.8%) and consider the integration of geoethics on higher education in geosciences important (Q5 – n=56, 62.2%), followed by the option partially agree about the same topics (Q1 – n=16; 17.8%; Q2 – n= 31, 34.4%; Q5 – n= 26, 28.9%). It must be noted that the mean in all questions is closer to 5 revealing concordance with the statements presented to students.

Table 2. Five-point scale questions and answers about the geoethics domain (n=90).

Question/ statement	Answers										Mean and Standard deviation
	Totally agree		Partially agree		Neither agree nor disagree		Partially disagree		Strongly disagree		
	n	%	n	%	n	%	n	%	n	%	
Q1	71	78.9	16	17.8	3	3.3	–	–	–	–	M = 4.76 SD = 0.504
Q2	52	57.8	31	34.4	5	5.6	2	2.2	–	–	M = 4.48 SD = 0.707
Q5	56	62.2	26	28.9	6	6.7	1	1.1	1	1.1	M = 4.50 SD = 0.768

Table 3 shows most of the students never have ever heard about geoethics (n=37, 41.1%), being the mean naturally low (M= 1.91) This can reflect that geoethics is poorly taught in the higher institution participating in this study.

Table 3. Three-point scale questions and answers about the geoethics domain (n=90).

Question/ statement	Answers						Mean and Standard deviation
	Yes, and I know what it means		Yes, and I do not know what it means		No		
	n	%	n	%	n	%	
Q3	29	32.2	24	26.7	37	41.1	M = 1.91 SD = 0.856

Table 4 shows that: i) most of the respondents, after being confronted with the definition of geoethics, considered it essential for the society’s future (n=87, 96.7%) and ii) most of the opinions of students are in favor of the existence of a “Geoethical Promise”, yet the opinions are both expressing concerns if the promise is essential (n=56, 62.2%) or not (n=30, 33.3%). Also, four respondents placed themselves against the implementation of the promise.

Table 4. Three-point scale questions and answers about the geoethics domain (n=90).

Question/ statement	Answers						Mean and Standard deviation
	Yes, it is essential		Yes, but it is not essential		No		
	n	%	n	%	n	%	
Q4	87	96.7	3	3.3	–	–	M = 2.97 SD = 0.181
Q6	56	62.2	30	33.3	4	4.4	M = 2.58 SD = 0.580

3.2. Questions about the sustainable development

Concerning two questions about sustainable development revealed that most of the students know what sustainable development is ($n=83$, 92.2%) and what is the “2030 Agenda for Sustainable Development” ($n= 50$, 55.6%). However, it is also important to denote that a considerable number of students don’t know what the “2030 Agenda” is or don’t know at all about its existence.

Table 5. Two and Three-point scale questions and answers about the sustainable development domain ($n=90$).

Question/ statement	Answers						Mean and Standard deviation
	Yes		Yes, but I do not know what it is		No		
	n	%	n	%	n	%	
Q7	83	92.2	n.a	n.a	7	7.8	M = 1.92 SD = 0.269
Q8	50	55.6	18	20.0	22	24.4	M = 4.43 SD = 0.937

n.a. – not applicable

On the five-point scale question of this domain, table 6 demonstrates that most of the students recognize the importance of the “2030 Agenda” implementation giving the panorama of society. Also, the mean was high ($M=4.43$) for a five-point scale demonstrating the positioning of the students.

Table 6. Five-point scale question and answer about the sustainable development domain ($n=90$).

Question/ statement	Answers										Mean and Standard deviation
	Very relevant		Partially relevant		Neither relevant nor not irrelevant		Partially irrelevant		Very irrelevant		
	n	%	n	%	n	%	n	%	n	%	
Q9	58	64.4	19	21.1	10	11.1	–	–	3	3.3	M = 4.43 SD = 0.937

3.3. Questions about the connections between geoethics and sustainable development domain

On the last domain, the results of a four-point scale question demonstrate that most of respondents consider geoethics essential to the sustainable development. However, a considerable number of students ($n=27$, 30.0%) also respond affirmatively, but assumed they had poor knowledge on the subject.

Table 7. Four-point scale question and answers about the connections between geoethics and sustainable development domain ($n=90$).

Question/ statement	Answers								Mean and Standard deviation
	Yes, it is essential		Yes, but it is not essential		Yes, but I lack more knowledge on the subject		No		
	n	%	n	%	n	%	n	%	
Q10	55	61.1	7	7.8	27	30.0	1	1.1	M = 3.29 SD = 0.939

In table 8 we can see that some students gave an invalid answer for the Q11 ($n=22$, 24.4%), that is because those students selected more or less than three or none Sustainable Development Goals as asked in the questionnaire. The three selected goals mostly selected by the respondents were the 13 (Climate change) (38.9%), 7 (Affordable and clean energy) ($n=30$; 33.3%) and 15 (Life on land) ($n=29$; 32.2%). We can consider that these goals are very relevant for geoethics, and geosciences and the students recognize that.

Table 8. Frequencies of stated Sustainable Development Goals ($n=90$).

f	Sustainable Development Goals																	Invalid answer
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
n	5	6	4	6	1	21	30	1	9	2	15	22	35	15	29	2	1	22
%	5.6	6.7	4.4	6.7	1.1	23.3	33.3	1.1	10.0	2.2	15.7	24.4	38.9	16.7	32.2	2.2	1.1	24.4

Although students positioned themselves in favor and value geoethical subjects, most of the students revealed they did not know what geoethics is. In the sustainable development domain, we can assume that it is known by students but the recognition of the “2030 Agenda for Sustainable Development” was poor. Finally, students recognize the potential of geoethics to help in future sustainable development and the “2030 Agenda for Sustainable Development”.

4. Conclusion

With the current global panorama it is essential to have the best tools for thinking of solutions for the problems we face and will face in the future. It is more important than ever to finally find the sustainable development of the planet. Geoethics can contribute to pursuing a pathway to improve the relationship between human beings and the Earth system. For that, it needs to be disseminated and one way it can be done is through education. This study shows favorable opinions about geoethics of higher education students from geosciences-related courses. However, as most of the students do not know what geoethics is, it is a possible indicator of poor investment in geoethics education. Furthermore, sustainable development and the “2030 Agenda for Sustainable Development” were the subjects more known by the respondents. After knowing what geoethics is, most of the students recognize the important role geoethics can play in sustainable development. Students chose Sustainable Development Goals very relevant concerning what great benefits geosciences and geoethics can bring. The education on geoethics for future geoscientists can help them to improve their knowledge and practice of geoethics, allowing this latter to be present in every decision made.

References

- Bohle, M. (2021). A geo-ethical logic for citizens and geoscientists. *Sustain. Water Resour. Manag.* 7, Page Numbers. doi:10.1007/s40899-021-00557-1
- Bohle, M., & Marone, E. (2021). Geoethics, a Branding for Sustainable Practices. *Sustainability* 13, 895. doi:10.3390/su13020895
- C. Vasconcelos, S. Schneider-Voß, S. Peppoloni (Eds.). (2020). *Teaching Geoethics Resources for Higher Education*. Porto: U.Porto Edições.. doi:10.24840/978-989-746-254-2
- Cardoso, A, Ribeiro T., & Vasconcelos C. (2021). Geoethics: results of an intervention programme in higher education. In L. G. Chova, A. Martínez, I. C. Torres (Eds.), *ICERI2021 Proceedings* (pp. 548-556). Valencia: IATED. doi:10.21125/iceri.2021
- Di Capua, G., & Peppoloni, S. (2017). The Cape Town Statement on Geoethics. *Annals of Geophysics* 60, 1-6. doi:10.4401/ag-7553
- Gill, J. C., & Smith, M. (Eds.) (2021). *Geosciences and the Sustainable Development Goals*. Cham: Springer.
- Mogk, D. W., Geissman, J. W., & Bruckner, M. Z. (2018). Teaching Geoethics Across the Geoscience Curriculum: Why, When, What, How, and Where? In L. C. Gundersen (Ed.) *Scientific Integrity and Ethics in the Geosciences* (pp. 231-266). Hoboken, and Washington, D.C: American Geophysical Union and John Wiley and Sons. doi:10.1002/9781119067825.ch13
- Peppoloni, S. & Di Capua, G. (2021). Geoethics to Start Up a Pedagogical and Political Path towards Future Sustainable Societies. *Sustainability* 13, 10024. doi:10.3390/su131810024
- Peppoloni, S., & Di Capua, G. (2020) Geoethics as global ethics to face grand challenges for humanity. In G. Di Capua, P. T. Bobrowsky, S. W. Kieffer, & C. Palinkas (Eds.), *Geoethics: Status and Future Perspectives* (pp. 1-17). London: The Geological Society of London. doi:10.1144/SP508-2020-146
- United Nations (2015). *Transforming our world: the 2030 Agenda for Sustainable Development*. United Nations.
- Vasconcelos, C, & Orion, N. (2021). Earth Science Education as a Key Component of Education. *Sustainability* 13, 1316. doi:10.3390/su13031316

FOSTERING YOUNG AGRONOMISTS' COMPETENCIES THROUGH EXPERIENTIAL LEARNING: A PILOT RESEARCH IN THE AGRICULTURAL UNIVERSITY OF ATHENS, GREECE

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Abstract

In the 21st century agronomy students need to take the responsibility of their career planning. Upon graduation, they are called to combine knowledge, skills, and values, in order to support as change agents, farmers' decision making aiming at sustainable agriculture and rural development. To reinforce such a role it is deemed necessary to cultivate student agency, namely, a sense of responsible and active participation in society. Students need to be able to set achievable goals, collaborate successfully in order to solve problems, and act in-line with a professional ethos supporting the wellness of the community and the sustainability of earth. Hence, the need of competence-based education in our century is usually taken as granted. Higher education should adopt educational methods and tools that would support students' competence development. Experiential learning, represented by Kolb's Experiential Learning Cycle (KELC), is an essential part of such an approach and includes four stages: concrete experience, reflective observation, abstract conceptualization, and active experimentation. In this paper, we explore the effectiveness of experiential learning aiming at the acquisition and/or development of competencies on the part of Agricultural University of Athens (AUA) students. To attain such an objective, we carried out a pilot with 69 AUA students, in spring of 2021. Students were divided into three groups (A, B, and C). Each group, attended a 3-hour meeting, using different approaches (A=traditional lecturing, B=experiential learning based on KELC and C=investigative case-based learning). Furthermore, students were offered a participatory class regarding rural advisors' profile and planet sustainability. Due to the COVID-19 pandemic, online tools were adopted. Students participated in pre- and post-survey based on a questionnaire. Focus groups and observation methods were also utilized to further explore and validate quantitative data. In this paper we report the design and the quantitative and qualitative findings, particularly focused on the experiential learning approach.

Keywords: *Higher education, experiential learning, competencies, agronomy students, future advisors.*

1. Introduction

In agricultural education and agricultural extension, experiential learning (EL) constitutes an essential and fundamental component of the learning procedure (Roberts, 2006). Due to the nature of the studies at the Agricultural University of Athens (AUA), students parallel to traditional lecturing, experience laboratory work, fieldwork, field trips, and internships. These learning environments support the acquisition and development of scientific knowledge and technical skills that are necessary for academic and professional progress. Nevertheless, we need to consider the acquisition and development of social competencies necessary to support students' role as future agents of change.

2. Theoretical background

Kolb (1984) in his Experiential Learning Theory (ELT) affirms that “Learning is the process whereby knowledge is created through the transformation of experience.” Kolb’s Experiential Learning Cycle (KELC) provides a clear view on the above statement. ELC consists of four stages: Concrete Experience (CE), Abstract Conceptualization (AC), Reflective Observation (RO), and Active Experimentation (AE) and invites the learner to a circle of experiencing, reflecting, thinking, and acting (Kolb & Kolb, 2005). This learning procedure helps students retain information (Knapp & Benton, 2006), develop meta-cognitive skills and competencies, and achieve personal and moral development. In order to offer such experiences, ELC requires holistic participation, through thinking, feeling, perceiving, and behaving, on the part of students. A good grade in exams does not always mean solid knowledge; on the other hand, when the content of the learning is relevant or could be linked or refer to students’ goals, personal experiences, and life interests, supported by constant coaching in the direction of creating meaning around the experience, then the acquisition and stability of knowledge and competencies is enhanced.

One necessary pre-condition is the educator’s presence and willfulness to develop a learning environment that will engage students in a process towards goal-orientated, meaningful, relevant, and measurable experiences (Baker, Robinson, & Kolb, 2012; Kolb & Kolb, 2005). To achieve students’ participation and motivation, the educator should support the four phases of the ELC in different ways, playing the role of the facilitator (experiencing to reflecting), subject expert (reflecting to thinking), evaluator or standard-setter (thinking to acting), and coach (action to experience) (Knapp & Benton, 2006; Baker et al, 2012). When ELC in agricultural studies is successfully implemented by the educator, students are invited to communicate efficiently and to collaborate successfully in order to solve real-life problems, to participate in settings and/or accomplishing goals that involve the collective wellness and the sustainability of the environment, to take initiatives, and to reflect and act in-line with ethos and responsibility for themselves, for others, and for the earth. These qualities describe student agency that could lead to professional agency. The Organisation for Economic Co-operation and Development (OECD, 2019) refers to student agency as: “the belief that students have the will and the ability to positively influence their own lives and the world around them as well as the capacity to set a goal, reflect and act responsibly to effect change. Student agency relates to the development of an identity and a sense of belonging.”

Student agency equips students with confidence, inspiration, and responsibility towards well-being, and that leads to actions toward global sustainability. Students probe, enhance and practice their agency during collaboration and communication with their peers and their educators. Furthermore, research shows that agronomy students feel more confident when they acquire and/or develop competencies and self-efficacy during their studies. The literature points to the need to provide future rural advisors with competencies like communication, collaboration, facilitation, reflection, analytical and inquiring thinking, collective and responsible acting, and ethos (Charatsari, Jönsson, Krystallidou, & Lymberopoulos, 2021). Therefore the interest and the need for research for the development of curricula and policies in Higher Education Institutions.

3. Methodology

3.1. Objective

The objective of this study is to explore the experiential learning approach impact, regarding AUA students’ opinion about the profile of the modern agronomist (MA)-agent-of-change with reference to knowledge, social competences, metacognitive skills, ethical values and professional ethics. It also investigates the impact of students’ learning experience following an ELT approach, in relation to the acquisition and/or development of the above mentioned profile components.

3.2. Participants

In March 2021 an invitation was sent to AUA students enrolled in two lessons, namely, “Agricultural Education” and “Management and protection of the rural environment.” Students were invited to participate in extra online classes that would use different learning methods, aiming to explore the acquisition of competencies necessary for their profile as MA. A total of 69 AUA students, 24 males and 45 females voluntarily participated and, afterwards, anonymously evaluated these classes. Students enrolled in “Agricultural Education” attended a 3-hour extra class on “Teaching techniques and tools”. Students enrolled in “Management and protection of the rural environment” attended a 3-hour extra class on “Organic Agriculture and Sustainability”. Students from each lesson were divided in three groups (A=27 students, B=21 students, and C=21 students). Each group followed a different approach:

A=traditional lecturing (TL), B=EL based on KELC and C=investigative case-based learning (ICBL). Following 57 students voluntarily attended an additional 3-hour participatory class, using the EL/ KELC approach, on the MA's-agent-of-change profile, communication and collaboration skills, and earth sustainability as a mixed group D (comprising students from A+B+C). In this study, we focus on groups B and D that experienced EL/ KELC.

3.3. Research strategy and instruments

The study methodology was designed between January and March 2021 and was applied on March and April 2021. Due to COVID-19 restrictions, online teaching using Microsoft Teams was adopted and online interactive tools such as Mural and Mentimeter were used. A 2-hour preparatory online meeting, helped group B (EL based on KELC) and group C (ICBL) students to get familiar with the online tools to be used them in the extra classes. It also gave them the opportunity to meet each other, as due to COVID-19 restrictions, some of them had never met before in person and through icebreakers and energizers to create a frame of collaboration necessary for the forthcoming class. Group A did not attend any preparatory meeting, as they were going to attend traditional lecturing.

Each student participated in total 6 hours, in 2 extra classes (3 hours each). In order to enhance the participation and the collaboration during the learning procedure (groups B, C and thus D; A students were also given a preparatory session in order to participate in D), tools such as role playing, brainstorming, mind maps, case studies, work in teams, debate etc. were used. For the evaluation of these extra-classes, a mixed research design was adopted using quantitative, qualitative and observation tools. Students, before and after the classes, filled an online quantitative questionnaire (google forms). The instrument consisted of a 5-point Likert scale, multiple choice, and open ended questions. Therefore, students' opinions regarding the agronomist's profile and the importance of knowledge, social competencies, metacognitive skills, ethical values, and professional experience and their respective learnings, during the extra classes were assembled.

For further assessment and validation of the quantitative data, online focus groups and observation were used. The focus groups were recorded with students' consent. Four focus groups were carried out (with regard to groups B and D). The abovementioned online tools provided the observation materials and the opportunity to delve into the rest of the materials collected. Qualitative data analysis followed the thematic content analysis approach (Gibbs, 2007).

4. Results

For the quantitative analysis Wilcoxon sign rank test, one sample Wilcoxon's rank test and Friedman's ANOVA were carried out using SPSS v27. Considering the impact of the EL in relation to the students' opinion about the profile of the MA and how important it is for the MA to have scientific knowledge, social competences, metacognitive skills, ethical values, professional ethics and professional experience a statistically significant positive change was observed only over 'ethical values and professional ethics' ($\chi^2=6.582, P=0.037$).

Considering the impact of the EL implementation in relation to students' "acquisition and/or development of knowledge" as well as "social" and "metacognitive skills" statistically significant positive differentiation was observed for all items with the exception of "ethical values and professional ethics" (Table 1 – Q6)

The same applies regarding the impact of the EL method and the opportunities given to students during the extra class, to apply social (collaboration, communication etc.) and metacognitive competencies (reflection, problem solving, critical thinking etc.) during the learning procedure, except for the items: "negotiate to resolve conflicts" and "test your limits in failure despite adversity". (Table 1 – Q9).

Table 1. Students' evaluation on the impact of the EL class (One-sample Wilcoxon Signed Rank Test).

ITEMS	P
Q6. In your opinion, how much did the extra class influence you in acquiring:	
a. knowledge about teaching techniques and tools/ organic agriculture and Sustainability?	<0.001
b. social skills, i.e. effective communication, cooperation, teamwork, etc.:	<0.001
c. metacognitive skills, i.e. critical thinking, reflection, problem solving, etc.:	0.003
d. ethical values and professional ethics.	0.593
Q9. In the extra class did you have the opportunity to:	
a. Seek, organize and use information to solve problems	<0.001
b. Recognize and solve problems using concrete arguments	<0.001
c. Set goals and work methodically to achieve them	<0.001
d. Collaborate effectively as a team member	<0.001
e. Build and coordinate teams and networks	0.003
f. Communicate effectively your opinion and your ideas	<0.001
g. Act with confidence	<0.001
h. Develop empathy, understand, respect and appreciate other peoples' diversity, ideas and values	<0.001
i. Negotiate to solve conflicts and face crises	0.078
j. Take decisions taking into account the social and collective interest	0.002
k. Be flexible to changes	<0.001
l. Self-evaluate and reflect	0.008
m. Become aware of the consequences of your choices, sayings and actions	<0.001
n. Emphasize on the procedure and not just on the result	<0.001
o. Act under ethical rules and ethics	0.006
p. Collaborate using interdisciplinary thinking by combining scientific fields	0.002
q. Visualize the future of the wider agri-food sector companies	0.022
r. Test your limits at failure and continue to try despite harsh conditions	0.074
s. Use new technologies and adopt new methods and tools	<0.001
t. Take initiatives, make a plan and suggest innovative actions for further development	0.001
u. Define and describe terminology, formulas and procedures, about what you have learned in class	0.005
v. Explain what you have been taught using examples	<0.001
w. Use what you learn in real scenarios	0.011
x. Analyze, correlate and compare concepts in order to draw a conclusion	<0.001
y. Use the given information to design and compose something new by yourself	<0.001
z. Evaluate, review and assess an existing project	0.003

Qualitative analysis showed that students had a positive experience that triggered positive changes regarding students' opinions and their identification with the profile of MA. Students in the focus groups shared their impressions and opinions on-line, in a friendly and comfortable created environment comments like:

"while working systematically with my classmates I had to share my opinion and listen to others, so that we would able to reach a common result; being the time keeper I felt strongly the responsibility of my role to the accomplishment of the task; I realized that without ethics and respect we cannot work as a team" (Student 26);

"I took initiatives and I had to improvise and be creative in order to transform quickly my team's ideas into text to be presented in the plenary; I had the opportunity to learn about MA-agent-of-change profile. I realized that, additionally to my degree, I need to have and develop competences in order to build a MA's profile. The video we saw made me think about the MA's ethics and reflect on my commitments as a graduate" (Student 3);

"as a member of a team I had to be responsible for both my sayings and my actions (Student 24); coming from different Departments and having different personal experiences, in our team we exchanged our knowledge to solve the exercise and each one of us contributed in order to compose together the final presentation" (Student 24);

"I had to communicate with my peers in order to plan our study and read the proposed literature on time. We shared goals and we collaborated successfully ... and we achieved our goals on time" (Student 61);
"I reflected on my knowledge and competences through my classmates' feedback during my presentation" (Student 1);

"we had to give emphasis to the process ... not only to find the solution; we had to discuss, make decisions and follow steps" (Student 7);

"I had to respect my peers and act with empathy and responsibility in order to achieve my team's goals; I felt confident during the presentation and responsible that I am representing my team" (Student 48).

5. Discussion and conclusions

The purpose of this study was to investigate the impact that experiential learning approach might have on AUA students' opinion about the profile of the MA-agent-of-change, with reference to knowledge, social competences, metacognitive skills, ethical values and professional ethics. It also explored the impact of students' learning experience following the ELT approach, regarding the acquisition and/or development of the above mentioned profile components.

Both quantitative and qualitative analyses showed a positive multilayered experience on the part of students. The findings suggest that EL may influence the AUA students' profile development, as it provides an opportunity for communication between peers and teachers, reflection, feedback and collaboration with empathy and responsibility in order, using critical thinking to solve real problems. Our findings are in alignment with other researches (Meerts-Brandsma & Sibthorp, 2020; Knapp & Benton, 2006). Such an overall positive picture indicates that a move towards the adoption in HEIs curricula of experiential learning methods and participatory tools can support the transformation of the students towards the profile of the MA-agent-of-change.

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References

- Baker, M.A., Robinson, J.S., & Kolb, D.A. (2012). *Aligning Kolb's Experiential Learning Theory with a Comprehensive Agricultural Education Model*. Journal of Agricultural Education, 53, 1-16.
- Charatsari, C., Jönsson, H., Krystallidou, E., & Lymberopoulos, A. (2021, March–April). *Agronomic education at a crossroad: providing skill sets or developing mindsets?*. 14th European Farming Systems Conference. Évora, Portugal. <https://portal.research.lu.se/en/publications/agronomic-education-at-a-crossroad-providing-skill-sets-or-develo>
- Gibbs, G. R. (2007). *Thematic coding and categorizing*. In: Gibbs GR, ed. Qualitative research kit: analyzing qualitative data (pp. 38-55). SAGE Publications
- Knapp, D., & Benton, G. M. (2006). *Episodic and semantic memories of a residential environmental education program*. Environmental Education Research, 12, 165-177.
- Knobloch, N.A. (2003). *Is Experiential Learning Authentic*. Journal of Agricultural Education, 44, 22-34.
- Kolb, D.A. (1984). *Experiential Learning: Experience as the Source of Learning and Development*. Englewood Clifff, NJ: Prentice-Hall.
- Kolb, A.Y., & Kolb, D.A. (2005). *Learning Styles and Learning Spaces: Enhancing Experiential Learning in Higher Education*. Academy of Management Learning and Education, 4, 193-212.
- Meerts-Brandsma, L., Ricks, M., & Sibthorp, J. (2020, November). *Before, during, and after an immersion semester: a three-wave study on educational context and adolescent identity development*. In 2020 Symposium on Experiential Education Research, p. 10.
- Organisation for Economic Co-operation and Development (2019). <https://www.oecd.org/education/2030-project/teaching-and-learning/learning/all-concept-notes/>. Retrieved on December 28, 2021.
- Roberts, T.G. (2006). *A philosophical examination of experiential learning theory for agricultural educators*. Journal of Agricultural Education, 47, 17-29.

TEACHING ENGLISH WITH A CHILLY FORMAT: THE GRAPHIC NOVEL!

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Abstract

Recently, the term graphic novel is commonly used in the educational area, and it's often associated with another term, which is '**comic book**'. In a typical perception, the graphic novel provides an interesting way to communicate language concepts with a number of characteristics that may help students learning in a more effective manner rather than traditional textbooks. Given that it has been introduced in school lessons, it has certainly represented an opportunity for teachers.

However... what exactly is a graphic novel? It is a didactic tool. A graphic novel, as its name suggests, is a novel that tells a complete story via illustrations. A graphic novel will offer the type of resolution that one expects from a novel, even if it is part of a series. Effectively, this makes a graphic novel longer and more substantive than a comic book, which is a serialized excerpt from a larger narrative story.

Humankind has long told stories via images, beginning, perhaps, with the cave paintings of ancient civilizations. It was in the twentieth century, that we witnessed the rise in the use of comic books, which experienced a golden age during the Great Depression and World War II with the ascendance of Marvel and DC Comics. The Cold War era saw comic books and novels emerge into what is now known as a graphic novel. The term "graphic novel" traces back to an essay written by Richard Kyle in the comic book fanzine *Capa-Alpha* (although to this day there is not one fixed definition of "graphic novel"). The term is thought to have become mainstream with the publication of Will Eisner's *A Contract with God* in 1978.

The authors provide an overview of the graphic novel format and its use in school lessons. The work is aimed at describing the most important steps of this format, with its implications for teachers and students, and the theoretical base that highlights how and why it can be a useful tool to present content relevant for the current generation of students. The authors provide examples of how the graphic novel medium could be applied to English concepts and conclude with the future prospects of this studying/teaching tool.

Keywords: *Graphic novel, digital technologies, comic, teaching, medium.*

1. Introduction

It could be argued that 1986 was the year of the graphic novel. This year included the publication of the first volume of *Maus*, the release of the first issue of *Watchmen*, and the entire serial run of *The Dark Knight Returns*. Although none of the aforementioned works were originally printed as graphic novels, all three were serialized before being collected and rereleased; it would be difficult to ignore the impact that they have had on the medium (Hoover S., 2012).

The birth of the graphic novel cannot be dated back to a precise moment in the cultural history of the twentieth century, but it has depended on a long process of evolution which in many respects is still underway. In the book *The Ten-Cent Plague* (2008) David Hajdu pointed out that the first graphic novel published in the United States in 1950 was probably *It Rhymes with Lust* written by Arnold Drake and Leslie Waller and illustrated by Matt Bsaaker. It was an innovative work of art, thought of as a novel and published in one single volume, which at the time was defined as a picture novel ("novel for images"). Being a novelty, unfortunately, it was not understood and therefore unsuccessful. The American publisher, Richard Kyle, in 1964, was first publisher to use the diction of the graphic novel together with the graphic story. He wanted to draw the attention of American readers and artists to the quality of contemporary Japanese comics (*manga*) and French (*bandes dessinées*), trying to free the American comic book from its mediocrity and its vulgarity. Conventionally, however, the authorship of this definition is attributed to the American cartoonist Will Eisner (1917-2005), with his *Contract with God*, published in 1978. Eisner's work is divided into four stories, the first of which has the same title as the book and tells the story of Frimme Hersch, a pious Jew who lives in the Bronx and whose daughter is tragically taken away from him.

The story focuses on Frimme's rebellion against God, his feelings, his interiority and his changed relationship with his neighbour. For the first time in the comic book serious and important issues are treated: religion, society, politics, daily life, the interiority of people, topics which are typical of the great literature. Eisner's work represented a small revolution at the time: until then the comic book, especially the American one, was mostly linked to stereotypes, characters and stories of little depth or to the figures of superheroes, whereas with this text a new way of narrating life became effective.

A further turning point for the development and definition of the graphic novel was in 1986, when *Maus*, by Art Spiegelman was published in volumes, a novel that tells the story of the Shoah by staging anthropomorphic figures of mice (to represent the Jews) and cats (for the Nazis). The publication of the volumes 'as a result was gradual but rapid in many countries and in particular in ours, the ennoblement of a field of artistic creativity, the recognition of its validity, of its diversity but also of its interweaving with other arts and forms of expression and other fields of knowledge» (Goffredo Fofi). Starting from that date we can in fact find a greater awareness in artists, on one hand, who sought unprecedented expressive potential from this innovative way of mixing words and images, and on the other, in readers, that little by little constituted an increasingly mature and quantitatively more consistent group, being able to guide and require a more mature typology of products to the publishing market.

What about in Italy? According to Luca Raffaelli (journalist, comics expert) the birth of the graphic novel can be attributed to our country, with the works of Guido Buzzelli (*La rivolta dei racchi*, 1966) and Hugo Pratt (*A ballad of the salty sea*, 1967). During that year very cultured author, Dino Buzzati, also rightfully entered among the great classics of the twentieth century literature, published the *Poema a fumetti* (1969). Alongside the authors, critics too began to examine comics as an object of study, as well as Umberto Eco in *Opera aperta*, *Apocalyptic and Integrated*. In the following years the Italian comic strip was characterized in an innovative way thanks to the works of Andrea Pazienza (1956-1988), Bonvi (1941-1995), Guido Crepax (1933-2003) and to the thrust of magazines such as "Linus", "L'Eternauta", "Corto Maltese", "Comic Art", "Pilot", "Frigidaire", whose pages hosted many talented contributors (Senna P., 2018).

In the last few years, the Italian panorama has been very vast and complex, and the graphic novel has increasingly assumed the characteristics of a free genre capable of dealing with themes typical of the great expressive arts. This has resulted in works such as *LMVDM. La mia vita disegnata male*, in which Gipi takes a journey through his childhood and youth; *Igor's Quaderni Russi and Quaderni Ukraini*, halfway between a reportage and a journey of the soul; *Paolo Bacilieri (Sweet Salgari, Sul pianeta perduto and the albums of Napoleon and Dampyr)*, capable of imprinting particular incisiveness on his drawings thanks to the very particular use of framing and transitions between vignettes and those of Lorenzo Mattotti, including for example *Dottor Nefasto*, *Fuochi* and the adaptation of Stevenson's novel *Jekyll & Hyde*, where an expressionist work of image deformation is carried out (Bavaro, V. & Izzo D, 2009).

Since 1986, graphic novels have grown considerably, both in sophistication and popularity, to the point where they deserve attention in higher education. This is especially true for academic librarians. Current academic library literature includes a good deal of scholarship on the history of the medium and offers advice on building and maintaining collections (Ellis & Highsmith, 2000; Nyberg, 2010) but very little about how to integrate graphic novels into instruction. It is important to explore the characteristics of graphic novels that make them a valuable resource for librarians who focus on research and information literacy instruction, to identify skills and competencies that can be taught through the study of graphic novels, and to provide specific examples of how to incorporate graphic novels into instruction. be taught through the study of graphic novels, and to provide specific examples of how to incorporate graphic novels into instruction (Hoover S.,2012).

2. Method

2.1. Graphic novel: One, a hundred, a thousand

Not all comics are graphic novels, but all graphic novels are comic books and claim the freedom typical of this instrument of expression. When we talk about graphic novels, we refer to a particular genre whose goal is to tell a story through the use of words and images, using a structure similar to that of a novel. Contrary to the seriality of the strips we find published in newspapers or magazines, graphic novels are usually self-contained. Exactly the same as in the case of novels, in fact, graphic novels have structure, ways of managing the plot and psychological characteristics of the characters comparable to literary ones (Palmeri M., 2019).

This is another reason why the graphic novel is mostly (but not always) published in a standard (or at least recognizable) format, similar to that of the book. It is a free and strong autonomous genre, capable of absorbing a considerable variety of elements from other arts (literature, painting, music, cinema, television). The main characteristic of graphic novels is the very close relationship between text and image,

which differentiates them from all others making them unique and the fact that they are able to modulate in different directions and narrative orientations. There are many different genres: autobiographical, experimental, historical, dystopian, science fiction. There are experimental graphic novels (whose purpose is precisely to experiment with the potential of the genre), others that follow historical (such as Spiegelman and Eisner) or (auto)biographical narratives (Emmanuel Guibert, Gipi, Manu Larcenet, Marjane Satrapi). There are graphic novels of fantasy, fantastic or surreal type (David B., Sienczyk, Vázquez), others that narrate parallel realities (such as Moore and Lloyd's *V for Vendetta*, Moore's *Watchmen*), but also journalistic narratives and chronicles from current events (Joe Sacco, Joe Kubert) and there is no shortage of even re-actualizations of comic book superheroes, whose characters are re-read with greater psychological and inner depth (on the character of Batman in Franck Miller's *Return of the Dark Knight*) or re-readings and re-adaptations of literary classics (Senna P., 2018).

2.1.1. Is it a Comic Book or a Graphic Novel? To make the best use of graphic novels, it is important that educators and scholars approach them in a serious manner. Clarifying terminology and establishing context can help to dispel such misperceptions.

The difference between Graphic Novels and Comics? Mixing up comic books and graphic novels can seem like a simple error but the terms “graphic novel” and “comic book” are not synonyms. Although both formats feature illustration-based storytelling, they have distinctions that reveal substantive differences.

A graphic novel, as we said before, is a novel that tells a complete story via illustrations. A graphic novel contains a beginning, middle, and end. A graphic novel will offer the type of resolution that one expects from a novel, even if it is part of a series. Effectively, this makes a graphic novel longer and more substantive than a comic book, which is a serialized excerpt from a larger narrative story (Goldsmith, F.2005).

A comic book is an excerpt from a larger serialized narrative (it can be difficult to read a comic book if you haven't read the comic that comes directly before it in series) that is told via illustration. Famous comic book publishers include Archie Comics, Marvel Comics, and DC Comics. From the mid-twentieth century through the present day, these publishers and other similar companies have issued comic books on a weekly or monthly basis in the form of books or as pieces of sequential art called comic strips, which are published in magazines or newspapers. These comics contain excerpts from long-running narratives that can last for years or even decades.

Is there a difference between the graphic novel and the common newsstand comic? Yes and no: the answer remains unclear, and that it was probably easier to answer this question in an affirmative way a few years ago. The comics sold at newsstands today, in fact, are very different from those that could be found, for example, fifty, thirty or even twenty years ago. Comics have progressively become free of ordinary and approximate or poorly edited drawings and contents, being easier to find, even in products destined for newsstands, albums of great graphic quality with scripts worthy, if not of a novel, at least of an excellent literary tale: characteristics that bring comics much closer to the concept of graphic novels. Let us take for example, the publications of Sergio Bonelli, such as *Julia* - whose scriptwriter Giancarlo Berardi has accustomed for years his readers to exciting events and narrative rhythms marked with great skill, thanks also to the use of a group of high-level illustrators - *Dampyr* and *Napoleone*, or some of the texts in the *Le Storie* series, or the reinterpretation of characters that have become part of the collective imagination, such as *Tex*, through the use of great names on the international comics scene (in February 2015 the first issue of the annual series "*Tex d'autore*" was published, with subject, script, cover and drawings by Paolo Eleuteri Serpieri). Take into consideration a courageous publishing house, Editoriale Cosmo of Bologna, which in the last few years has offered at newsstands great masterpieces of international comics, "translating" into the newsstand format works of great artistic and literary value, which rightly (and for the most part) can be considered graphic novels (Goldsmith, F.2005).

Therefore, Frezza's opinion that today's comics are "particularly pushed towards the graphic novel" is uncontroversial, in the sense that in some of them we can feel the air of the great meditated and successful narratives. However, these are "serial" works, not conceived as a novel, but as a story that continues, often with events that are scarcely linked to each other; and this is a difference not only of form, but also of substance. Even in these serial comics, however, one can find one of the typical traits of novelistic literature from which the graphic novel is inspired, namely the inner development and psychological depth of the characters. Because of all these elements, it is not always easy to set a precise limit to what is or is not a graphic novel (Frezza G., 2008).

2.1.2. Our fun learning experience: A graphic novel in a classroom or educational setting.

The notion that graphic novels are too simplistic to be regarded as serious reading is outdated. The excellent graphic novels available today are linguistically appropriate reading material demanding the same skills

that are needed to understand traditional works of prose fiction. Often, they actually contain more advanced vocabulary than traditional books at the same age/grade/interest level. They require readers to be actively engaged in the process of decoding and comprehending a range of literary devices, including narrative structures, metaphor and symbolism, point of view, the use of puns and alliteration, intertextuality, and inference. Reading graphic novels can help students develop the critical skills necessary to read more challenging works, including the classics. In addition to the connections to analysing text, graphic novels inspire readers to understand and interpret information differently from how readers process prose. In a world where young people are growing up navigating narratives presented through websites, video games, television, films, and increasingly interactive media, learning and maintaining visual literacy is a necessary skill. Today's world of stories contains far more than just prose, and readers who are skilled at understanding and being critical of multiple formats will excel (Jacobs, D. 2007).

Graphic novels have become increasingly popular in the classroom as a means to engage English language learners (ELL) in new ways (Christensen L.L., 2007). The accessible and diverse content of graphic novels can inspire critical discussions by encouraging students to become 'agents' of their own meaning-making experience (Boatright, 2010). Using both text and sequential art to tell what are often serious, non-fiction narratives, many graphic novels use intelligence and humour to explore sensitive issues of race, social justice, global conflict and war (Christensen, 2007). The wide range of stories and perspectives delivered through this multimodal medium are capable of inspiring a deeper level of engagement for students as they relate the stories to their own experiences (Chun, 2009).

In an ever-globalizing world, in which the literacy experiences of students, as well as their cultural, social, linguistic, and technological backgrounds, are both diverse and evolving, the use of graphic novels as a pedagogical tool has offered various benefits, English language teachers have had an opportunity to introduce students to a form of literature:

- **Uniquely** placed between the old and the new and offering perspectives not embraced by traditional literary discourse.

- **FUN!!!** Students love the visual and colourful nature of these stories, which provide an opportunity to shift the focus of the lesson.

- **Visuals!** Visuals not only attract students' attention, they help support the meaning of the story. Pictures also make stories easier to remember.

- **Flexible!** It is not necessary to use a full story to take advantage of a graphic novel. With a few charts you can create a whole range of activities for the classroom, for individual, pair, or group work.

- **Used to develop the four skills in an integrated way.** Many of the versions for teaching English have a recorded version. The audio can form the basis of the listening activities.

- **Used to focus on language:** spoken language in dialogues, narrative text and discourse markers in captions, but also indirect speech, descriptive language to describe pictures, and onomatopoeic words such as Splat, Boom, and Yikes!

- **They have been used to integrate technology into lessons.** There are many programs for creating digital comics that students can use to bring their stories to life. They develop creativity and imagination.

- **Used for activities** to do before (prediction work), during (confirmation of predictions), and after (creative work) the students have read the story.

In addition, teachers with the use of graphic novels have promoted:

- **Motivation** Graphic novels powerfully attract and motivate kids to read.

- **Discerning readers** Graphic novels can be a way in for students who are difficult to reach through traditional texts.

- **Benefits for struggling readers, special-needs students, and English-language learners'**

Graphic novels can dramatically help improve reading development for students struggling with language acquisition for various reasons.

3. Result

The comic book has endured over a century of literary scrutiny. Though once relegated to minority status, the medium, most recently accessed through the popularized graphic novel, offers its readers a valuable alternative window through which to view the world. Through the existing literature and studies on the use of graphic novels in classrooms, the question: "How can the multimodal and socially diverse material in graphic novels be used to encourage ELL students and reluctant readers to draw from their own experiences, perspectives and multiliteracies to construct meaning and participate in a critical literacy experience?" was investigated (Rycroft, 2014).

It has been shown that graphic novels have proven effective in reaching students from diverse linguistic and social backgrounds in ways that traditional literature cannot. The scaffolding that the

combination of image and text offers, allows students to both contextualize and conceptualize the words while offering flexibility for interpretation and discussion of meaning. This increased access to the meaning making process helps to include all students in critical discussions surrounding topics of relevance and importance. As many of the topics and viewpoints considered in graphic novels are unique to this medium, they allow students to see that diverse perspectives are both recognized and celebrated through the educational discourse. While the medium itself can act as a springboard from which to investigate other forms of text, the perspectives as well, provide a frame through which further readings can be analysed (Rycroft K. F, 2014).

Furthermore, as the future of literacy is changing with the dynamics of evolving literacy practices shaping the ways in which we communicate, graphic novels offer a unique reading experience to prepare for multimodal communications. Technology and the Internet are rapidly changing the ways we read and process information. As not all schools are equipped to prepare students for the demands of technology's influence on literacy, graphic novels can bridge the gap between print and onscreen reading. A multiliteracies pedagogy embraces the changing needs of literacy and fosters students' critical awareness of multimodal texts by using students' own resources (Chun C. W., 2009).

The ability to critically analyse the multiple forms of literature that surround us is essential in a world that is rife with power relations. Graphic novels, through their diversity of styles, language, interpretations, and most importantly, creators' perspectives, can introduce students to literature they might never otherwise encounter (Schwarz G., 2006). As Schwarz states, "perhaps, new media can serve the old purposes of helping adolescents learn about others, appreciate differences, identify injustice and intolerance, and become motivated to act for a better world. A tall order, but worth a try" (Schwarz G., 2007).

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References

- Bavaro, V. & Izzo D. (2009). Il graphic novel negli Stati Uniti. In Acoma. Rivista internazionale di studi nordamericani, n. 38
- Boatright, M. D. (2010). Graphic journeys: Graphic novels' representations of immigrant experiences. *Journal of Adolescent and Adult Literacy*, 53(6).
- Christensen, L.L. (2007). Graphic global conflict: Graphic novels in the high school social studies classroom. *The Social Studies*.
- Chun, C. W. (2009). Critical literacies and graphic novels for English language learners: Teaching Maus. *Journal of Adolescent and Adult Literacy*,
- Ellis, A. & Highsmith, D. (2000). About face: Comic books in library literature. *Serials Review*.
- Frezza, G. (2008). Evoluzione e attualità del graphic novel. In *Le carte del fumetto*, Longo.
- Goldsmith, F. (2005). Graphic Novels Now: Building, Managing and Marketing a Dynamic Collection. *American Library Association*.
- Hoover, S. (2012). The case for graphic novels, *Communication in informations literacy, University of Nevada – Las Vegas*,
- Jacobs, D. (2007). More than words: Comics as a means of teaching multiple literacies. *English Journal*, 96.
- Nyberg, A. K. (2010). How librarians learned to love the graphic novel. In R.G. Weiner (Ed.), *Graphic novels and comics in libraries and archives*. Jefferson, NC: McFarland & Company, Inc.
- Rycroft K. F., (2014). Graphic Novels: Preparing for a Multimodal and Multiliterate World, *Inquiries VOL. 6 NO. 08*
- Schwarz, G. (2006). Expanding literacies through graphic novels. *English Journal*, 95.
- Schwarz, G. (2007). Media literacy, graphic novels, and social issues. *Simile*, 7.
- Senna, P., (2018). Prof, cos'è un graphic novel?, *Pearson*.

BRIDGING LANGUAGE GAPS OF L2 (SECOND LANGUAGE) TEACHERS BY OPTIMIZING THEIR SELF-AWARENESS

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Abstract

During a Canada-wide consultation session of teacher trainers for future teachers of French, Canada's official second language (L2), given the problematic situation of unprepared candidates with questionable mastery of the language, some instructors even retreated to a position stating that these students need to be encouraged although they are struggling with French. What this implies is placing role models in classes with inaccurate French, repeating the same situation if not making it even worse as indeed early French immersion is still the chosen protocol by Canadian non-French speaking parents. Young children absorb language like sponges repeating their teacher and if their French is inaccurate, learning the mistakes.

What is however of more crucial importance is not to replicate language programs delivery from which learners emerge without sufficient mastery to make themselves understood because of inaccurately learnt language forms. Therefore, we have to uncover remedies to properly guide all learners, through strategies and techniques for their individual management of the language they are trying to acquire-learn. We want to ensure an economy of time in teaching programs with efficient contact times.

Revisiting language programme approaches to uncover what was advocated for error correction, we looked at actional attention (Ellis, 1992), work on noticing (Fotos, 1993), markedness (Larsen-Freeman, 2018), interference (Abdullah & Jackson, 1998) interlanguage theory (Selinker, 1972), the monitor model (Krashen, 1982) and recent types of approaches, namely notional functional, communicative, and action-oriented. As well, we gleaned insights from a review of the literature on strategies and techniques including Raab, (1982) on spectator hypothesis with feedback to the whole class; through peer correction by Cheveneth, Chun and Luppescu (1983); with other innovative techniques suggested by Edge (1983); techniques advocated by Vigil and Oller (1976) for oral correction; and correction across modalities (Rixon, 1993).

We will report on a qualitative study (Creswell & Poth, 2018) based on an analysis of instructor's notes regarding the observed effect on some of the strategies that were tried and across different student groups. In this study, notes on how the instructor devised ways of drawing attention and using metacognition to obtain the best results are examined. In addition, ways involving the affective domain, through emotions and also using innovative ways through disruptions etc. were tried to see if they provided a further impact.

Students reported that they appreciated the corrective feedback the way it was dispensed. However results show a variety of concerns, namely the problem with deeply fossilized errors, some students' being over confident about their language ability, and either a deep concern for making errors that is paralyzing or a belief that over time correction will take place in interlanguage development without making any effort.

Due to page limitations, in this paper we will essentially present overarching aspects.

Keywords: *Self-awareness raising, error correction, emotions and creativity.*

1. Introduction

A major problem identified in Canadian French language programs in English language (L1) speaking provinces was the fact that many students have inadequate levels of French. The difficulty resides in the fact that student error correction is very controversial and that there are correction protocols both for oral and written French. Findings in psychology point to the need to access awareness in order to operate change and for some repeated applications for consolidation.

The most recent tendency in order to bring about paying more attention to language use and correction has been to fall back on multi-linguaging. Using the mother tongue to clarify aspects in L2 can help improve consciousness raising around problems. The danger with this strategy is going back to talking about the language rather than talking the language to be learned.

2. Method

We used a qualitative approach as we were interested in finding out a lot of detail about lived experiences (Creswell, & Poth, 2018). The site is a Faculty of Education where teacher preparation programs are offered. Participants were students enrolled in French teacher specialization and there were six courses under scrutiny with a total of approximately 150 students with some drop-outs and irregular attendance. These future teachers in Canada are required to have two teaching subjects, a major and a minor with fewer courses in that second subject. The study consisted of the analysis of an instructor's teaching journal and class notes, and it was decided to investigate over two academic years as it appeared that the problems seemed to increase over time and additional strategies had to be applied.

Entrance into the program is highly competitive and students' statements of prior experiences are attributed as much value as academic criteria. The program has two components, with one consecutive stream i.e. students who had just decided to become teachers, and a concurrent stream with students carrying out their regular academic studies along with introductory education courses during all the university years, including class observations and some teaching practice.

The analysis consisted mainly in textual analysis highlighting emergent themes and experiences to uncover how these students language barriers were overcome, what strategies were used, what prompted what reactions etc. A description of the elements behind the instructor's decisions included the fact that a number of complex aspects were involved especially when having to deal with fossilized language forms, anglicized or influenced by Spanish due to South American population movements. The instructor also decided that in order to prevent anxiety and the blockage of the affective filter a subtle combination of strategies was deemed to be more effective in light of the accumulation of complex issues to be faced. Anonymity was maintained and pseudonyms used when names are mentioned.

3. Findings and discussion

The idea was to uncover remedies to properly guide all learners, through strategies and techniques for their individual management of the language they were trying to improve upon. The need to ensure an economy of time in teaching programs with efficient contact times was identified given the collapse of the program into 16 months rather than the two full years mandated by the Ministry.

By the end of the courses, students were thankful for all they had acquired and appreciated the various reflections and designed activities embedded with correction techniques. The success of the strategies could be measured by the superior quality of the students' assignments.

The analysis of instructor's notes allowed to tease out the following major themes: the need for various strategies, the need to alleviate strong emotional upsets, how to ease anxiety, the impacts of preparedness and confidence, and of changes of focus.

3.1. Articulating a wide variety of strategies

The study shows that the instructor decided to present all the diverse views on student correction to the class to familiarize them with a variety of possibilities from which they could choose. They looked at corrections through actional attention (Ellis, 1992), work on noticing (Fotos, 1992, 1993a, 1993b), markedness (Larsen-Freeman, 2018), interference (Abdullah, & Jackson, 1987), interlanguage theory (Selinker, 1972), the monitor model (Krashen, 1982) and recent types of approaches, namely notional functional, communicative, and action-oriented. As well, insights were gleaned from a review of the literature on strategies and techniques including Raab, (1982) on spectator hypothesis with feedback to the whole class; through peer correction by Chenoweth, Day, Chun and Luppescu (1983); with other innovative techniques suggested by Edge (1983); techniques advocated by Vigil and Oller (1976) for oral correction; and correction across modalities (Rixon, & Erwin, 1993).

Following this presentation of concepts the idea was to find correction possibilities across a variety of practical activities. Through their interactions, students were made more aware of language use and interacted to give corrective feedback or asked questions. These activities involved group work.

They carried out dicto-gloss activities. These consist of note taking with the objective of reconstituting a text. Students were to draw three columns to allow note taking after listening to an oral text three times. After each listening, they shared and completed their notes with a peer with the idea that for the completion of the last column there would be more discussion as the text had to be recreated.

They also engaged in concept attainment exercises. These are based on identifying a concept through binary eliminations using identifiers. These were written on small pieces of paper and handed to students to be placed on a 'yes versus no' chart, making hypotheses as to whether or not the qualifier applies. Throughout, students discuss possibilities and end up discovering the concept. This activity was centred around language forms and lexical items.

Disruption in class routine also allowed better concentration. For instance gaming aspects were added to regular activities where ever possible. As an example, for one activity type they could not use certain words, or there was a time limitation, or instead of a written answer they had to produce a graph, using a summarizing strategy. There were 20 question group competitions based on explanation of language use and definitions. Activity centres were devised to increase the pace of activity completion with a rotation every seven to 10 minutes. This entailed a fair amount of negotiations around language forms.

Creativity and originality were encouraged, like for instance having students draw their emblem on language learning situations, or having them draw their week-end activities, exchanging drawings with a partner who was to glean the information from the drawing and by asking questions.

Contact with L1 products were encouraged, for instance through treasure hunts in real museums virtually. In this case, students could choose activities suited to their level of proficiency.

All the examples above showed students engaging with some of the techniques presented, they were consciously active and questions were dealt with at the metacognitive level.

In addition to group work, we also resorted to whole class feedback based on spectator hypothesis. This was achieved through presentations in front of the whole class, and also 'four corner activities'. In the latter case, a controversial topic or an item from the daily news, became the object of discussion and students had to place themselves in the correspondingly labelled corner, according to whether they totally or somewhat agreed or disagreed. Then in turn each had to justify the choice and all this resulted in a final discussion. This required a number of language manipulations and increased students paying attention to the language forms used.

Throughout all the diverse practices students remained aware of their own and their peers' language uses and also engaged in self- and peer-correction as well as asking relevant questions in order to get help.

3.2. Expression of anger, blame and overall fatigue

A small number of consecutive students expressed anger when being confronted to their insufficient mastery of the French language for classroom use after having spent years studying it. This came about during classroom oral activities, especially with the realization that they were lacking many vocabulary items, and were stuck more with formulaic expressions than with a communicative ability.

Five of them blamed their school teachers for not having pointed out the mistakes they were making and letting them get away with speaking what is termed as 'franglais' in Canada, i.e. French based on English.

The activities devised, with encouragement from the instructor, peer support and continuous practice over the five weeks prior their actual teaching placement in schools appeared to somewhat alleviate this anger and feelings of incompetency. The main point was to show them how quickly they could adapt and complete assignments with their peers as all early assignments were mainly based on group work especially during the second year. After having identified the problems over the previous years and their aggravation over time that had been deemed to be a good decision.

Three others were upset because they felt that in the university courses they took there was insufficient practice in the oral language. Therefore, obviously no corrective feedback was available to these students on their oral interactions. This could, also be based on the fact, that there are contradictory discourses on the effectiveness and efficiency of the different types of corrections. Various researchers recommend not interrupting the flow of speech during oral practice, specially recommending to not worry about mistakes, but only be concerned with follow-up on errors that are more serious. On the other hand, other research findings point to the need to nip errors in the bud before they become fossilized, and recommend immediate intervention. Specific ways of intervening are also subject to controversies with the only overall acceptable strategy, according to specialists, is involving metacognition if one expects results.

Hence, confronting the speakers with a question to have them reflect on what they said, at a metacognitive level, requires them to reflect on language use and attempt to sort out what they are trying to say and adjust it to a form that they can acknowledge as being accurate. Or else the instructor can keep on prompting until an accurate way of expressing a thought is found, even if only in the form of a paraphrase.

All in all, carrying out this correction implies difficult choices, is time consuming and delicate and perhaps if some instructors choose not to do this, perhaps they also do not have the required specialized background as an applied linguist in a teacher preparation program would have.

This information was unsettling as a prerequisite for entrance into the program is an advanced course in oral French and this did not make sense and required further investigating.

A number of the students in this group were able to overcome some hurdles due their level of creativity. They used alternative pathways, resorted to more visual data and creative uses of applications for the classroom. This creativity also helped them keep motivated when facing challenges.

3.3. Anxiety and the affective filter

It was therefore of utmost importance to design activities to reduce anxiety and hence to avoid blockage of the affective filter (Krashen, 1982). Hence devising action-oriented communication around a gaming approach, activities for the development of motivation by choosing topics of interest to students or adding an interesting aspect to topics had to be explored.

Multilingualism is a technique used to reduce anxiety by allowing students who share a heritage language to use it to help better understand their work in L2, separately practicing specifically for fluency and accuracy. The most recent trend to bring more attention to language use and more efficient and effective correction is using the mothertongue.

The lack of differentiation between correcting for accuracy and developing fluency also causes confusion. Without this separation, there can only be uncertainty as regards students' progress. In addition, without the distinction, when teachers are trying to conflate the two into just productive or receptive abilities, there are too many aspects that have to be left unexplored. Recently in Ontario with the push on communication, accuracy was often left by the wayside and this could account for some gaps in the present student population in the teacher preparation program.

Despite all the attempts at alignment and fine-tuning when faced with their first school placement assignments, many students became very anxious, Although the majority of them displayed a certain degree of confidence the students from the concurrent program all indicated that they felt apprehensive. A number of them got their placement in French changed to the second term, hoping to develop more confidence over time and to get better acclimated. Nevertheless two students dropped out of the program at that time, one in each year. Mark, although feeling uncertain, had an acceptable level of communicative competence and an excellent accent in French, having a French grandmother, however he felt unable to face students in the classroom. He was given an opportunity to reenter the program in the following year. Paul's fluency in French was not adequate and he withdrew totally from the program despite my help with plans in getting him to use readymade materials thus minimizing his direct involvement in directionality and only in facilitation in front of his classes.

More recent statements from the Ontario College of Teachers, the accreditation body in the province, point to a lack of resilience in new teachers leading to burnout. Moreover, studies identified new teachers lacking self-regulation strategies that have to do with how stressors are handled. They are found to be insufficiently resourceful in ways to manage and regulate their energy states, their emotions, thoughts and behaviors in acceptable ways with positive results in order to be well, have loving relationships and effectively learn. That means that they are lacking self-awareness, emotional intelligence, an efficient way to filter sensory stimulation, to relate to others and to sustain focus in order to cope well with stress. The awareness of their inadequate quality of language is an additional stressor.

3.4. Preparedness and confidence

Of a total of 130 students, the majority were confident and took everything in their stride. Not only did they have good levels of French, there were also French native speakers included, plus based on the criteria in the program selection process these students also had excellent teaching capabilities. Nevertheless a stark contrast could be identified between the French first language (L1) speakers and the overconfident French Immersion (FI) students with less than adequate levels of French.

As another example, one student from a private university, accepted mainly for high grades, displayed a total lack of preparedness in terms of language background, as she was unable to express herself in French without seeming to take time to translate from English. She managed during the initial five weeks thanks to peer support. However, she demonstrated a good level of confidence, showed that she had acquired self-regulation and appeared to be resilient.

Two students had graduated from an on-line university with all their French courses on-line and no opportunity to really interact orally. Although their communicative ability was hesitant initially, not necessarily fraught with mistakes, it appeared that their maturity and a solid basis that they eventually managed to reactivate, placed them in good stead. These two students developed a proper way of channeling their abilities and had the willingness to explore all avenues.

4. Conclusion

By the end of year, many of the strategies had become second nature and besides self-correction and peer correction. Some students also appeared to have sought help with corrections from specialized resource personnel like the University writing center staff with help available for the review of assignments. All in all, this developing awareness and the commitment to produce professional quality of language will place my students in good stead in their career if they continue with the habits that were practiced in consciousness raising for quality language during class.

Better yet, it is hoped and as the strategies were found useful and interesting, that in turn these will also be implemented in their own classrooms as they monitor their own students' progress in using the French language.

Where major problems were identified we have to remember that language plays an essential role in the distortion of meaning (deGramont, 1992), hence the problems might be aggravated due to the use of L2. As well, more complex issues come into play and it would be useful to investigate them in future research, namely the importance of the more specific contexts that shaped these students' experiences (Baars, 1997).

References

- Abdullah, K. & Jackson, H. (1998). Idioms and the language learner: contrasting English and Syrian Arabic. *Languages in Contrast* 1, 1, 83-107.
- Baars, B. (1997). *In the theater of consciousness: the workspace of the mind*. Oxford: Oxford University Press.
- Chenoweth, A., Day, R., Chun, A., & Luppescu, S. (1983). Attitudes and preferences of ESL students to error correction. *Studies in Second Language Acquisition* 6, 1, 79-87.
- Creswell, J. & Poth, C. (2018). *Qualitative inquiry and research design. Choosing among five approaches* (Fourth edition). Thousand Oaks, Cal.: SAGE.
- deGramont, P. (1992). *Language and the distortion of meaning*. New York: New York University Press.
- Edge, J. (1983) Reading to take notes and to summarize: a classroom procedure. Retrieved from: https://infallibleinroad.co.uk/scholarspace.manoa.hawaii.edu/bitstream/10125/66969/1/1_2_10125_66969_rfl12edge.pdf
- Ellis, R. (1992). Learning to communicate in the classroom: study of two language learners. *Studies in second language acquisition* 14, 1-23.
- Fotos, S.S. (1992). *Grammar consciousness raising tasks: negotiating interaction while focusing on form*. Temple University ProQuest Dissertations Publishing, 9227461.
- Fotos, S.S. (1993a). Integrating grammar instruction and communicative language use through grammar consciousness-raising tasks. *TESOL Quarterly* 28, 2, 323-351.
- Fotos, S.S. (1993b). Consciousness-raising and noticing through focus on form: grammar tasks versus formal instruction. *Applied Linguistics* 14, 4, 385-407.
- Krashen, S. (1982). *Principles and practice in second language acquisition*. Oxford: Pergamon Press Inc.
- Raab, L.M. (1982) Conflict centered on the cultural concepts that were not anticipated. *North American Archeologist* 2, 4, 331-343.
- Rixon, R., & Erwin, P.G. (1999). Measures of effectiveness in a short term interpersonal problem solving program. *Counselling Psychology quarterly* 7, 305-310.
- Selinker, L. (1972). Interlanguage. *IRAL* 10, 1-4, 209-232.
- Vigil, N., & Oller, J. (1976). Rule fossilization: a tentative model. *Language Learning* 26, 281-296.

PECULIAR NUTRITIONAL HABITS IN ROALD DAHL WORKS: A STORYTELLING INTERVENTION ON PROMOTING PRESCHOOLERS' DIETARY SELF-REGULATION

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Abstract

One of the recurring motifs in Roald Dahl works whether leading to the plot's unfolding or not, is the peculiar nutritional habits and, by extension, everything connected with it, such as socio-emotional behaviors and concepts of the dietary rules' infringement. Looking at *The Twits*' distorted dietary hygiene, *George's Marvellous Medicine*'s disorientated nutritional advices and *The BFG*'s disgusting essential goods, it can be observed that the food as an act and its processes, are cultural notions identifying current concepts of not only the excesses and the adult's control upon children, but also the pedagogically proper nutrition. A reading of the interpretations carried by food's humorous representations in Dahl's aforementioned classics is ventured. The ways of how children's literature depicts the characters' nutritional attitudes and their possible implications on their behavior are analyzed. While proceeding, the design of a storytelling intervention on promoting dietary self-regulation is proposed for kindergarten. A series of narrative and creative writing activities of subverting and parodying Dahl's works, which aim to familiarize preschoolers with notions such as nutritional balance, food hygiene and eating habits, is presented. Dahl's humorous and extreme carnivalesque depiction of nourishment, followed by an exaggerated deviation of normal eating habits, is what could provoke and motivate preschoolers to shape a healthy nutritional attitude and a dietary self-regulation. The contribution of this particular study is to highlight children's literature significant role as a means of influencing children's thinking on fundamental issues related with their health, and to demonstrate storytelling's dynamics as a teaching tool for shaping their attitudes towards life matters.

Keywords: *Peculiar nutritional habits, Roald Dahl, storytelling intervention, preschoolers, dietary self-regulation.*

1. Introduction

“Food experiences form part of the daily texture of every child's life [...]; thus, it is hardly surprising that food is a constantly recurring motif in literature written for children” (Keeling & Pollard 2009: 10). As such a case, Roald Dahl uses food linking it with peculiar nutritional habits, social misbehaviors and concepts of the dietary rules' infringement. Looking at “The Twits” (1980), “George's Marvellous Medicine” (1981) and “The BFG” (1982), it can be observed that the archetypal of food as an act and its processes, the infringement of what is associated with nourishment, constitute a reason for the emergence of symbolisms that describe a powerful instrument for rewarding or discipline, as bait for deception, control or even bullying (Keeling & Pollard, 2009).

2. Literature review: Critical reading of nutritional habits in Roald Dahl works

Bakhtin's carnival theory (1984) offers a theoretical tool for the study of children's literature where the predominant ideology is being violated and social rules are being questioned. He acknowledges carnivalesque elements which characterize any literary text that tends towards the mockery and questioning of nourishment values, and the twisting of this basic human need. The paradox eating occurrences in Dahl's works consist of a form of expression of this anarchistic disposition against conventions (Kalaitzi & Gavriilidis, 2019). The gastronomically extreme peculiarities in three selected texts will be interpreted subsequently. All texts, dated to the early 80ies, frame exaggerations in eating habits or deviations from whatever constitutes normality in nourishment procedures. In the critical approaching of the texts below, there has been an attempt of reading them as examples of the carnivalesque element; as characteristic token of texts for this age of readership that feature complex compounds of humor which, as Alberghene (2013) puts it, offer the opportunity for child readers to become aware of alternative ways of thinking.

2.1. In dinner with The Twits

Mr Twit didn't even bother to open his mouth wide when he ate. As a result (and because he never washed) [...] you would see tiny little specks of dried-up scrambled eggs stuck to the hairs, and spinach and tomato ketchup and fish fingers and minced chicken livers and all the other disgusting things Mr Twit liked to eat. If you looked closer still (hold your noses [...]), [...] you would probably see [...] a piece of maggotty green cheese or a mouldy old cornflake or even the slimy tail of a tinned sardine. [...] By sticking out his tongue and curling it sideways to explore the hairy jungle around his mouth, he was always able to find a tasty morsel here and there to nibble on. (Dahl, 1980:20-22)

The description of Mr Twit absolutely expresses what Daniel (2006) suggests that food reveals who we are, where we came from, and what we want to be. For the young reader, the adult Mr Twit -from which Mrs Twit does not essentially differ much- is in a state of glorious disharmony with the rules of dietary hygiene imposed by the society. Katz (1980) notes that manners constitute an important feature of eating and the types of food consumed may signal some broader meaning in the text, or important insights about individual characters. Quoting West, it can be argued that “an aspect of The Twits that appeals more strongly to children than to adults is the disgusting nature of Mr and Mrs Twit. [...] On one occasion, Mrs Twit puts her glass eye in Mr Twit's beer mug, and he nearly swallows it. Another time she pours spaghetti sauce over a plateful of live worms and serves it to her unsuspecting husband” (1990: 115). The absolutely appalling gastronomic behavior of Mr Twit, distorts every familiar view of hygienic culinary behavior and concludes with the pleasure that is supplied by the grotesque, which complies with Bakhtin's quote “all that was terrifying becomes grotesque” (1984: 91). By witnessing the grotesque couple in their unbalanced eating habits, young readers could distinguish all that our matter is subjected to, in which our ethics and our substance is being codified, if we deviate from the rules. Dahl constructs a disgusting depiction of adult figures in reference with their dietary -with an absolute lack of nutritional balance- attitudes -which refer to grotesque medieval comic images- while he subjects them to immense criticism.

2.2. In dinner with George's Marvellous Medicine

It's what's good for you that count. [Grandma snapped]. From now on, you must eat cabbage three times a day. [...] And if it's got caterpillars in it, so much better!'. [...] Cabbage doesn't taste of anything without a few boiled caterpillars in it. Slugs, too. [...] Whenever I see a live slug on a piece of lettuce [...] I gobble it up quick before it crawls away. Delicious.' [...] 'Warms and slugs and beetle bugs. You don't know what's good for you [...] Beetles are perhaps best of all. They go crunch! [...] Sometimes, if you are lucky, she said, you get a beetle inside the stem of a stick of celery. [...] A big fat earwig is very taste, Grandma said, licking her lips. (Dahl, 1981:5-7)

An implication of children's unawareness of what's nutritious for them to eat is underlined here; but George, who perceives the alienated gastronomic preferences in the dietary advices of his Grandma, attempts not only to contradict her authority, but also to restore her gastronomic balance through the production of a medicine. The peculiar dietary ideas of Grandma and the daring attempts of George, meet in the *gobble up* act, since medicine and meals are related to consumption. Beyond this, George's marvellous medicine ends up disfiguring strangely whoever happens to taste it. It is a common pattern after all in books of children's literature to find metamorphosis and bodily size fluctuation that comes from eating and drinking, with the most renowned example to be Lewis Carroll's Alice in Wonderland (Katz, 1980). The resetting of size is not achieved in Grandma because by exaggerating with the dosage of the marvellous medicine begun to shrink until she was no bigger than a pin and then a pumpkin seed, until she is rendered invisible. As it is a common practice in Roald Dahl's works, the figure of the cannibalistic adult, Grandma in that case, suffers from a horrible ending, reversing the order of the world and carrying implications of why children should respect their food (Kalaitzi & Gavriilidis, 2019). The narrative reveals one more adult who is punished because of their unorthodox dietary habits, and who, in George's case, tries to disorientate a child too, as far as proper nutrition is concerned (Katz, 1980). Despite the various symbolisms and interpretative approaches that can be used to understand the changes that matter can produce on our essence, in Dahl, food is the vehicle for him to play with the social rules of the adult class and, in that case, to imply lessons for food hygiene by penalizing adults who like their vegetables filled with bugs.

2.3. In dinner with the BFG

In BFG's surrealistic secular society there are only two kinds of food, as well as eaters. The snozzcumber -a long striped lengthwise black and white cucumber with wart-like growths [...] tasted of frogskin, rotten fish, cockroaches and slime wangers (Dahl, 1982:58-61) - along with frobscottle, is the sole diet of the Big Friendly Giant; a kind of a vegetarian one might say. But for the rest of the non-friendly giants, Fleshlumpeater, Bonecruncher, Manhugger, Childchewer, Meatdripper, Gizzardgulper, Maidmasher, Bloodbottler and Butcher Boy, human flesh is their treat; proven hard-core

carnivores as they are. Notions of food functioning as punishment appear at BFG. Not only the protagonist feeds himself with repulsive food in his effort not to be a flesh-eater, but when he captures the rest of man-eaters giants he feeds them this same food for the rest of their lives -an apparent act of penalization, due to the snozzcumber's disgusting flavor- which is even worse for them after a lifetime of eating humans (Hodgkins, 2002). It is, also, apparent that these terrifying giants' names reflect their human-being-diet and their gastronomic habits that favor the body. In accordance with Nikolajeva who states, "one of the most common folktales archetypal connected with the food, is 'to eat or to be eaten'" (2016: 365), Dahl, with a whole list of made-up language, called 'Gobblefunk', emphasizes on whatever is related to the consumption of food and drink, transforming the pleasure of food into a terrifying adventure. This transformation has strong carnivalesque elements and it is for this reason that the terrifying becomes entertainingly humorous (Bakhtin, 1984). With the carnivalesque depictions of the adult world, Giants' world in this case, the narrative challenges adult superiority in relation with their dietary habits and attitudes, while it gives to the child-readers the carnivalesque freedom in searching for different and alternative ways of action.

2.4. Aim of the current study

The particular study aims to present a series of interdisciplinary connections among literature, language and science. More specifically, food implications in Roald Dahl's works become the medium for teaching preschoolers about nutritional self-regulation through storytelling approaches. For the above purposes, a detailed outline of an intervention is proposed, as an interdisciplinary teaching approach in early years.

3. Methodology

3.1. Framework: A storytelling intervention on promoting preschoolers' dietary self-regulation

The design of a storytelling intervention on promoting dietary self-regulation is outlined below in a layout form (Tables 1, 2 and 3) as a teaching proposal for an average class (17-25) of preschoolers (5-6 years old). The intervention is divided into three phases, including nine activities in total (three activities per phase). Each phase uses one of selected Dahl's works as a reference point for subversion or parody, aiming to familiarize preschoolers with notions such as nutritional balance, food hygiene and eating habits. General purposes, specific objectives, and interdisciplinary connections of learning areas are based on the framework of the New Early Years Curriculum (Institute of Educational Policy, 2014).

Table 1. Intervention phase 1 – Nutritional balance limericks.

ACTIVITY LAYOUT: "Mouth-battles"			
GENERAL PURPOSE & SPECIFIC OBJECTIVE	<ul style="list-style-type: none"> • Demonstrate a knowledge of nutrients' value using storytelling ➢ To express themselves through limericks about nutritional balance (Institute of Educational Policy, 2014) 	LEARNING AREAS – INTERDISCIPLINARY CONNECTIONS	<ul style="list-style-type: none"> • Science/ Living creatures • Personal & Social Development/ Self-regulation • Language/ Oral speech • Art & Culture/ Painting (Institute of Educational Policy, 2014)
DESCRIPTION			
<ul style="list-style-type: none"> • <u>Activity 1 – All that Mr Twit can eat</u>: Each preschooler chooses a nutrient leftover from Mr Twit's mouth to present it in the circle. They gather information about its benefits and nutritional value. • <u>Activity 2 – Leftovers' vignettes</u>: Preschoolers draw vignettes of food leftovers. In the vignette they depict the ingredient of their choice and its benefits. • <u>Activity 3 – Cullinary battles</u>: All preschoolers generate limericks which present one of the ingredients from Mr Twit's mouth, its benefits and nutritional value*. <i>*i.e. There once were scrambled eggs/ Their rich iron made my heart begs/ Vitamins are filled/ Once eat them, you're healed/ A shelly fighter with yellow legs.</i> 			
LEARNING OUTCOMES	Preschoolers are expected to: <ul style="list-style-type: none"> • generate the narrative type of limericks • being aware of different nutrients' value 	ACTIVITY VARIANT	Mouth hygiene: <i>"Do you ever kiss poor Mrs Twit on the cheek with this mouth sick, Mr Twit?"</i> <i>Haikus (Japanese poem of seventeen syllables) about hygienic habits</i>

Table 2. Intervention phase 2 – Food hygiene Aesop fables.

ACTIVITY LAYOUT: “How bugs started living in vegetables”			
GENERAL PURPOSE & SPECIFIC OBJECTIVE	<ul style="list-style-type: none"> • Acknowledge of food hygiene acts using storytelling <ul style="list-style-type: none"> ➢ To express themselves through Aesop fables about food hygiene (Institute of Educational Policy, 2014) 	LEARNING AREAS – INTERDISCIPLINARY CONNECTIONS	<ul style="list-style-type: none"> • Science/ Living creatures • Personal & Social Development/ Self-regulation • Language/ Oral speech • Art & Culture/ Painting (Institute of Educational Policy, 2014)
DESCRIPTION			
<ul style="list-style-type: none"> • <u>Activity 1 – Aesopian titles</u>: Each preschooler chooses a bug and a vegetable to form the figures of their fable. They came up with a title which represents the bug’s damage on the vegetable. • <u>Activity 2 – Bugs & veggies’ vignettes</u>: Preschoolers draw vignettes in which they depict the damage of the vegetable caused by its bug. • <u>Activity 3 – Food care fables</u>: All preschoolers generate the Aesop fable structure, where a title gives contextual introduction of a bug (talking animal) and a vegetable, the plot describes the bug’s damage on the vegetable and the ethical guide in the end underlines the water purifying. *i.e. Title: “The slug that filled a lettuce with mucus”/ Plot: a lettuce which gets dirty by a slug - the rain cleans all the mucus from the lettuce/ Ethical guide: Now that the lettuce is slippery, the slug slips over. 			
LEARNING OUTCOMES	Preschoolers are expected to: <ul style="list-style-type: none"> • generate the narrative type of Aesop fables • being able to give advice about proper food hygiene 	ACTIVITY VARIANT	Multicultural eating habits: <i>Insects’ culinary myths and fables around the world</i>

Table 3. Intervention phase 3 – Eating habits picture short stories.

ACTIVITY LAYOUT: “Giant stories”			
GENERAL PURPOSE & SPECIFIC OBJECTIVE	<ul style="list-style-type: none"> • Demonstrate a knowledge of harmful dietary consequences using storytelling <ul style="list-style-type: none"> ➢ To express themselves through picture short stories about healthy eating habits (Institute of Educational Policy, 2014) 	LEARNING AREAS – INTERDISCIPLINARY CONNECTIONS	<ul style="list-style-type: none"> • Science/ Living creatures • Personal & Social Development/ Self-regulation • Language/ Oral speech • Art & Culture/ Painting (Institute of Educational Policy, 2014)
DESCRIPTION			
<ul style="list-style-type: none"> • <u>Activity 1 – Giant heroes</u>: Preschoolers present Giants’ eating habits (due to their multiplicative names) in the circle and they express their thinking of why these habits are harmful. • <u>Activity 2 – Giant portraits</u>: Each preschooler draws a portrait where they depict a Giant’s external characteristics and their peculiar eating preferences. • <u>Activity 3 – Giant stories</u>: All preschoolers generate short stories which follow the basic narrative structure, where a Giant is the hero, who has a peculiar eating habit as a problem and a change in his nutrition is proposed as a solution in the end. *i.e. Hero: Bonecruncher / Problem: he eats only bones, which are stiff and difficult to digest and he suffers from constipation all the time/ Solution: start eating vegetables and fruits. 			
LEARNING OUTCOMES	Preschoolers are expected to: <ul style="list-style-type: none"> • generate the narrative type of picture short stories • distinguish between healthy & harmful dietary consequences 	ACTIVITY VARIANT	Vegetarianism: <i>BFG’s vegetarian picture short story</i>

4. Discussion

Dahl’s characters like the Twits, Grandma and Giants are being taught valuable lessons due to their own endless unhygienic, peculiar, unbalanced, carnivalesque eating manners and attitudes. What has emerged is that the adults’ control forced upon the child’s perception of nourishment, is overthrown, ridiculed, condemned and finally, reaching the extremes, is defeated (Kalaitzi & Gavriilidis, 2019;

Keeling & Pollard 2009). And this humorous representation of nutritional standards is that allow young readers to dream about their reality; to set their own dietary rules (Alberghene, 2013; Stephens, 2013). The subversion of healthy dietary habits in Dahl's texts does not end with the reintegration into a familiar acceptable regularity (Kalaitzi & Gavriilidis, 2019). This is where the semantic gap is; this is why Dahl's texts could become powerful mediums for teaching.

When the proposed storytelling intervention was conducted, the produced preschoolers' narratives showed that preschoolers are capable not only to assimilate the importance of dietary self-regulation, but also to include food hygienic advises and balanced dietary habits in their storytelling. Nevertheless, the objective of this particular study is not the display of the results, but the presentation of the intervention itself, as an effective teaching proposal.

As Stephens (2013) highlights, whether food tempts or excites, punishes or rewards, it will remain a fixture of children's literature. And they are books for children that work as, among others, a medium for shaping young-readers' critical thinking. Hence, Dahl's humorous and extreme carnivalesque depiction of nourishment, followed by an exaggerated deviation of normal eating habits, is what could provoke and motivate preschoolers to shape a healthy nutritional attitude and a dietary self-regulation.

5. Conclusion

The contribution of this particular study to the field of scholarly approaches of children's literature is to highlight its significant role as a means of influencing children's critical thinking on fundamental issues related with their health and to prove storytelling's dynamics as a teaching tool for provoking young children's creative expression on attitudes towards life matters.

References

- Alberghene, J. M. (2013). Humor in children's literature. In P. McGhee (Ed), *Humor and children's development: a guide to practical application* (223-245). London & New York: Routledge.
- Bakhtin, M. M. (1984). *Rabelais and his world* (1st ed.1965). Bloomington: Indiana University Press.
- Dahl, R. (1982). *The BFG*. London: Jonathan Cape.
- Dahl, R. (1981). *George's Marvellous Medicine*. London: Jonathan Cape.
- Dahl, R. (1980). *The Twits*. London: Jonathan Cape.
- Daniel, C. (2006). *Voracious Children. Who Eats Whom in Children's Literature*. London & New York: Routledge.
- Hodgkins, H. H. (2002). White Blossoms and Snozzcumbers: Alternative Sentimentalities in the Giants of Oscar Wilde and Roald Dahl. *Critic*, 65(1), 41-49.
- Institute of Educational Policy. (2014). *21st Contemporary school – New Curriculum* (Horizontal Act MIS: 295450, Subcontract 1 “Implementation of Curriculum in Compulsory Education”). Athens: Hellenic Ministry of Education and Religious Affairs.
- Kalaitzi, C., & Gavriilidis, S. (2019). A reading of contemporary short stories dealing with food and humour. *Studying humor - International journal*, 6.
- Katz, W.R. (1980). Some uses of food in children's literature. *Children's literature in Education*, 11(4), 192-199.
- Keeling, K. K. & Pollard, S. T. (Eds.). (2009). *Critical Approaches to Food in Children's Literature*. London & New York: Routledge.
- Nikolajeva, M. (2016). Food. In A. E. Duggan, D. Haase & H. J. Callow (Eds.), *Folktales and Fairy Tales: Traditions and Texts from around the World* (Rev. ed.) (363-366). Santa Barbara, California: Greenwood.
- Stephens, M. A. (2013). "Nothing More Delicious: Food as Temptation in Children's Literature" *Electronic Theses and Dissertations*, 50. Retrieved February 2, 2022, from: <https://digitalcommons.georgiasouthern.edu/etd/50>
- West, M. (1990). The Grotesque and the Taboo in Roald Dahl's Humorous Writings for Children. *Children's Literature Association Quarterly*, 15(3), 115-116.

SPORT AND PERFORMANCE PSYCHOLOGY IN SECONDARY EDUCATION

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Abstract

The mission of sport and performance psychology is to facilitate psychosomatic resolutions to help boost performance and well-being in those individuals who participate in sports. The incorporation of these performance-enhancing concepts in mental training is especially important for high school student-athletes with a negative mindset. Unfortunately, at the secondary level, there are a limited number of educational processes available which formally guide student-athletes through their psychological development in sport. As a result, many student-athletes are left without the mental skills needed to cope with the physical, psychological, and socioemotional demands of competition. The development of sport and performance psychology courses in schools could help facilitate positive improvements in how student-athletes think, act, and ultimately play, by merging the informal setting of extracurricular sports with the formal setting of the classroom. In this paper, we employ a mixed methods case study to demonstrate how a high school sport psychology class could impact the mindset of student-athletes. Course curriculum and pedagogy, grounded in a number of learning theories, was designed to utilize educational and psychological principles to create a course anchored in sport and performance psychology concepts. Specifically, this case study demonstrates course effectiveness at building mental skill through the cognitive-behavioral system of ‘Event + Response = Outcome’ in 14 different self-actualizing constructs like goal-setting, mental toughness, and leadership. We present our results on mental skill development and draw a number of conclusions alongside several recommendations for those wishing to incorporate an innovative sport psychology course at the secondary level.

Keywords: *Sport psychology, performance psychology, sports education, high school teaching, curriculum and pedagogy.*

1. Introduction

Sport psychology is an extremely young and evolving specialization within the broader field of psychology. Psychology is the scientific study of human behavior and mental processes and is one of the most popular courses to take at the high school and collegiate level. Within the lesser-known discipline of sport psychology, definitions are wide-ranging, diverse, and difficult to pinpoint. In general, sport psychology is a science in which principles of psychology are used within a sport or exercise setting (Cox, 2012, p. 4). According to the American Psychological Association (2019), “Sport psychology is a proficiency that uses psychological knowledge and skills to address optimal performance and well-being of athletes, developmental and social aspects of sport participation, and systemic issues associated with sport settings and organization.”

Most high school student-athletes can benefit from learning about sport psychology and building mental skill in constructs like goal-setting, mental toughness, and leadership (Afremow, 2018). In fact, sport psychologists and mental coaches have been working on building mental skill with college, professional, and Olympic athletes for many decades now in order to improve their athletic performance and enhance their personal well-being (Weinberg & Gould, 2019). While sports are not always directly tied to secondary education in international schools, there is still a presumed relevance for all students who perform at a competitive level. In fact, many national and international research studies have confirmed the effectiveness of different sport psychology skills training programs for various audiences (Vealey, 2007). However, only a few research pioneers have argued for bringing sport psychology into the schools (Gilbert, 2017; Rockwood, 2011; Lamberth, 2007; Gilbert et al., 2006; Maher, 2005; Weissman, 2003; Lyons, 2001). This literature, however, does not adequately address how sport psychology could be implemented into the curriculum of secondary education to benefit the almost eight

million high school student-athletes who participate in high school sports in the United States (National Federation of State High Schools Association, 2018). The rest of the paper is organized to help the reader better understand this possibility of school sport psychology based on a case study of a Sport and Performance Psychology course being taught at a high school in the Midwestern United States.

2. Background

While there is a growing base of literature in the field of sport psychology, there is a limited amount of research covering its incorporation in schools and education. In fact, school sport psychology is especially limited at the high school level where sport psychology courses are taught in a limited manner across the United States. The rest of this section provides background information related to the use of sport psychology in the school setting.

Michael Weissman became what seems to be the original pioneer for truly bringing sport psychology into high school. First, Weissman's (2003) dissertation was centered on his experience as an in-district school psychologist developing a sport psychology program at his urban high school. This program was designed and implemented within case study methodology and specifically focused on three sports teams at a New Jersey public high school. To help address student-athlete needs on these teams, Weissman's (2003) program used individual and team educational sessions alongside on-site consultations to teach student-athletes mental skills like anxiety management, motivation, discipline, confidence, intensity, focus, composure, communication, teamwork, accountability, and goal-setting. While the provision of these sport psychology services were oftentimes limited by time constraints, the main finding of this study revealed that a school sport psychology program designed and implemented for high school student-athletes was, in fact, feasible and could address the needs of those student-athletes in a satisfactory way (Weissman, 2003).

Next, Lamberth's (2007) study built upon Weissman's (2003) work in the school sport psychology literature by also designing and implementing a sport psychology program for high school student-athletes at the secondary level. Using Prochaska and Velicer's (1997) Transtheoretical Model of Change as a theoretical guide, a case study approach was implemented to understand how to design and implement three distinct sport psychology programs for Highland Park High School's (New Jersey) football, basketball, and baseball teams during the 2005-2006 school year. During this time, Lamberth attempted to build mental skill through team psychoeducational sessions, individual player sessions, onsite player and coach consultation, and player and coach feedback sessions. At the conclusion of her study, Lamberth's three sport psychology programs were endorsed by all parties involved as individuals reported gaining benefits from their participation. Specifically, her program was deemed effective in addressing specific needs and equipping them with the mental skills necessary to manage themselves appropriately and optimally (Lamberth, 2007, p. 33).

While Weissman and Lamberth's dissertations were two of the first published accounts of sport psychology programming being taught to student-athletes in the high school setting, Jenelle Gilbert proved to be a mainstay researcher in the field of school sport psychology over the next decade. Gilbert's main focus was to teach sport psychology skills in a meaningful and practical way, and believed most athletes were not mentally prepared to train and compete. As a result, Gilbert et al. (2006) had graduate sport psychology students teach a 12-week sport psychology curriculum to high school student-athletes using her innovative UNIFORM approach and Game Plan Format. This curriculum was offered in 50-minute lessons, twice per week during 6th period 'Athletic PE' classes. The curriculum consisted of three 4-week units on the following mental skills: confidence, belief, and positive attitude; desire, visualization, and commitment; and competitive greatness and character development. While no formal data collection occurred, general feedback from all parties involved within the process confirmed that high school student-athletes could successfully learn and implement sport psychology skills through Gilbert's sport psychology program. This study was the one of the first studies to document sport psychology curriculum being taught to high school students as part of a separate academic course (Athletic PE). Since this groundbreaking study, Gilbert (2011) and Gilbert and Lewis (2013) have further validated this curricular and pedagogical approach while providing further evidence of sport psychology's utility in the classroom setting, with Gilbert, Moore-Reed, and Clifton (2017) concluding: "Regardless of the teaching organization, athletes can and should be taught to use sport psychology and life skills. Though there is not one "correct" way to do this, with its multimethod approach and sport-themed activities, the Psychological UNIFORM appears to be an effective vehicle to accomplish this task" (p. 98). Interestingly, however, despite these limitations noticed by Gilbert, little is mentioned within having this approach taught by teachers within an actual sport psychology course.

3. Significance and research question

The significance of the present study is that it aims to fill a gap in the literature by exploring the process behind designing and implementing an innovative Sport and Performance Psychology course at a high school in the Midwestern United States. Specifically, this study examined how to effectively teach a course that is predicated on building mental skill and helping students with the psychological side of the game. By introducing these mental skills into a sport psychology curriculum, the course aimed to inspire and ultimately equip student-athletes with the skills necessary to chase the best versions of themselves on and off the field. Unfortunately, sport psychology research with high school student-athletes is very limited. While the effectiveness of sport psychology programming with high school student-athletes has been researched, there has never been a case study of an actual Sport and Performance Psychology course. In this case, the course was offered as an elective class within the school's educational curriculum, providing a rare opportunity to explore the effectiveness of a sport psychology classroom in-action. Additionally, because sport psychology is rarely taught at the secondary level, curriculum guidance is limited within what content to teach and how to effectively teach it. As a result, the present case study research strived to break new ground by capturing the effectiveness of one teaching approach for others to possibly consider when designing and implementing a sport psychology course in their school district. In the end, audiences interested in this research may include future sport psychology teachers, coaches, student-athletes, guidance counselors, athletic directors, school district administrators, and sport psychology consultants.

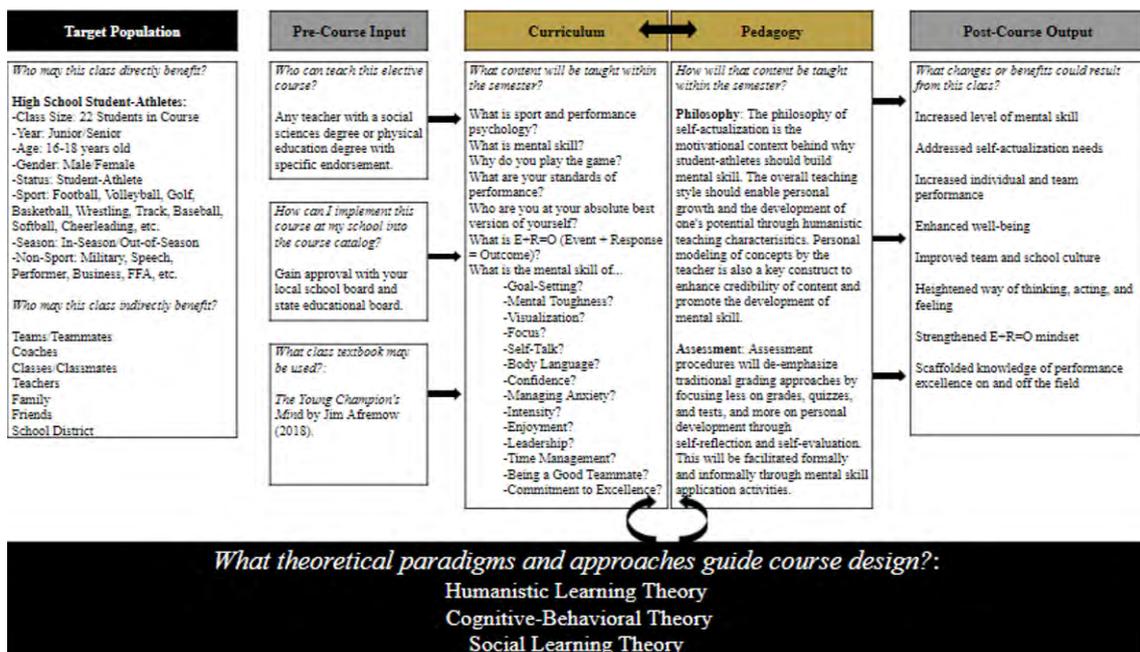
As a result, the following research question guided this case study exploration of a Sport and Performance Psychology course that was documented in this paper:

Research Question: To what extent could a Sport and Performance Psychology course be designed and implemented to build mental skill within high school student-athletes?

4. Theory

The proposed design theory utilized educational and psychological principles found within the literature to create a course anchored in mental skills related to sport and performance psychology. Specifically, humanistic learning theory was used as the main theoretical foundation for pedagogy and Maslow's theory of self-actualization served as the central motivational tenet to inspire student-athletes to become the best version of themselves. Most importantly, cognitive-behavioral theory was used as the main underpinning for curriculum development as Event + Response = Outcome served as the primary cognitive-behavioral system to teach and apply sport and performance psychology concepts. To detail how course design theory translated to practice, a pre-course logic model was created to better illustrate how theory was transformed into practical application. This was illustrated in Figure 1.

Figure 1. Sport and Performance Psychology Course Logic Model (Rickels, 2021).



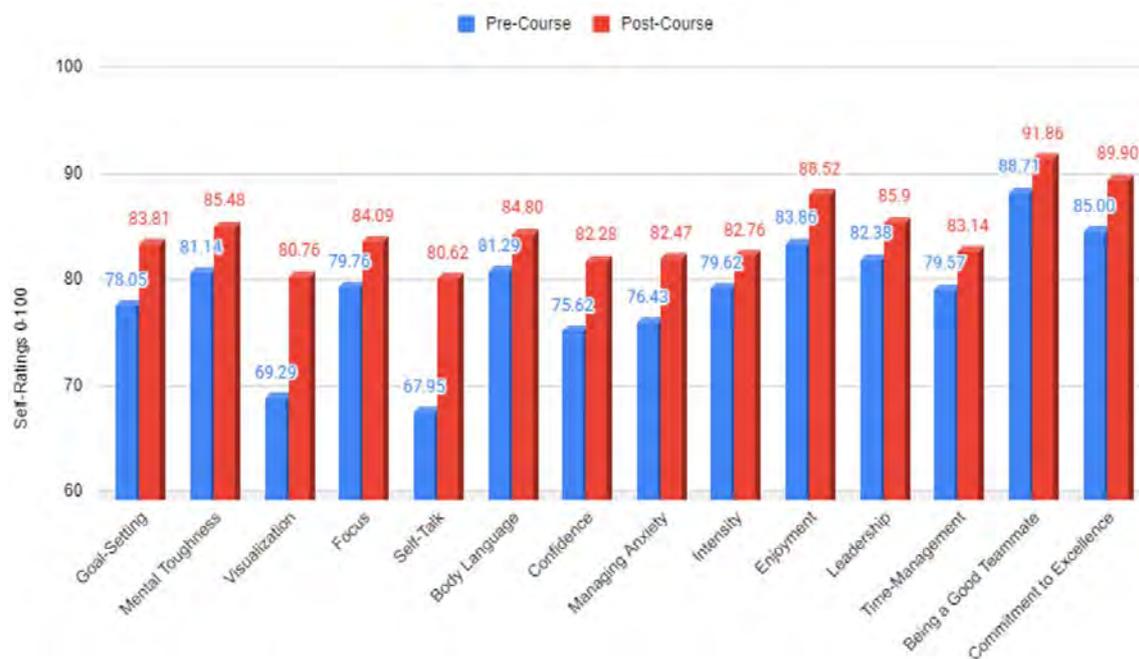
5. Methods

While physical skills in sport are external capabilities like speed, strength, and endurance, mental skills are internal psychological capabilities that contribute to success in sport, which can also be learned and improved with instruction and practice (Lesyk, 1998). As a result, case study methodology was utilized to examine the effectiveness of a semester-long elective class called *Sport and Performance Psychology* in building mental skill at a small public high school in the Midwestern United States from January 2021-May 2021. The 14 mental skills taught through the Event + Response = Outcome framework included the following: Goal-Setting, Mental Toughness, Visualization, Focus, Self-Talk, Body Language, Confidence, Managing Anxiety, Intensity, Employment, Leadership, Time-Management, Being a Good Teammate, and Commitment to Excellence. Evidence for mental skill development in 21 student-athletes was gathered using a mixed methods approach, as quantitative and qualitative data was collected through pre- and post-course surveys and participant interviews. Pre-course data included a baseline assessment of mental skill and a needs analysis. Post-course data collection included a final assessment of mental skill and participant feedback on course effectiveness.

6. Results and findings

After a thorough examination of the quantitative and qualitative data, the present study revealed substantial evidence that an effective sport psychology course could be designed and implemented at the high school level to build mental skill in high school student-athletes. When comparing the class average for pre-course mental skill to post-course mental skill, all 14 mental skills showed improvement (as illustrated in Figure 2), with an average increase of +5.56 per mental skill.

Figure 2. Side-by-Side Comparison of Mental Skill Level (Pre-Course and Post-Course).



At an individual level, student-athletes reported a positive change, on average, in 10 of their 14 mental skills (71%). This led to a measurable improvement in overall mindset for all 21 participants (100%), as determined by a participant's average self-rating for all 14 of their mental skills.

When participants were asked about effective curriculum and pedagogy, Event + Response = Outcome was commonly cited as an effective vehicle for learning, applying, and building mental skill. This mindset was overwhelmingly recognized by participants as "very helpful" and "a good framework to base every mental skill within." One of the student-athletes described it this way: "E+R=O can help anyone in any situation at any second of any day. It is literally the equation of life. You can never control the E, but you can sure as heck control the R, and how you respond with discipline or default, can shape or mold the O depending on how you respond to the E. It literally applies to every situation in life which is what I love so much about it."

7. Conclusion

Due to the fact that this was a single case study at a small public high school in the Midwestern United States, it is necessary for educators to understand the parameters of this case and determine for oneself how this paper may be relevant to their particular situation. From an educational perspective, sport psychology has not yet been established as a mainstream course within the United States' public school system; however, many believe it is only a matter of time before sport psychology programming is a normal part of the curriculum (Maher, 2005; Gilbert & Lewis, 2013; Gilbert et al., 2017). The present study contributes to the existing school sport psychology literature of Weissman (2003), Maher (2005), Lamberth (2007), and Gilbert (2011, 2017) and presents compelling evidence for sport psychology programming to take the shape of an educational sport psychology course designed and implemented to build mental skill in student-athletes. Overall, the findings of this paper suggested that a sport psychology course could be successfully designed and implemented at the high school level. Furthermore, an overwhelming majority of participants appreciated the course, quantitatively and qualitatively reporting a vast array of positive benefits from what they learned. Consequently, the rationale at the basis of this study was confirmed, as student-athletes reported improvements in athletic performance and well-being. As a result, we propose that sport psychology should be further integrated into secondary education, preferably through an actual school sport psychology course.

References

- Afremow, J. (2018). *The young champion's mind*. Rodale.
- American Psychological Association. (2019). *Sport psychology*. Retrieved July 17, 2019, from <https://www.apa.org/ed/graduate/specialize/sports>
- Cox, R. H. (2012). *Sport psychology: Concepts and applications* (7th ed.). McGraw-Hill.
- Gilbert, J. N. (2011). Teaching sport psychology to high school student athletes: The psychological UNIFORM and the game plan format. *Journal of Sport Psychology in Action*, 2, 1-9.
- Gilbert, J. N. (2017). Sport psychology teaching approaches for high school coaches and their student-athletes. *Journal of Physical Education, Recreation, & Dance*, 88(2), 52-58.
- Gilbert, J. N., Gilbert, W. D., Loney, B., Wahl, M.-T., & Michel, E. (2006). Sport psychology in an urban high school: Overview of a two-year collaboration. *The Journal of Education*, 187(1), 67-95.
- Gilbert, J. N., & Lewis, D. K. (2013). Sport psychology with high school student-athletes: Uniform and the game plan format [PDF]. *The Journal of Performance Psychology*, (6), 1-30.
- Gilbert, J. N., Moore-Reed, S. D., & Clifton, A. M. (2017). Teaching sport psychology for now and the future? The psychological UNIFORM with high school varsity athletes. *The Sport Psychologist*, 31, 88-100.
- Lamberth, R. (2007). *Sport psychology in the schools: The process of designing and implementing scholastic sport psychology programs at the secondary level* [Doctoral dissertation, Rutgers University]. ProQuest Dissertations and Theses.
- Lesyk, J. J. (1998). *The nine mental skills of successful athletes*. Ohio Center for Sport Psychology. Retrieved January 9, 2021, from <https://www.sportpsych.org/nine-mental-skills-overview>
- Lyons, M. (2001). In support of a written curriculum based on sport psychology for high school sports teams. *The Online Journal of Sport Psychology*.
- Maher, C. A. (2005). *School sport psychology*. Taylor & Francis.
- National Federation of State High School Associations. (2018, September 11). *High school sports participation increases for 29th consecutive year*. NFHS. Retrieved July 25, 2019, from <https://www.nfhs.org/articles/high-school-sports-participation-increases-for-29th-consecutive-year/>
- Prochaska, J. O., & Velicer, W. F. (1997). The transtheoretical model of health behavior change. *American Journal of Health Promotion*, 12(1), 38-48.
- Rickels, A. S. (2021). *Class in Session?: A Case Study Exploration of the X's and O's behind teaching a sport and performance psychology course at the high school level*. EdD thesis. University of Illinois Urbana-Champaign, Urbana, Illinois, USA.
- Rockwood, D. L. (2011). *Closing the gap: Applied sport psychology for high school*.
- Vealey, R. S. (2007). Mental skills training in sport. In G. Tenenbaum & R. C. Eklund (Eds.), *Handbook of sport psychology* (pp. 287-309). John Wiley & Sons.
- Weinberg, R. S., & Gould, D. (2019). *Foundations of sport and exercise psychology* (7th ed.). Human Kinetics.
- Weissman, M. E. (2003). *Sport psychology services in public schools: Breaking new ground through program development and support for student athletes and coaches* [Doctoral dissertation, Rutgers University]. ProQuest Dissertations and Theses.

CORRELATION BETWEEN PASSIVE REST AND THE APPEARANCE OF FATIGUE IN A GROUP OF PUPILS FROM BOTOSANI COUNTY

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Abstract

Introduction: fatigue is a physiological phenomenon that disappears when lowering effort levels and when sleeping. Young people need at least nine hours of sleep per day.

Material and methods: the study was carried out on a group of 246 high schoolers (9th and 11th grade) from three schools in Botoșani County. Pupils completed a questionnaire with questions about the daily time spent sleeping at night, the presence of fatigue, the time of day and the day of the week when it occurs and the presence of sleep during the day (naps). The results were processed using Pearson's chi-squared test.

Results and discussions: most pupils sleep for 6-7 hours (37.80%) or 7-8 hours (33.73%) per night, with statistically insignificant differences between the two classes ($p > 0.05$). Fatigue is often present in 46.34% of cases with insignificant differences between classes ($p > 0.05$). The correlation between night sleep and fatigue shows significant differences ($p < 0.05$). When waking up in the morning, 44.30% of young people feel tired, with statistically significant differences ($p < 0.01$). The correlation between the time allotted for nighttime sleep and the presence of morning fatigue shows statistically significant differences ($p < 0.01$). Most pupils in the 11th grade feel tired at the end of the week, while those in the 9th grade show signs of fatigue at the start of the week, the differences being statistically significant ($p < 0.05$). The correlation between nighttime sleep and the occurrence of fatigue during the week highlights statistically insignificant differences ($p > 0.05$). Napping is rarely present in most cases (46.74%), the calculated differences being insignificant between classes ($p > 0.05$).

Conclusions: insufficient sleep during the night is associated in most cases with the appearance of fatigue, an aspect that must be carefully studied and monitored from a medical point of view.

Keywords: Sleep, tired, napping, high school.

1. Introduction

Fatigue is a physiological phenomenon that occurs when the body exceeds effort capacity. Special attention should be paid to this phenomenon in students who are undergoing the processes of growth and development, but who must also adapt to school demands.

Fatigue disappears after passive rest through sleep or after active rest represented by recreational activities. Unfortunately, recreational activities can become a problem if the time allotted for them is too long – for example time spent on the computer can reach several hours a day. Obviously in this context active rest leads to a reduction in the number of hours of sleep and to the appearance of a chronic fatigue. Unfortunately, it can also lead to computer addiction which is dangerous (Baciu, 2020).

There is currently much discussion about addictive phenomenon, especially those related to overeating associated with reduced interest in physical activity and changes in sleep-related behavior. People who do not have a food addiction rarely experience moments of sudden sleepiness during the day (3.8 ± 5.0 days in the last month) while those with severe eating problems frequently have such moments (6.4 ± 7.7 days in the last month) (Tan Ee Li, Pursey, Duncan & Burrows, 2018).

Directly opposed situations where young people have eating problems manifested by insufficient intake. These imbalances are associated with slow growth, high stress, and impaired sleep. There are high school students who, due to an unbalanced diet, have problems with sleep quality (55.7% of students have such problems) (Rasouli et. al, 2021).

Parents should pay attention to these issues and intervene when needed. A study carried out on a group of teenagers from Iasi shows a modest level of parents' interest for students' leisure activities (rarely - 38.00%) or even an absence (never - 20.36%) so there is little chance that there is special concern for time given to sleep (Albu, Dima, Abdulan & Carausu, 2018).

Educational programs should also focus on understanding the importance of nighttime and daytime sleep in maintaining health and school performance. Programs that teach meditation exercises have increased the time allocated to sleep in students from 6.92 hours to 8.08 hours, which can be used in the therapy of patients with various addictions. (Soriano-Ayala, Amutio, Franco & Mañas, 2020).

There are aspects that need to be carefully monitored even for students who do not have addictions because as they get older, the time given to sleep decreases, which is concerning. This trend is clear in Ecuador's pupils. Children sleep an average of 8.96 hours per day, young adolescents an average of 7.96 hours and older adults an average of 7.08 hours with statistically significant differences (Villa-González, Huertas-Delgado, Chillón & Ramirez-Vélez, Barranco-Ruiz, 2019).

The objectives of the study:

- to evaluate of the time allotted for nighttime sleep and compare it with the norms;
- to assess levels of fatigue and the correlation with insufficient night sleep;
- to evaluate the time of the week and the day when fatigue occurs;
- to find out the frequency of daytime sleep;
- to evaluate the correlation between nighttime sleep and daytime sleep.

2. Method

The study was carried out on a group of 246 students from three high schools in Botosani County. There are 123 pupils in the ninth grade and 123 in the eleventh grade. The young people completed a questionnaire about the time allotted for nighttime sleep, the presence of fatigue, the time of day / week when it occurs and the presence of sleep during the day.

Nighttime sleep was estimated based on the question:

- How many hours do you sleep on average per night: 6-7 hours; 7-8 hours, 8-9 hours; over 9 hours.

Fatigue was assessed with the help of four questions:

- Do you feel tired? - often, rarely, never;
- How do you feel when you wake up in the morning? - rested, tired, very tired;
- During the week, when do you feel tired? - at the start, in the middle, at the end;
- During the day, when do you feel tired? - in the morning, during the day, in the evening.

The presence of sleep during the day was also studied:

- Do you sleep in the afternoon? - every day, often, rarely, never.

The results were interpreted insisting on the correlations between nighttime sleep and the presence of fatigue. They were processed using the Pearson's chi-squared test.

3. Results

High school students need 9 hours of sleep per day. Unfortunately, this result is present in only less than 30% of young people (Table 1).

Table 1. Time spent sleeping at night.

	6-7 hours	7-8 hours	8-9 hours	Over 9 hours	Total
9 th grade	52	38	23	10	123
11 th grade	41	45	20	17	123
Total	93	83	43	27	246
%	37.80	33.73	17.47	10.97	

The calculated differences are statistically insignificant ($p > 0.05$, $f = 3$, $\chi^2 = 3.912$) so this is a habit that exists in most young people.

In this context, it is essential to assess the presence of fatigue. It is often recognized in 46.34% of cases. Out of the entire group we see that 6.50% of teenagers are never tired (Table 2).

Table 2. Frequency of fatigue.

	Often	Rarely	Never	Total
9 th grade	58	60	5	123
11 th grade	56	56	11	123
Total	114	116	16	246
%	46.34	47.15	6.50	
Correlation between nighttime sleep and fatigue				
6-7 hours	57	32	4	93
7-8 hours	32	44	7	83
8-9 hours	17	22	4	43
Over 9 hours	8	18	1	27

The calculated differences between the two school years are statistically insignificant ($p > 0.05$, $f = 2$, $\chi^2 = 2.420$). The correlation between the time allocated to night sleep and fatigue shows significant differences ($p < 0.05$, $f = 6$, $\chi^2 = 15.775$) which indicates the existence of a high percentage of students who sleep little and feel marked fatigue.

After a sleep adapted to the needs of the body in the morning on waking the student must feel rested. Unfortunately, this response occurs only in 44.30% of situations (Table 3).

Table 3. The presence of morning fatigue.

	Rested	Tired	Very tired	Total
9 th grade	41	66	16	123
11 th grade	68	43	12	123
Total	109	109	28	246
%	44.30	44.30	11.38	
Correlation between nighttime sleep and morning fatigue				
6-7 hours	24	53	16	93
7-8 hours	45	34	4	83
8-9 hours	21	16	6	43
Over 9 hours	19	6	2	27

The differences between school years are significant ($p < 0.01$, $f = 2$, $\chi^2 = 12.110$) and draw attention to young people in the ninth grade who often feel tired. The correlation between night sleep and morning fatigue shows statistically significant differences ($p < 0.01$, $f = 6$, $\chi^2 = 22.011$).

Fatigue should appear physiologically towards the end of the week. In the surveyed pupils, fatigue also occurs at the beginning and middle of the week (Table 4).

Table 4. The time of week when fatigue occurs.

	At the start	In the middle	At the end	Total
9 th grade	48	43	32	123
11 th grade	31	44	48	123
Total	79	87	80	246
%	32.11	35.36	32.52	
Correlation between nighttime sleep and fatigue during the time of the week				
6-7 hours	35	38	20	93
7-8 hours	24	28	31	83
8-9 hours	12	13	18	43
Over 9 hours	8	8	11	27

The differences between the two school years are statistically significant ($p < 0.05$, $f = 2$, $\chi^2 = 6.868$) and draw attention to students in the ninth grade who often feel tired. The correlation between sleep and the time of the week when fatigue appears shows statistically insignificant differences ($p > 0.05$, $f = 6$, $\chi^2 = 8.670$).

Physiological fatigue normally occurs in the evening. In the surveyed students, fatigue is also manifested in the morning and during the day (Table 5).

Table 5. The time of day when fatigue occurs.

	In the morning	During the day	In the evening	Total
9 th grade	44	43	36	123
11 th grade	30	46	47	123
Total	74	89	83	246
%	30.08	36.17	33.73	
Correlation between nighttime sleep and fatigue during the time of day				
6-7 hours	33	41	19	93
7-8 hours	22	30	31	83
8-9 hours	15	11	17	43
Over 9 hours	4	7	16	27

Between school years the differences are insignificant ($p > 0.05$, $f = 2$, $\chi^2 = 4.204$) but the correlation between nighttime sleep and fatigue during the day shows statistically significant differences ($p < 0.01$, $f = 6$, $\chi^2 = 18.349$).

Theoretically, the problem of fatigue and insufficient nighttime sleep can be solved by sleeping during the day. This is present "often" or "every day" only in less than 20% of cases (Table 6).

Table 6. The presence of sleep during the day.

	Every day	Often	Rarely	Never	Total
9 th grade	3	14	66	40	123
11 th grade	7	16	49	51	123
Total	10	30	115	91	246
%	4.06	12.19	46.74	36.99	
Correlation between nighttime sleep and daytime sleep					
6-7 hours	4	9	43	37	93
7-8 hours	5	15	34	29	83
8-9 hours	1	6	22	14	43
Over 9 hours	0	0	16	11	27

Between school years the calculated differences are insignificant ($p > 0.05$, $f = 2$, $\chi^2 = 5.572$). When looking at the correlation between nighttime sleep and daytime sleep we see statistically significant differences ($p > 0.05$, $f = 6$, $\chi^2 = 10.740$).

4. Discussion

Specialists recommend 9-11 hours of sleep per day for teenagers under 14 years old, and 8-10 hours of sleep a day for those over 14 years old or 9-12 hours for those aged 9-12 years and 8-10 hours for 13-18-year-olds (Kracht et al., 2019; Hansen, Hanewinkel & Galimov, 2022). In a study carried out on adolescents in Iasi, similar results appear, which indicates the existence of a habit of young people related to an insufficient number of hours slept per night (Albu, Hodorcă, Onose, Negrea & Crăcană, 2016). In adolescents in the United States, insufficient sleep is present in only 25% of responses, being recognized by 24.98% of boys and 32.2% of girls (Jacobs, 2019). Urban adolescents in Mexico experience an average sleep time of 10 hours, a response that occurs in both sexes, in public and private schools and that is adapted to the age requirements (Galván et al., 2017).

Unhealthy living habits of young people often persist or worsen even after high school. In a group of young people aged 18-20 in Japan, there are situations in which the number of hours of sleep per night is 4 or less in 6.3% of cases or 5 hours in 22.4% of cases with the dominant response being 6 hours in 45.0 % of cases (Nakanishi et al., 2018). The situation is even more interesting for students who are preparing for a medical career and who often recognize a small number of hours of sleep per night (Saiyida, Afshan, Abdul & Syeda, 2019).

Marked fatigue is present in 46.34% of cases, with 55.68% of young people waking up tired and even very tired in the morning. The percentage is similar to that of the study conducted on adolescents in Iasi, which is a cause for concern (Albu, Hodorcă, Onose, Negrea & Crăcană, 2016). Physiological fatigue should occur in the evening or at the end of the week. In our group, fatigue occurs in the evening only in a third of cases and it appears at the end of the week with the same frequency.

Many problems arise because the lack of parental supervision leads adolescents in the studied group to an unhealthy lifestyle that can have serious repercussions on their health and their school results (Albu, Dima, Abdul & Carausu, 2018). Parents need to be actively involved in students' lives even if they are older and want to be independent. Parental involvement means, among other things, taking an interest in school performance and school activities, spending quality free time together, talking to teachers and the establishment of rules with clear consequences (Erdener & Knoepfel, 2018). The family environment is essential for the development of healthy living habits and this implies avoiding excessive alcohol consumption, smoking, unsafe sexual practices, drug abuse or engaging in antisocial behaviors (Harris et al., 2017; Richardson, McCarty, Radovic & Ballonoff Suleiman, 2017).

Unfortunately, when fatigue arises, adolescents turn to various stimulants that briefly remove the feeling of fatigue. Adolescents in rural and urban schools in Rhode Island sleep an average of 8.8 hours per night. Only a third of young people (38%) feel comfortable during the day. There are small problems of staying awake during the day in 49% of young people or even bigger problems of doing so in 10% of cases which they try to solve by drinking alcohol, smoking or even by taking drugs (Miller, Janssen, & Jackson, 2017).

5. Conclusion

The time allotted for nighttime sleep is, in most cases, insufficient; therefore, it is not possible to remove the fatigue that appeared during the day and the previous week. Fatigue is felt intensely by half of the teens in the group. They wake up tired and even very tired in the morning. Physiological fatigue occurs in the evening and at the end of the work week, but such answers appear in only a third of cases.

The correlation between hours slept and the presence of fatigue often indicates significant differences that underline the risk of progression towards chronic fatigue or overwork.

Such studies are essential for adolescents' health and for the formation of a healthy lifestyle that can be maintained throughout life.

References

- Albu, A., Hodorcă, R. M., Onose, I., Negrea, M. & Crăcană, I. (2016). The evaluation of the scholar fatigue phenomenon and some causative factors in a group of teenagers from Iasi. *Global Journal of Sociology: Current Issues*, 6(2), 44-49.
- Albu, A., Dima, F., Abdulan, I. & Carausu, M. (2018). Evaluation of school fatigue and social relationships in a group of students from general knowledge high schools in Iasy country. *Education Journal*, 7(1):1-4.
- Baciu, A., 2020. Medical and social consequences of digital addiction. *Medical Anthropology*, The Publishing House of the Romanian Academy, 22(3), 141-147.
- Erdener, M. A. & Knoepfel, R. (2018). Parent perceptions of their involvement in schooling. *International Journal of research in Education and Science*, 4(1).
- Galván, M., Monroy-Campos, A., López-Rodríguez, G., Unzaga, M. G., Olivio, D. Jhazmín, H. C., Teodoro, S. D., Trinidad, F. C., Rebeca, G. S. & Hugo, A. (2017). Physical activity in Mexican urban school children: difference by nutritional status and school type. *Global Advanced Research Journal of Medicine and Medical Sciences*, 6(12), 362-368.
- Hansen, J., Hanewinkel, R. & Galimov, A. (2022). Physical activity, screen time and sleep: do German children and adolescents meet the movement guidelines?. *European Journal of Pediatrics*. doi: <https://doi.org/10.1007/s00431-022-04401-2>
- Harris, S., Aalsma, M., Weitzman, E., Garcia-Huidobro, D., Wong, C., Hadland, S. E., Santelli, J., Park, M. J. & Ozer, E. M. (2017). Research on clinical preventive service for adolescents and young adults: wherw are we and were do we need to go?. *Journal of Adolescent Health*, 60, 249-260.
- Jacobs, M. (2019). Latent class analysis of adolescent health behaviors. *Journal of Community and Preventive Medicine*, 2(1).
- Kracht, C., Chaput, J. P., Martin, C., Champagne, C., Katzmarzyk, P. & Staiano A. (2019). Associations of sleep with food cravings, diet, and obesity in adolescence, *Nutrients MDPI*, 11, 2899.
- Miller, M. B., Janssen, T. & Jackson, K. (2017). The prospective association between sleep and initiation of substance use in young adolescents. *Journal of Adolescent Health*, 60, 154-160.
- Nakanishi, J., Suematsu, Y., Arimura, T., Kuwano, T., Shiga, Y., Kitajima, K., Morito, N., Nii, T., Saku, K., & Miura, S. I. (2018). Recomendations of lifestyle modification according to a survey of first-year university students. *J.Clin.Med. Res.* 10(10), 772-780. doi: 10.14740/jocmr3574w
- Rasouli, A., Mohiti, S., Javadi, M., Panjeshahin, A., Karemi, M. & Shiri-Shahsavari, M. R. (2021). The effect of daily fast-food consumption, family size, weight-caused stress and sleep quality on eating disorder risk in teenagers. *Sleep Breathing Physiology and Disorders*. doi: 10.1007/s11325-020-02189-9
- Richardson, L., McCarty, C., Radovic, A. & Ballonoff Suleiman, A. (2017). Research in the integration of behavioral health for adolescents and young adults in primary care settings: a systematic review. *Journal of Adolescent Health*, 60, 261-269.
- Saiyida, K. F., Afshan, A., Abdul, R. K. & Syeda, F. (2019). Distribution and determinant of sedentary lifestyle among health care professionals. *Pakistan Journal of Medicine and Dentistry*, 8(2), 80-86.
- Soriano-Ayala, E., Amutio, A., Franco, C. & Mañas, I. (2020). Promoting a healthy lifestyle through mindfulness in university students: a randomized controlled trial. *Nutrients MDPI*, 12, 2450.
- Tan Ee Li, J., Pursey, K., Duncan, M. & Burrows, T. (2018). Addictive eating and its relation to physical activity and sleep behavior. *Nutrients MDPI*, 10, 1428.
- Villa-González, E., Huertas-Delgado, F., Chillón, P., Ramirez-Vélez, R. & Barranco-Ruiz, Y. (2019). Associations between active commuting to school, sleep duration and breakfast consumption in Ecuadorian young people, *BMC Public Health*, 19(85).

EFFECTS OF INVOLVEMENT LOAD IN EXTENSIVE READING ON LEXICAL RELATIONS AMONG ALREADY KNOWN L2 WORDS

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Abstract

The effects of task-induced involvement load, *evaluation* and *need* in particular, in extensive reading on a change of the lexical relations that EFL learners perceive were investigated. Fifty-two Japanese university students were assigned to one of three groups. All groups were given the same reading material (an English passage of 319 words including 12 target words) but with different tasks. MCQ group answered multiple-choice questions about the contents of the passage. MCQ+FB group answered fill-in-the-blank questions in the passage as well as the MCQ. MCQ+Com group did a composition task using the target words as well as the MCQ. In addition, all participants judged the degree of relationship between target words three times, a week before the task, immediately after the task, and a month after the task. The mean of relationship score was calculated for each participant each time, and was used as a dependent variable that indicates the degree of deepening of the lexical network. Participants also answered questions asking about their intrinsic motivation for the task. The results showed, contrary to our hypothesis, that *evaluation* manipulated by the tasks nor *need* compared by the degree of participant's intrinsic motivation did not affect the dependent variable. Next, we analyzed the data by using AMISESCAL (Asymmetric von Mises Scaling), a statistical model that visualizes asymmetric relations among elements on a two-dimensional map, and found that the relations among target words largely depend on the main target word (keyword of the passage). Although the present findings were generally negative in terms of the Involvement Load Hypothesis (Laufer & Hulstijn, 2001), it was suggested that carefully choosing appropriate reading material with target words is important for the future studies.

Keywords: *Already known words, extensive reading, involvement load hypothesis, Japanese learners of English, lexical network.*

1. Introduction

Much research has been done to explicate how and how much extensive reading in a foreign language can contribute to the lexical acquisition of the language (Cobb, 2007; Horst, et al., 1998; Hulstijn & Laufer, 2001; Krashen, 2004; Laufer & Hulstijn, 2001; McQuillan & Krashen, 2008; Pigata & Schmitt, 2006; Waring & Takaki, 2003; Webb, 2008). Although Horst et al. (1998) claimed the limitation of extensive reading as a method of expanding L2 vocabulary, especially for early stage learners, they also mentioned the possibility for learners to enrich their knowledge of the words they have already acquired, and to build network linkages between words through extensive reading. Pigata & Schmitt (2006) suggested that various aspects of word knowledge should be treated differently when effectiveness of vocabulary acquisition through reading is discussed, implying Nation's (2001) nine categories of lexical knowledge. Waring & Takaki (2003) suggested to the series editors of graded readers that they should not only be overly concerned with presenting new vocabulary but also provide a rich input of already known vocabulary with a variety of collocations and colligations. Although these studies have been mainly focusing on acquiring new words, some of them mentioned the important role of reading as a method of deepening vocabulary knowledge. It can be assumed that learners are provided with ample opportunities to incidentally acquire new information about familiar words as well as unfamiliar words through reading, which enables them to establish interwoven associations among those words.

It is widely acknowledged that one of the important aspects of lexical knowledge is how words are organized into a structured whole. However, how such organization is achieved, or how learner's lexical knowledge can be assessed in this structural aspect has not been sufficiently explicated (Wilks & Meara, 2002). In our previous study (Aotani & Takahashi, 2021), we compared Japanese EFL learner's

lexical knowledge before and after undertaking extensive reading tasks. Participants were divided into three groups, each of which was given the same reading material but with different tasks, translation task, multiple-choice question task, and no task (as a control group). The results revealed that participants in the translation task group tended to find the relationships between the words more easily than the participants in other groups, and they were also more aware of changes in their own ability to recognize word association. We tried to interpret the result in terms of the Involvement Load Hypothesis proposed by Laufer & Hulstijn (2001). Their hypothesis, which was inspired by the notion of depth of processing theorized by Craik and Lockhart (1972), proposed a motivational-cognitive construct of involvement, consisting of three basic components; *need*, *search*, and *evaluation* (see also, Hulstijn & Laufer, 2001). Three degrees of prominence are suggested for each of the three components; *no*, *moderate*, and *strong*. In terms of the involvement load, participants in the translation task group in our study should have been in the highest involvement index among the three groups. According to Laufer & Hulstijn's (2001) findings, the greater the involvement load, the better the retention of new words. Although our study did not focus on the acquisition of new words but the association between already known words, their hypothesis could be applied to the results of our study in terms of the depth of processing.

The present study aims at extending the above discussion by employing a more systematic experimental setting. We made two improvements to the previous study. First, tasks assigned to three groups of participants were modified based on the involvement load. The three kinds of task were multiple-choice questions (MCQ), MCQ plus fill-in-the-blank questions (MCQ+FB), and MCQ plus composition (MCQ+Com). According to Hulstijn & Laufer (2001), *evaluation* induced by these tasks is MCQ=*no*, MCQ+FB=*moderate*, and MCQ+Com=*strong*. Since this study targeted only already known words, no tasks induced *search*. Therefore, the learning outcome, which is measured by the degree of lexical relations among some target words in the passage, was presumed to be higher in order of MCQ+Com, MCQ+FB, and MCQ. The second improvement is that we added an investigation of participant's intrinsic motivation for the task. Hulstijn & Laufer (2001) indicated that the task based on learner's own necessity would elicit *strong need*, while the task directed by the other is to elicit *moderate need*. Thus, we measured participant's intrinsic motivation by the originally-developed questionnaire after finishing the task, and examined its effect on the learning outcome. Participants with higher intrinsic motivation were assumed to have *strong need* and to show a better learning outcome than those who with lower intrinsic motivation.

2. Method

2.1. Participants

Fifty-two Japanese university students (34 males and 18 females; ranging from 19 to 22 years old excluding one male aged 34) participated in the experiment with informed-consent. Their English proficiency level was 445.5 (SD 90.6) points on the TOEIC score. They were randomly divided into three groups (see 2.3).

2.2. Materials

As a reading material, we chose a passage about medicine safety from the McGraw-Hill's textbook of Health for fourth graders (word types 149, word tokens 319). It was divided into two halves that have different kinds of lexical network, and we chose target words to be examined in each half. From the first half, one keyword (*treatment*) and five relating words (*seek*, *harmful*, *find*, *right*, *choose*) that collocate with *treatment* were chosen. From the second half, another keyword (*medicine*) and five relating words (*affect*, *take*, *cause*, *use*, *dependent*) that collocate with *medicine* were chosen.

2.3. Procedure

The experiment consisted of three parts.

Part 1: The participants were asked to judge the degree of relationship among two sets of six target words (1 keyword and 5 relating words) mentioned above (Test 1). At that time the reading material was not shown to the participants. In order that data can be analyzed in terms of the asymmetrical relationship between two words (AMISESCAL; see 3.2), a perceived relationship of $word_A$ toward $word_B$ and that of $word_B$ toward $word_A$ were separately measured. That means all permutated pairs out of six words (i.e., 30 pairs) were prepared, and the participants judged 60 pairs in total. The degree of relationship was measured by a 6-point Likert scale from 1: 'not related at all' to 6: 'strongly related.'

Part 2: A week after Part 1, the participants were required to read the passage without dictionaries and do the assigned task. The task for MCQ group was to answer four multiple-choice questions (MCQ) about the contents of the passage. The task for MCQ+FB group was to answer the MCQ and ten fill-in-the-blank questions in the passage. Blanks corresponded to ten relating words, which

were given as a word list. The task for MCQ+Com group was to answer the MCQ and to make ten English sentences using the relating words. After finishing the task, participants in all groups answered ten questions asking about their intrinsic and extrinsic motivations for the task on a 7-point Likert scale. Then, they did the same words-relationship test as in Part 1 (Test 2).

Park 3: A month after Part 3, all participants did the words-relationship test for the third time (Test 3).

3. Results

3.1. Quantitative analysis

Ratings for the words-relationship test were averaged for each participant and each test (Test 1, 2, and 3) separately for the first half of the passage (*treatment-set*) and the second (*medicine-set*). Figure 1 shows the results in each group. As regards the *treatment-set* (Figure 1a), two-way (3 groups × 3 tests) analysis of variance (ANOVA) showed a significant main effects of the group-factor ($F=3.68, df=2,49, p=.032, \eta^2=.131$) and of the test-factor ($F=8.67, df=2,98, p<.001, \eta^2=.150$). Post-hoc analysis revealed that ratings in MCQ+FB group was significantly higher than those in MCQ group, and ratings of Tests 2 and 3 were significantly higher than those of Test 1. The interaction between the two factors was not significant. The same ANOVA for the results of the *medicine-set* (Figure 1b) showed no significant main effects nor interaction.

Figure 1. Relationship score in each group and each test for the *treatment-set* (a) and *medicine-set* (b).

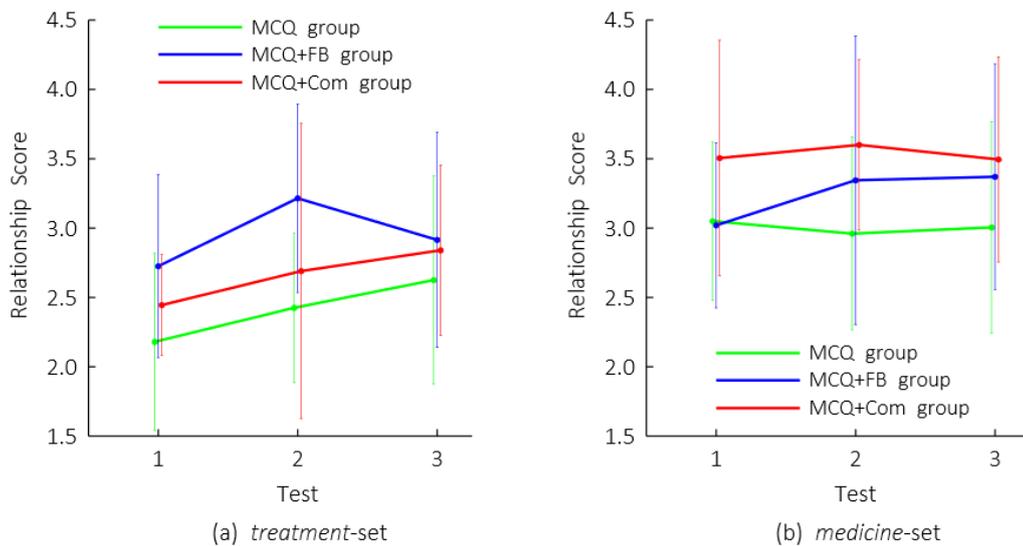
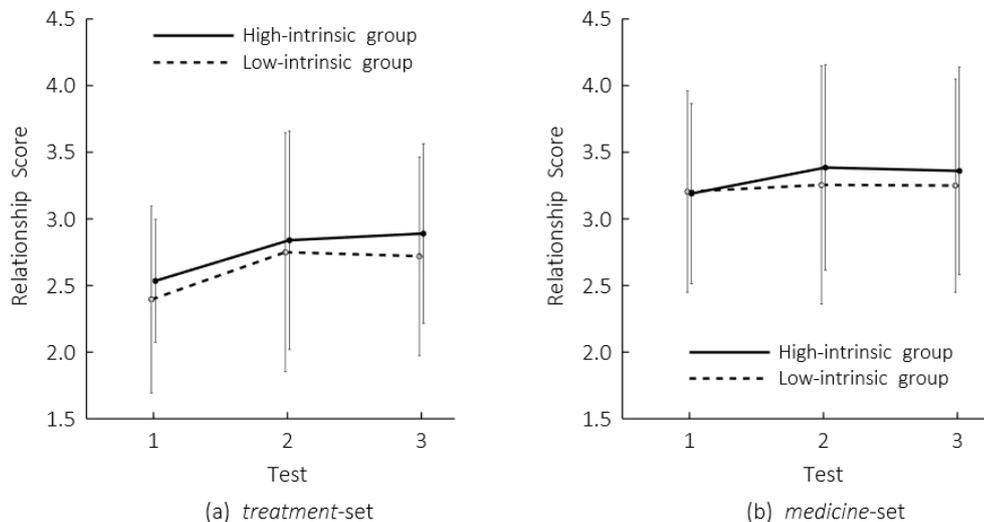


Figure 2. Relationship score in each group and each test for the *treatment-set* (a) and *medicine-set* (b).

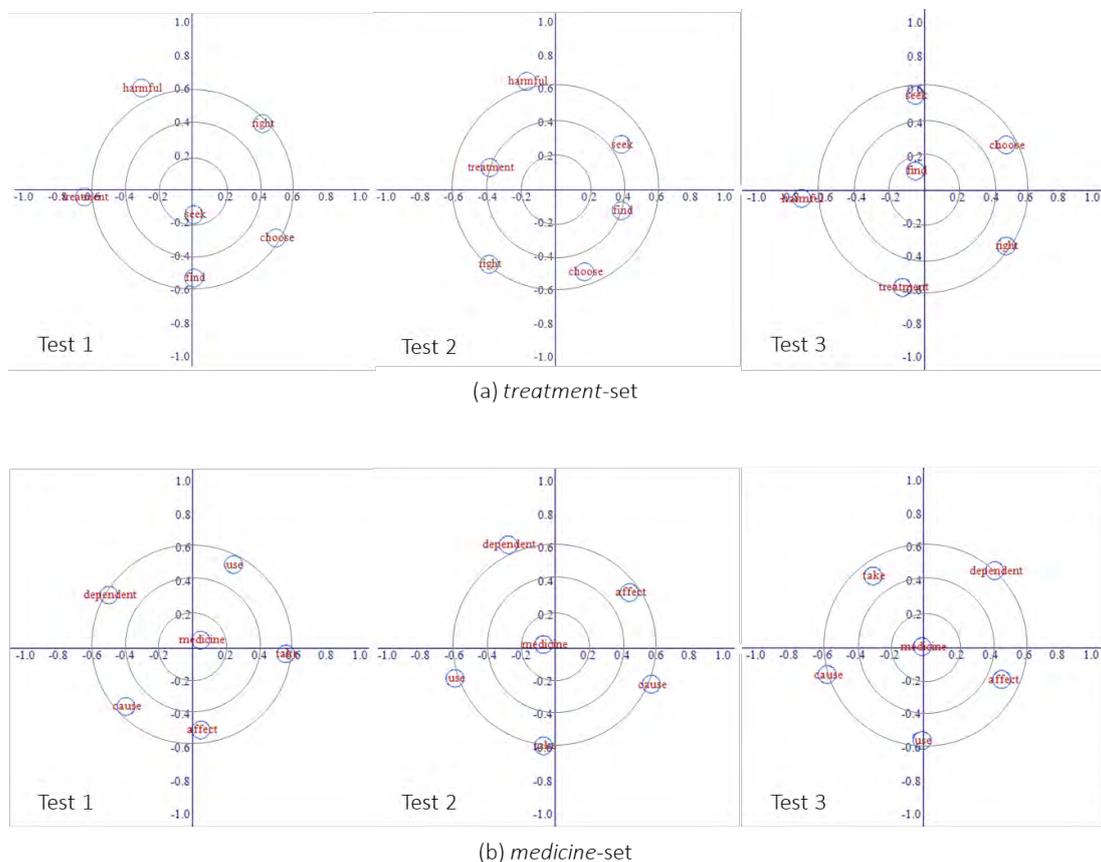


Next, we analyzed the effect of participant’s intrinsic motivation on the learning outcome. Since the interaction between the group-factor and the test-factor was not significant, we pooled the data in all groups for subsequent analysis. First, data of the motivation questionnaire were subjected to a factor analysis (principal factor method, Promax rotation), and two factors were obtained, namely intrinsic motivation and extrinsic motivation. Then, for each participant, ratings for question items that were highly loaded by each factor were averaged to make an ‘intrinsic score’ and ‘extrinsic score,’ and the ‘intrinsic index’ was calculated by subtracting the ‘extrinsic score’ from the ‘intrinsic score.’ Next, we divided all participants into a high-intrinsic group (28 participants whose intrinsic index ranging from 0.17 to 4.00) and a low-intrinsic group (24 participants whose intrinsic index ranging from -3.33 to 0.00). Figure 2 shows the results in each group. For the *treatment*-set (Figure 2a), two-way (2 groups × 3 tests) ANOVA showed a significant main effect of the test-factor ($F=8.30, df=2,100, p<.001, \eta^2=.142$), and post-hoc analysis revealed that ratings of Tests 2 and 3 were significantly higher than those of Test 1. A main effect of the group-factor and the interaction between the two factors were not significant. The same ANOVA for the results of the *medicine*-set (Figure 2b) showed no significant main effects nor interaction.

3.2. Qualitative analysis

The individual results were analyzed by AMISESCAL developed by Shojima (n.d.), which is an application of directional statistics to visualize the asymmetric structure underlying the data matrix. The great advantage of using AMISESCAL in this study is that it can visualize how learners recognize the relationship between target words. As a result, significant changes in AMISESCAL mapping from Test 1 to 3 could not be observed. There was, however, a remarkable difference between the visualized lexical networks of the *treatment*-set and the *medicine*-set. Figure 3 shows the AMISESCAL mapping using the data of all participants (from the left to the right, Tests 1, 2, and 3). On the maps of the *medicine*-set (b), the keyword *medicine* is always located at the center, indicating that the word was judged to have strong relationship with the all relating words and thus perceived as the central concept in the participant’s lexical network. On the maps of the *treatment*-set (a), on the other hand, the keyword *treatment* is located in the peripheral position, suggesting that the word was failed to be perceived as the central concept in the lexical network.

Figure 3. AMISESCAL mapping of all participants’ data in each test for the *treatment*-set (a) and the *medicine*-set (b).



4. Discussion

In the present study, we tried to observe how different involvement loads affect the association among already known words. To achieve this end, we examined the effect of *evaluation* through systematically manipulated tasks and the effect of *need* by comparing the degree of participant's intrinsic motivation. As a result, neither the task-load factor nor the motivation factor affected the learning outcome, which was shown by that there was no significant interaction of these factors with the test factor (i.e., tests before and after the task). In this respect, the present findings were generally negative in terms of the Involvement Load Hypothesis.

Meanwhile, comparing the results of two target-words sets may lead to an interesting consideration. As shown in Figures 1 and 2, in the case of *medicine*-set, there were no significant differences among different involvement loads, between higher and lower intrinsic motivation, or from Test 1 to 3. The meaning of *medicine* is unambiguous and simple, so the results suggested that the participants have already developed the lexical network of the word as shown on the AMISESCAL mapping where *medicine* is always positioned at the center. On the other hand, the word *treatment* is polysemous. The result indicated reading passages with tasks partly affected participant's knowledge regarding word association of *treatment*, but it was not enough for reorganizing the lexical network as shown on the AMISESCAL mapping where *treatment* remained in the peripheral position. This difference suggested that in order to assess the involvement load effectively, it is important to carefully choose appropriate reading material with appropriate test words. In addition, the experiments in this study were conducted in a short period of time with only one-time experience of performing the task, so further accumulation of data samples and observation over a longer period of time would be needed to prove the effectiveness of task-induced involvement load for deepening and expanding lexical network of already known words.

References

- Aotani, N. and Takahashi, S. (2021). An analysis of Japanese EFL learners' lexical network changes. *Frontiers in Education*, 15 from : 5:621437. doi: 10.3389/educ.2020.621437
- Cobb, T. (2007). Computing the vocabulary demands of L2 reading. *Language Learning & Technology*, 11, 38-63.
- Craik, F.I.M. and Lockhart, R.S. (1972). Levels of processing: A framework for memory research. *Journal of Verbal Learning and Verbal Behavior*, 11, 671-684.
- Horst, M., Cobb, T., and Meara, P. (1998). Beyond a clockwork orange: Acquiring second language vocabulary through reading. *Reading in a Foreign Language*, 11, 207-223.
- Hulstijn, J.H. and Laufer, B. (2001). Some empirical evidence for the involvement load hypothesis in vocabulary acquisition. *Language Learning*, 51, 539-558.
- Krashen, S.D. (2004). *The Power of Reading*, 2nd edition. Portsmouth, NH: Heinemann.
- Laufer, B. and Hulstijn, J.H. (2001). Incidental vocabulary acquisition in a second language: The construct of task-induced involvement. *Applied Linguistics*, 22, 1-26.
- McQuillan, J. and Krashen, S.D. (2008). Commentary: Can free reading take you all the way? A response to Cobb (2007). *Language Learning & Technology*, 12, 104-108.
- Nation, I.S.P. (2001). *Learning Vocabulary in Another Language*. Cambridge, UK: Cambridge University Press.
- Pigata, M. and Schmitt, N. (2006). Vocabulary acquisition from extensive reading: A case study. *Reading in a Foreign Language*, 18, 1-28.
- Shojima, K. (n.d.). Asymmetric von Mises scaling. Retrieved Feb. 10, 2022, from <http://shojima.starfree.jp/ams/index.htm>.
- Waring, R. and Takaki, M. (2003). At what rate do learners learn and retain new vocabulary from reading a graded reader? *Reading in a Foreign Language*, 15, 130-163.
- Webb, S. (2008). The effects of context on incidental vocabulary learning. *Reading in a Foreign Language*, 20, 232-245.
- Wilks, C. and Meara, P. (2002). Untangling word webs: Graph theory and the notion of density in second language word association networks. *Second Language Research*, 18, 303-324.

GENIUS LOCI: THE RIGHT CONCEPT FOR ELEMENTARY EDUCATION?

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Abstract

The paper deals with the phenomenon which, when grasped in a suitable way, can become an integral part of teaching in Czech schools: it is *genius loci* and related instruction. In the context of ongoing discussions on the new form of the curriculum, on the rapid changes in society over the past two decades and especially on the outlook for the future development of (not only) the Czech natural environment, we recognize the importance of the development of knowledge of the landscape. All existing processes, phenomena and landscape in general provide wide range for evaluation and cognitive part of children's personality. The environmental dimension, ranging from local aspects to global challenges and problems, also extends the personal and subjective conception of the place. Finally, practical experience and the development of competencies, in addition to knowledge, complete the use and application of the place by pupils in the intentions of locally grounded learning. The paper is divided into two parts, the first is devoted to the theoretical background, introduction of the key factors of both phenomena and their risks, and the second follows the context of curricular documents, teaching and place-based education on examples of pedagogical practice. Finally, the paper focuses on the view of outdoor education and place-based education as tools for student participation in the formation, consolidation and preservation of the *genius loci* in the level of knowledge, values, community cooperation, shared memory and common traditions.

Keywords: *Place, elementary education, curriculum, genius loci.*

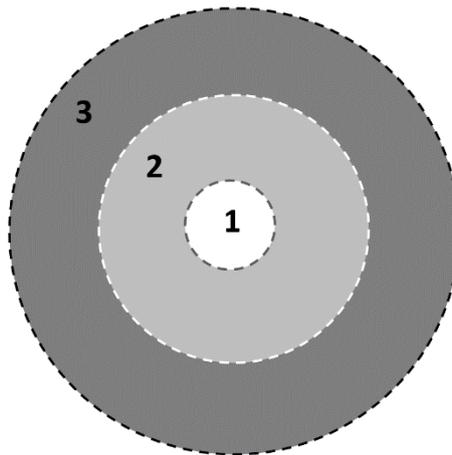
1. Introduction

With these words, cartographers once filled the so-called white spots on maps. They were called localities unknown to the people at the time, hiding new knowledge, civilization and possibly risk (hence the lions mentioned). It is the concept of place that has been found to be one of the key terms in geographical education (IGU, 1992) and is reflected in many disciplines: architecture, history, linguistics, culture, etc. Finally, the word geography itself hides the term place in its essence. - similarly to geographers and environmentalists - about the next level of foundation, we inevitably come across relationships between individual elements and phenomena, at present almost always in the context of human existence and its influence on given elements or phenomena (Gruenewald, 2003). In this respect, we can proceed from the theses of the IGU (1992, p. 10) on the interconnectedness of the physical nature of the place with its cultural potential. In its review, Betrand (1998) provides a basic amount of information on the eco-social approach to education, which permeates the synergies of the environmental space and the social dimension of education, and should thus aim at sustainable behavior and desirable activity of the pupil as an informed and responsible individual. This is a return to mythological harmony with the landscape, as outlined by Machovec (1998, pp. 74–76), when one of the foundations of the catharsis of the contemporary world is seen in renaissance of the unity of nature and man from the level of matter (source of raw material and livelihood) to the level of nature (man is part of the landscape). Kohák (2011, p. 66) adds that with the loss of the natural environment we lose the ability to behave naturally. In the spirit of Naessian deep ecology, Kohák develops several layers of the relationship between man and his environment, which offers a deeper level of knowledge of the place. Norberg-Schulz (1994) outlines the philosophical dimension of place as a phenomenon that forms an integral part of existence: without place, an event cannot be interpreted. In the overall historical image of Central Europe, we reveal the very varied and complex structure of any place with this lens, which is reflected in many media images. Even from this point of view, the place seems to be a multidisciplinary and multifactorial concept, which can be described seemingly only by a holistic principle and used in the same spirit (Betrand, 1998; Sobel, 2013a, 2013b).

2. Place and genius loci

The knowledge of the place itself is a purely individual process, which is moreover differentiated on the basis of the development of the knowing individual. If we take into account the gradual development of the human psyche, Vygotsky's thesis on the zone of proximity is offered (Bertrand, 1998), which we apply to the lexical definition of a place and at the same time to the spatial delimitation. Vygotsky links the development of children's cognition to the development of speech, and through that zone of proximity he understands the closest possible attainable area of cognition that the child can actually know. A similar scheme can be derived for spatial orientation. Sobel (2013a) notes that personal experience is reflected in the knowledge of the place with regard to the age of the individual in the size of the place (Fig. 1). The degree of internalization of space remains a question for research practice.

Figure 1. Boundaries of cognition of space.



Sobel (2013a) presents three phases for the development of children's conception of the local region, graded according to age and area of movement. The early (1) phase takes place at the age of up to 7 years near the house, the middle (2) develops the age of 8-11 years within the street and in the periphery of the hitherto known area. The peak phase (3) follows from the age of 12 and covers the places of social ties within the municipality and the region. The boundaries between the individual phases are not precisely defined and sharply defined in space. The place as a space known and cognized thus directly affects the identity of the individual when it affects the psychological structure of the personality. Within the community, the society in a given space, we then talk about the collective influence of shared cultural consciousness, which co-creates social identity. Marek (2020) summarizes the concept of the region as a social construct with regard to Paasi's social-geographical theory.

3. Place to education

The genius loci is often translated as the spirit of the place. In an extended metaphor, we can also speak of the soul of a place, aware of all the dimensions of a given space (Vecco, 2020). Norberg-Schulz (1994, pp. 11-13) extends the terminology to the character of the place, which denotes "the overall atmosphere" and at the same time "everything that is actually present". It should be added that just as it depends on the structure of the place itself in terms of its strict multifactorial characteristics (geographical, historical, economic, sociological, etc.), the key to other places, persons and events that enter with a defined place is also crucial. interaction (Norberg-Schulz, 1994; Schama, 2007; Sobel, 2013b). The College (2013) focuses on landscape the breeding transmission part is roofing. He defines the very concept of genius loci as "a symbolic spatial pattern of the landscape given by imaginary and real events" (Kolejka, 2013, p. 57). Vecco (2020) follows the hidden meaning of the term; he understands it as a transferred historical heritage, respectively as an identification framework of society. Without (re)interpretation of a place and its significance, community cannot be built (Vecco, 2020; Schama, 2007). If we continue to expand the definition, we come to the meta-concept of genius loci, which consists of a sum of soft and hard skills. These determine the subjective (personal, eg feeling) and objective (measurable, eg altitude) nature of the place (Vecco, 2020). Within each value, the individual layers of the place can be further interpreted into arbitrary levels in the geographical understanding of space (Kolejka, 2013, pp. 59–61)

In addition to objective (hard) values, however, the indescribable layer of place, which is based on cultural capital, is also very evident. Schama (2007, p. 272) describes the search for the roots of belonging between people in different environments based on myths natural phenomena and elements. It therefore implies constant human-environment interaction. Moreover, in such a relationship, we must constantly consider changing conditions, because there is no terminal, eternal structure in nature. However, Vecco (2020) takes this as a significant benefit, as it actually allows for the constant transmission of the genius's cultural capital and its reconstruction within society. Based on historical experience, it can be argued that the greater the importance of a given place in the so-called great history, the greater the social impact and impact of this process (Stradling, 2001).

3.1. Curriculum with genius

The environment of the Czech school offers the concept of genius loci unique possibilities in the trans-mission of the overall tradition. The curriculum directly encourages the reinterpretation of the place where we live, with an emphasis on "practical knowledge of local and regional realities" (MŠMT, 2017, p. 42). The current range of methodological materials for the pedagogical public presents the benefits of many methods and forms that meet both the requirements of the curriculum and the philosophical dimension of the concepts of place and environmental education. Among them we find conceptual materials (Svobodová et al., 2019), theoretical studies (Daniš, 2019; Sobel, 2013b), practical ideas for direct application in teaching (Kříž, 2017) or combined texts (Pluháčková et al., 2019). Sobel (2013a). Activation of an individual (regardless of age) brings enrichment to the place, although we may subsequently encounter problems in shared common memory during transmission. In this respect, the multidisciplinary of the genius loci emerges as a beacon that brings orientation. We can approach the place as a semi-structural entity, partially break down the unreliable human memory of direct witnesses and use the model of locally grounded learning (Gruenewald, 2003; Sobel, 2013b). It connects de facto all levels of knowledge in a seemingly holistic model of knowledge. It then depends on the specific pedagogical leadership in which direction the process of exploring the place will continue. Daniš (2019) argues that most (if not all) topics of education can be transferred to outdoor teaching. For example: From the introductory, purely geographical assignment of the complex characteristics of the place, the student can create a mental map, land art, literary work according to his individual abilities and experience. All of these practices will reformulate the genius loci on a personal level and share it with the group one level further.

4. Methods and research

In 2021 and 2022 two groups of 10-11 years old children were chosen for this research in one of the school in the city Ústí nad Labem (Czechia). The aim of the research was to identify place attachment and to compare qualitative impact of place-based education. The distance learning due to the pandemic of Covid-19 in 2021 transmitted the research from the form *in situ* to the online questionnaire which was distributed by class channels (Microsoft Teams). This first attempt was disrupted by low level of answers (n=6; identified reason from four interviews with children: low motivation). The second attempt after Covid-19 era was more successful with more than 85% returned complete questionnaires (pretest + posttest) which were fulfilled in the classroom (n=33).

The design of the research was transformed from original questionnaires used by Semken & Freeman (2008) or Williams & Vaske (2003) and modified for conditions of classes and natural context of the city. Then local differences (due to the state of community) were discussed with teachers for last modifications (e. g. social exclusion).

Children often found high value of natural parts of region (78,8%), appreciated their well-known neighborhood (72,7%) and marked more than three places as their favorites (average 3,2). With these conclusions with pseudo-random selection the extra research group was determined for next step of research: place meaning survey (PMS).

The method of PMS was originally introduced by Young (1999) and for this research was modified to local conditions again. Selected children (n=8; 3 girls and 5 boys) answered by 5-point Likert scale to the set of statements which rated their relationship to specific place in the area. With maximum of 60 points and minimum of 12 points the results seems to be average in whole group (n=8) as seen in Table 1.

Table 1. Comparison of changing PAI and PMS with selected children.

Questionnaire	Girls (n=3)	Boys (n=5)
PAI (pre-/posttest change)	+4,2	+4,6
PMS	+2,7	+3,8

5. Conclusion

Sobel (2013a, 2013b) and Gruenewald (2003) published similar texts in different ways: locally embedded learning as a pedagogical grasp of place adds a social dimension to field teaching (Svobodová et al., 2019). The seemingly identical context (or principle) of the concept of place is personalized to each pupil in a certain way in accordance with the intentions of the framework educational programs and the development of pupil competencies contained in them. The knowledge base recedes into the background in favor of the pupil's prosocial, environmental and developmental dispositions: locally grounded learning in the areas of Man and Society, Man and Nature, Language and Linguistic Communication, Mathematics and its Applications and so on can be applied in current educational plans. On the example of the reconstructed synagogue in Hartmanice (Musil 2021), it is possible to observe the history of the building living in the place (formerly and now), the Hartmanice landscape, the local dialect or relations between the Czech-German border in the Šumava mountains, the geometry of the mountain synagogue. The specific elaboration of the pedagogical application of the selected place always depends on the requirements of the teachers, the monitoring of the fulfillment of the set goals and other parameters available to the place. The preparation certainly deserves a mention: although Sobel (2013b) states in several examples certain advantages of complete freedom in pupils recognizing and processing the site, the question is what should be the goal of the activity - a clearly defined and precise goal, or a path to it?

References

- Bertrand, Y. (1998). *Soudobé teorie vzdělávání*. Praha: Portál.
- Daniš, P. (2019). *Tajemství školy za školou*. Praha: Ministerstvo životního prostředí.
- Fergusson, N. (2019). *Věž a náměstí*. Praha: Argo, Dokořán.
- Gruenewald, D. (2003). The best of both worlds: A critical pedagogy of place. *Educational Researcher*, 32(4), 3–12.
- IGU (1992). *International charter on geographical education*. CGE.
- Kohák, E. (2011). *Zelená svatozář*. Brno: Sociologické nakladatelství.
- Kolejka, J. (2013). *Nauka o krajině*. Praha: Academia.
- Kříž, M. (2017). *Krajina nápadů*. Apis Press.
- Machovec, M. (1998). *Filosofie tváří v tvář zániku*. Brno: Zvláštní vydání.
- Marek, P. (2020). Region coby sociální konstrukt a kritická diskuze Paasiho konceptualizace regionální identity. *Geografie*, 125(1), 47–68.
- MŠMT (2017). *Rámcový vzdělávací program*. Praha: NÚV.
- Musil, J. (2021). Genius loci. *Pedagogická orientace*, 31(2), 133-143.
- Norberg-Schulz, C. (1994). *Genius loci*. Praha: Odeon.
- Pluháčková, M., Duffek, V., Stacke, V., & Mentlík, P. (2019). *Kritická místa kurikula zeměpisu na 2. stupni základní školy I*. Plzeň: Západočeská univerzita.
- Schama, S. (2007). *Krajina a paměť*. Praha: Argo.
- Semken, S. & Freeman, C. B. (2008). Sense of Place in the Practice and Assessment of Place-Based Science Teaching. *Science Education*, 92: 1042-1057.
- Sobel, D. (2013a). *Beyond ecophobia*. The Orion Society.
- Sobel, D. (2013b). *Place-based education*. The Orion Society.
- Stradling, R. (2001). *Jak učit evropské dějiny 20. století*. Praha: MŠMT.
- Svobodová, H., Mísařová, D., Durna, R., Češková, T., & Hofmann, E. (2019). *Koncepce terénní výuky pro základní školy*. Brno: Masarykova univerzita.
- Vecco, M. (2020). Genius loci as a meta-concept. *Journal of Cultural Heritage*, 41, 225–231.
- Williams, D. R., & Vasek, J. J. (2003). The Measurement of place attachment: Validity and generalizability of a psychometric approach. *Forest Science*, 49, 830-840.
- Young, M. (1999). The Cosial construction of tourist places. *Australian Geographer*, 30, 373-389.

EMOTIONAL AWARENESS OF ELEMENTARY STUDENTS ANALYSIS OF NEEDS AND INTERVENTION PROPOSALS

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Abstract

The ability to master emotional vocabulary is evidenced to enhance emotional expression, as well as broaden knowledge of the world and facilitate interpersonal relationships. Also, it helps to develop critical thinking, promotes abstraction, deepens self-knowledge, emotional regulation, forge solid social relationships and improves emotional competencies: emotional awareness, emotional regulation, emotional autonomy, social competence and competences for life and well-being. Some of them are mediated by language, such as emotional awareness which is the first step towards becoming aware of one's own emotions and the emotions of others as well as capturing the emotional climate of a particular context.

This study aims to be a needs analysis to detect the level of emotional vocabulary that primary students know differentiating between positive, negative and ambiguous emotions. Consequently, the differences between gender and grades had been explored. The sample of this study was constituted of 551 primary students (335 boys and 216 girls). An instrument developed *ad-hoc* was implemented to measure the emotional vocabulary. A quantitative analysis was done with the program IBM SPSS Statistics 24.0 software.

The results showed that as participants' ages increased, more positive emotions were detected. Apart from that, a greater number of negative and ambiguous emotions were noticed in the older participants. On the other hand, the younger participants reported an increased number of positive words. As compared to the boys, the girls reported more positive words. To explain these results, a variety of explanations and arguments could be considered.

According to previous research, studies have demonstrated how relevant is to carry out emotional competence's programmes based in emotional education in primary schools at early ages, since then exists major flexibility and capacity to acquire emotional vocabulary. These interventions also prevent bullying and aid in conflict resolution, in addition to improving emotional vocabulary.

Keywords: *Anger, sadness, primary education, age, emotional vocabulary.*

1. Introduction

Communication is a basic tool for adaptation in the cognitive, social and emotional spheres (Bisquerra and Filella, 2018; Filella, 2014). Communicating therefore involves expressing and using concepts, commonly expressed through words. In this sense, the term vocabulary is used when referring to the set of words in a language that are used to communicate (Martín, 2009; Larraín, Strasser and Lissi, 2012; Bisquerra et al., 2018). The constructivist perspective emphasizes the importance of constructing knowledge with meaning (Díez, 2003). Therefore, increasing vocabulary contributes to the construction of reality, developing critical thinking and fostering abstraction (Bárcena and Read, 2003). Therefore, the emotional vocabulary increases the individual's emotional world and its correct interpretation (Bisquerra, 2000).

Our emotions constitute a triple response, since they include neurophysiological, behavioral and cognitive aspects (Lang, 1971). Beyond this, from the perspective of psychology, there is a relationship between the ability to recognize and communicate emotions with the main models of Emotional Intelligence (EI) (Bar-On, 1997; Goleman, 1985; Salovey and Mayer, 1990). From the Emotional Intelligence (EI) perspective (Goleman, 1985; Salovey and Mayer, 1990; Bisquerra and Pérez, 2007), all

opinions converge on the importance and necessity of the development of emotional competences, due to their immediate educational applications (Bisquerra et al., 2007), and therefore, of the promotion of emotional vocabulary.

Other studies (Baron-Cohen et al., 2010) commented that the early years are key for emotional development. The authors noted that, between the ages of 4 and 11, emotional vocabulary develops significantly every two years, doubling in volume. From the age of 12, however, it stabilizes and little change is noticeable, although there is still potential for some change (Baron-Cohen et al., 2010). The better senders and receivers we are, the more socially adept we are (Cruz et al., 2013).

A person who is able to name the emotion they are feeling through a word is able to regulate their emotions more effectively (Cervantes and Gaeta, 2017). Being equipped with good emotional competences allows children to identify and define what they are feeling and to act more effectively in response to it (Bisquerra et al., 2007). In another study, Chaplin and Aldao (2013) convey that in order to improve awareness of one's own emotions and the emotions of others, one needs to possess a broad and elaborate emotional vocabulary that allows one to describe precisely what emotion one is feeling. Emotion processing can be significantly influenced by language as soon as children learn to use words and verbal labels for the expression and categorization of emotions (Herbert et al., 2018). Reading has also been shown to be closely related to increased emotional vocabulary and increased levels of empathy (Dylman, Blomqvist and Champoux-Larsson, 2020). Because of this bidirectional link between emotion and language, it is essential to acquire a good emotional vocabulary from an early age.

This study aims to be a needs analysis to detect the level of emotional vocabulary that primary students know differentiating between positive, negative and ambiguous emotions. Consequently, the differences between gender and grades had been explored.

2. Design

2.1. Participants

The sample consisted of 551 participants, from 4 schools in the region of Lleida, aged between 6 and 12 years ($M= 9.23$, $SD= 1.83$), all of them primary school pupils. There were in total 335 boys and 216 girls.

2.2. Instruments

Ad hoc instrument consisting of asking the participants to write down on a piece of paper all the emotions they remembered during a time interval of 3 minutes.

2.3. Procedure

Permission was requested and granted from the Department of Education in order to distribute the vocabulary test. In addition, all families were informed about the content of the study and its purpose. All pupils participated on a voluntary basis, as did the schools.

3. Results

Table 1. Emotion vocabulary and age.

Age	Positive		Negative		Ambiguous	
	M	SD	M	SD	M	SD
6 (n=45)	1.38	0.91	1.38	1.25	0.02	0.15
7 (n= 67)	2.09	1.04	2.57	1.43	0.12	0.33
8 (n = 93)	2.26	1.17	2.74	1.66	0.15	0.36
9 (n= 93)	2.70	1.13	3.53	1.63	0.20	0.41
10 (n= 97)	2.85	1.34	3.52	1.98	0.18	0.38
11 (n= 79)	3.46	1.62	3.48	1.80	0.14	0.35
12 (n= 77)	3.40	1.49	4.16	1.93	0.40	0.49

The first purpose is to study whether there is a statistically significant relationship between the number of positive emotions and age. The results of the ANOVA test show that age has an influence on the number of positive emotions ($F= 20.905$, $p< 0.01$). The second purpose is to study whether there is a statistically significant relationship between the number of negative emotions and age. The results of the ANOVA test show that age has an influence on the number of negative emotions ($F= 16.389$, $p< 0.01$). The third purpose is to study whether there is a statistically significant relationship between the number of ambiguous emotions and age. The results of the ANOVA test show that age influences the number of ambiguous emotions ($F= 6.408$, $p< 0.01$).

Finally, statistically significant differences between boys and girls in the number of positive, negative and ambiguous emotions were explored using the student's t-test. The results show that there are significant differences between boys and girls in the number of positive emotions, $t(498) = -3.624$, $p< .05$, and negative emotions, $t(498) = -3.133$, $p< .001$. In contrast, there are no significant differences in gender and ambiguous emotions.

4. Conclusions

The aim of this study was to explore the differences between the emotional vocabulary of boys and girls between 6 and 12 years of age. Specifically, it was studied whether there were differences according to age and gender.

The results obtained showed that the number of positive emotions increased with increasing age, even more than doubling its initial volume. It is evident that the emotional vocabulary of pupils between 6 and 12 years of age is more than double its initial volume. Although the greatest difference is found between the beginning and the end of the initial cycle (between 6 and 8 years old), between 6 and the ages corresponding to the middle and upper cycle (9-12 years old) and between the ages of the middle cycle (8 and 9 years old) and the ages corresponding to the upper cycle (11 and 12 years old).

These results are congruent with the affirmation of previous studies, such as that of Baron-Cohen, Golan, Wheelwright, Granader and Hill (2010) on the importance of starting the process of acquiring emotional vocabulary at an early age, since in these early stages there is greater flexibility and capacity for acquiring emotional vocabulary. Furthermore, a sufficiently broad acquisition of emotional vocabulary is related to the emotional educational process, which will favor the pupil's overall development (Bisquerra et al., 2007).

The data obtained also showed that the older the age, the greater the number of ambiguous words. This can be explained by the fact that, as previous studies have shown, the acquisition of ambivalent concepts and complex vocabulary increases significantly with age. That is, the older the age, the higher the level of abstraction, and therefore the higher the number of ambiguous words (Lund, Sidhu and Pexman, 2019).

In reference to the gender variable, the results showed a higher number of negative words reported by boys while girls showed, in general, a higher number of positive emotion-words. Although there is no scientific agreement on the existing differences between boys and girls, some studies in adults have shown that the male gender manifests a higher level of self-control and employs the suppression strategy more frequently (Gross, 2019), while the female gender tends to express their emotions more (Goldshmit and Weller, 2000).

In conclusion, for the present study it was hypothesized that there were differences in emotional vocabulary as a function of students' age and gender. The results showed an increase in the number of positive emotions with increasing age, doubling their initial volume, an increase in negative and ambiguous emotions with increasing age, and a higher number of positive words reported by girls. These results give us an idea of our sample to therefore apply our emotional education program, to increase emotional competences through language and emotional awareness and regulation using the video game Happy 8-12. The videogame consists on resolving a group of 25 conflicts that occur in common contexts for children, such as at school, at home or in the park. the video game aims to improve the emotional competences encompassed in Bisquerra's theoretical framework: awareness, regulation, autonomy, social competences and life competences; providing children with a better understanding of their emotions and how to deal with them and their conflicts in everyday life.

Looking to the near future, we hope that the intervention with the Happy project will help us to improve the emotional competences of the pupils and that this baseline will form the foundation of the program for the improvement of emotional awareness and regulation through language.

References

- Bar-On, R. (1997). *The Emotional Intelligence Inventory (EQI): Technical manual*. Toronto, Canadá: Multi-Health Systems.
- Baron-Cohen, S., Golan, O., Wheelwright, S., Granader, Y. & Hill, J. (2010) Emotion word comprehension from 4 to 16 years old: a developmental survey. *Frontiers. Evol. Neurosci.* 2:109. doi: 10.3389/fnevo.2010.00109
- Bisquerra Alzina, R. (2003). Educación emocional y competencias básicas para la vida. *Revista De Investigación Educativa*, 21(1), 7-43.
- Bisquerra, R. (2000). Educación emocional y bienestar. *Ciss-praxis*: Barcelona
- Bisquerra, R. (2001). ¿Qué es la educación emocional. *Temáticos Escuela Española*, 1(1), 7-9.
- Bisquerra, R. (2009). Psicopedagogía de las emociones. *Síntesis*: Madrid.
- Bisquerra, R. y Pérez, N. (2007). Las competencias emocionales. *Educación XXI*, 10, 61-82. Bisquerra, R. (2015). *Universo de Emociones*. Valencia, España: PalauGea
- Bisquerra, R., & Filella, G. (2018). Análisis del vocabulario emocional en el profesorado de lengua. *Revista electrónica interuniversitaria de formación del profesorado*, 21(1), 161-172.
- Cabello, R., Ruiz-Aranda, D., & Fernández-Berrocal, P. (2010). Docentes emocionalmente inteligentes. *Revista Electrónica Interuniversitaria de formación del profesorado (REIFOP)*, 13,1. Recuperado de: <http://www.aufop.com>
- Cervantes, M. C., & Gaeta, M. L. (2017). Desarrollo de competencias emocionales en pre-adolescentes: El papel de padres y docentes. *Revista Electrónica Interuniversitaria De Formación Del Profesorado*, 20(2), 221-235. <https://doi.org/10.6018/reifop/20.2.232941>
- Chaplin, T. M., & Aldao, A. (2013). Gender differences in emotion expression in children: A meta-analytic review. *Psychological Bulletin*, 139(4), 735-765
- Conangla, M., Bisquerra, R. & Soler, J. (2016). *La fuerza de la gravitación emocional*. Barcelona, España: Ediciones B
- Creswell, J. W. (2014). *A concise introduction to mixed methods research*. SAGE publications.
- Cruz, V., Caballero-García, P. & Ruiz-Tendero, G. (2013). La Dramatización Como Recurso Didáctico Para El Desarrollo Emocional. Un Estudio En La Etapa De Educación Primaria. *Revista de Investigación Educativa*, 31(2),393-410. Recuperado de: <https://www.redalyc.org/articulo.oa?id=2833/283328062012>
- Cuadrado, M. (1998). Los programas de desarrollo de la inteligencia emocional. Recuperado de: <http://www.waece.org/biblioteca/pdfs/d071.pdf>
- Díez, A. (2003). El aprendizaje de la lectoescritura desde una perspectiva constructivista. Vol. I: Actividades para hacer en el aula: textos funcionales y cuentos. Barcelona: Graó.
- Dylman, A.S., Blomqvist, E., Champoux-Larsson, M.F. (2020). Reading habits and emotional vocabulary in adolescents. *Educational Psychology*, 40, 6, p.p. 681-694. doi: 10.1080/01443410.2020.1732874
- Ekman, P. (1984). Expression and the nature of emotion. En K.S. Scherer y P. Ekman (Eds.), *Approaches to emotion* (pp. 319-344). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Filella, G. (2014). *Aprender a convivir. Happy 8-12: Videojoc per al desenvolupament de les competències emocionals*. Barcelona, España: Barcanova
- Flores Muñoz, P., Muñoz Escobar, L., & Sánchez Acalo, T. (2019). Estudio de potencia de pruebas de normalidad usando distribuciones desconocidas con distintos niveles de no normalidad. *Perfiles*. 21, 1, 4-11
- Gardner, H. (2001). *La inteligencia reformulada. Las inteligencias múltiples en el Siglo XXI*. Barcelona, España: Paidós.
- Goldshmidt, O. T., & Weller, L. (2000). "Talking emotions": Gender differences in a variety of conversational contexts. *Symbolic Interaction*, 23, 2, p.p. 117-134. <https://doi.org/10.1525/si.2000.23.2.117>
- Goleman, D. (1985). *Emotional Intelligence*. Nueva York: Bantam books.
- Gross, J. (2015). Emotion Regulation: Current Status and Future Prospects. *Psychological inquiry*, 26:1, 1.26, DOI: 10.1080/1047840X.2014.940781
- Gross, J. T., & Cassidy, J. (2019). Expressive suppression of negative emotions in children and adolescents: Theory, data, and a guide for future research. *Developmental Psychology*, 55(9), 1938-1950. <https://doi.org/10.1037/dev0000722>
- Herbert, C., Ethofer, T., Fallgatter, A.J., Walla, P. & Northoff, G. (2018). The Janus Face of Language: Where Are the Emotions in Words and Where Are the Words in Emotions? *Frontiers. Psychol.* 9:650. doi: 10.3389/fpsyg.2018.00650

- Hernández, R., Fernández, C., & Baptista, P. (2014). *Metodología de la investigación McGraw-Hill*. México DF.
- Izard, C. (1977). *Human emotions*. Nueva York: Appleton.
- Joseph, E. & Strain, P. (2003). Enhancing Emotional Vocabulary in Young Children. *Young Exceptional Children*, 6, 4, 18-26.
- Lang, P. J. (1971). The application of psychophysiological methods to the study of psychotherapy and behaviour modification. In A. E. Bergin & S. L. Garfield (Eds.). *Handbook of Psychotherapy and Behaviour Change* (pp. 75- 125). New York: Wiley.
- Larraín, A., Strasser, K. & Lissi, M.R. (2012). Lectura compartida de cuentos y aprendizaje de vocabulario en edad preescolar: un estudio de eficacia. *Estudios de Psicología*, 33(3), 379-383.
- Li, Y., & Yu, D. (2015). Development of emotion word comprehension in Chinese children from 2 to 13 years old: Relationships with valence and empathy. *PloS one*, 10(12), e0143712.
- Logan, S., & Johnston, R. (2009). Gender differences in reading ability and attitudes: Examining where these differences lie. *Journal of Research in Reading*, 32, 2, p.p 199–214. <https://doi.org/10.1111/j.1467-9817.2008.01389.x>
- Lund, T.C., Sidhu, D.M., & Pexman, M. P. (2019). Sensitivity to emotion information in children's lexical processes in. *Cognition* 190, p.p 61-71.
- Magías-Robles, A., Gutiérrez-Cobo, M.J., Gómez-Leal, Cabello, R., & Gross, J, J. (2019). Emotionally intelligent people reappraise rather than suppress their emotions. *PloS ONE*, 14, 8. DOI: <https://doi.org/10.1371/journal.pone.0220688>
- Martín, S. (2009). La revisión del concepto de vocabulario en la gramática de ELE. *Didáctica del español como lengua extranjera*, 157-163.
- Nolen-Hoeksema, S., & Aldao, A. (2011). Gender and age differences in emotion regulation strategies and their relationship to depressive symptoms. *Personality and individual differences*, 51(6), 704-708. <http://dx.doi.org/10.1016/j.paid.2011.06.012>.
- Pegalajar Palomino, C. & López, L. (2015). Competencias emocionales en el Proceso de Formación del Docente de Educación Infantil. *REICE. Revista Iberoamericana sobre Calidad, Eficacia y Cambio en Educación*. 13 (3). 95-106. PLoS ONE, 14, 8. DOI: 10.1371/journal.pone.0220688
- Poventud L.S., Corbett NL., Daunic A.P., Aydin B., Lane H., et al. (2015) Developing Social-emotional Vocabulary to support Self-regulation for Young Children at Risk for Emotional and Behavioral Problems. *International Journal of School and Cognitive Psychology* 2, 1-9. doi:10.4172/ijsep.1000143
- Ridgeway, D., Waters, E., & Kuczaj, S. A. (1985). Acquisition of emotion descriptive language: Receptive and productive vocabulary norms for ages 18 months to 6 years. *Developmental Psychology*, 21, 901–908.
- Rose, E., Weinert, S., & Ebert, S. (2018). The roles of receptive and productive language in children's socioemotional development. *Social Development*. 27, 4, p.p 777-792. DOI: 10.1111/sode.12317
- Salavera C., & Usán, P. (2017). Repercusión de las estrategias de afrontamiento de estrés en la felicidad de los alumnos de Secundaria. *Revista Electrónica Interuniversitaria de Formación del Profesorado*, 20(3), 65-77.
- Salovey, P. & Mayer, J.D (1990). Emotional intelligence. *Imagination, cognition and personality*, 9(3), 185-211.
- Soldevila, A., Filella, G., Ribes, R., & Agulló, M. J. (2007). Una propuesta de contenidos para desarrollar la conciencia y la regulación emocional en la Educación Primaria. *Cultura y educación*, 19(1), 47-59
- Tomkins, S. (1963). *Affect, Imagery, Consciousness. The negative affects (Vol. 2)*. New York: Springer.
- Tugeman, O., & Weller, L. (2011). "Talking emotions": Gender Differences in a Variety of Conversational Contexts. *Symbolic Interaction*, 23, 2, p.p 117-134. <https://doi.org/10.1525/si.2000.23.2.117>
- Wang, L., Fan, C., Tao, T., & Gao, W. (2017). Age and gender differences in self-control and its intergeneration altransmission. *Child: care, health and development*, 43(2), 274-280. <https://doi.org/10.1111/cch.12411>.
- Weis, P. & Herbert, C. (2017). Bodily Reactions to Emotional Words Referring to Own versus Other People's Emotions. *Frontiers. Psychol.* 8:1277. doi: 10.3389/fpsyg.2017.01277

THE IMPACT OF SCIENTIFIC LANGUAGE ON THE TEACHING AND LEARNING OF GRADE 7 NATURAL SCIENCES

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Abstract

Questions have been asked about whether science is more special than any other subject in being less culture bound, and less subject to the usual differences between languages. At so many angles scientific language has been viewed as difficult because of its academic, authoritative and impersonal nature which makes it difficult for both teachers and learners to understand. This is an unfortunate reality because learners ought to develop a strong foundational understanding of scientific concepts in order to comprehend scientific knowledge and processes. Previous studies have shown how language acts as a possible barrier to scientific concept formation. Consequently, the current paper reports on a study to determine how the nature of scientific language impact on the teaching of grade 7 Natural Sciences. Guided by the socio-cultural theory as a framework the study adopted a qualitative case-study research approach. From two different schools in Johannesburg, four Natural Sciences teachers and their grade 7 Natural Sciences learners were purposefully selected to participate in the study. Each teacher was observed twice while teaching Natural Sciences to grade 7 learners and the observations were captured using Reformed Teaching Observation Protocol (RTOP). Each lesson observation was followed by semi-structured interviews to accord the teachers an opportunity to explain some of the episodes observed in the lessons. Data collected was subjected to constant comparative analysis. The results showed that both teachers and learners struggled with writing, pronouncing and spelling scientific terminologies regardless of their proficiency in the language of teaching and learning. The teachers indicated that their learners failed to understand the scientific concepts and processes when they explain to them in English. The lack of fluency in English reduced the participation of learners during the teaching and learning process particularly where teachers had zero tolerance for learners' use of home languages to answer questions. What came out strongly from the lesson observations was that whether learners were first or second English language speakers, the teachers' abilities to scaffold learning was essential to ensure science concepts were comprehensible to the learners. Concepts were more accessible to the learners in classrooms where the teachers utilised different ICT tools which lowered the impact of scientific language. The findings have implications for both pre-service and in-service teacher professional development programmes to equip teachers with the knowledge and skills for making science more comprehensible to the learners.

Keywords: *Natural sciences, nature of scientific language, language of instruction, English second language speakers.*

1. Introduction

In an attempt to overcome the challenges brought by the nature of scientific language and the language of teaching and learning in South African schools, teachers apply different pedagogical and intervention approaches, amongst other strategies. Ng and Cheung (2018) proposed that teachers should use scaffolding to assist learners to overcome the language barrier. The implications of learning science in a home language, a language that is more accessible to a learner, may seem as an ideal solution, however the nature of scientific language itself poses a huge challenge. Talking, writing and reasoning scientifically is fundamental in science learning.

Historically, human progress and advancement is attached to scientific improvement and innovation. A nations' development and economic prosperity is linked to its investment in scientific research and education (Brown, 1996). Miller (2006) asserts that language challenge is the most experienced one internationally amongst all the challenges. Ridge (1997) further dissects this assertion and narrows it down when he laments that learners at secondary school level in South Africa have limited academic success in science subjects, part of which is attributed to the language of instruction. However, recent research has established that the complexity of scientific language also plays a huge role in this. In support of this view, Mavuru and Ramnarain (2020) posited that not only is English as a language of

instruction impeding learners' understanding of scientific concepts, but the complex nature of the science language, play a huge role in blocking learners' scientific concept formation.

Scientific language contrasts with common everyday language which leads to considerable confusions in classroom settings where learners are introduced to scientific terms that have a different meaning in their everyday use. Previous researchers (e.g. Derewianka, 2014; Mavuru & Ramnarain, 2020) have also indicated that the way science language is written, designed to be concise, precise, and authoritative, tends to isolate learners from meaningfully engaging with the science content. This scientific language complexity tends to be difficult for learners to comprehend and hence blocks learning. There are however learners who display good proficiency in English but still struggle with scientific concepts and processes, which therefore highlights the assertion made by Derewianka (2014) that the problem of understanding science cannot not solely be placed on the language of instruction, but also the nature of science as an entity of knowledge, and the linguistic puzzle of science text. It is against this background that the current study sought to address the following research questions: 1. What are the challenges posed by the nature of scientific language that hinder effective learning of Natural Sciences at grade 7 level?; and 2. How do teachers mitigate the challenges caused by the impact of the nature of scientific language in teaching grade 7 Natural Sciences?

2. Literature review

Apart from the language of teaching and learning, the complex nature of the scientific language makes learning science difficult for learners' (Msimanga, Denley & Gumede, 2017). This is evident where even learners with good English language proficiency struggle to write and speak scientifically. Almost two decades ago Schleppegrell (2004) pointed that science has a language of its own that is distinct; abstract, objective and information oriented. Examples of complex scientific words that learners struggle with range from being technical (specific to science discipline) and non-technical (words that attain new meaning when they are used in science) for example when the word 'diversity' is brought into the biology branch of science it assumes a different meaning than it would in daily use. This makes the scientific words ambiguous and confusing, e.g. words like 'power' may mean something else in the learners' daily use which is totally different from the scientific meaning of the word (Mavuru & Ramnarain, 2020). Teachers should be well equipped with pedagogical strategies to mitigate these language conflicts. To this Ng and Cheung (2018) suggested that teachers should provide more scaffolding to facilitate learners' understanding of scientific concepts. The National Research Council (2004) suggested modelling which clearly defines task outcomes by giving learners partial solutions, hints and clues and by asking them leading-on questions to guide their learning.

Words in science can be difficult to pronounce and unfamiliar because some scientific words originate from Greek and Latin languages (Steffanides, 1965). Scientific terms learners struggle to pronounce and write at grade 7 level are often long words, for example 'monocotyledonous' and 'dicotyledonous'. Queigly (2019) proposes that words should be broken down into prefix, root and suffix when teaching. Zoski, Nellenbach and Erikson (2018) termed this approach as '*morphological strategies of teaching science*'. This makes the word easy to pronounce and write.

3. Methodology

The current study followed a qualitative case-study research design. Creswell (2016) defines qualitative research as an enquiry that seeks to understand social or human phenomena. This design allowed the researcher to observe and interact with the different research participants to formulate an understanding of their relationship with scientific language and the impact it has on teaching and learning of grade 7 Natural Sciences. Four grade 7 Natural Sciences teachers from two different schools were purposefully selected as a sample. In South African schools, grade 7 is a first step in transitioning from an intermediate phase (grade 4-6) where Natural sciences is offered as Natural Sciences and Technology. This comes with a shift in the structure of the curriculum with the technology component removed and the new features of the subject entail parts of Biology (Life Sciences), Physics and Chemistry. This is a critical level in science education upon which foundational scientific principles and core strands are laid out.

Data was collected through non-participant classroom lesson observations, which were followed by semi-structured interviews with the teachers. Each teacher was observed whilst teaching two Natural Sciences lessons and the Reformed Teaching Observation Protocol (RTOP) (MacIsaac, D., Sawada, D, & Falconer, 2001) was used to observe the classroom interactions. The interviews and lessons observed were audio and video recorded respectively with permission from the participants. The qualitative data was subjected to constant comparative analysis (Merriam & Simpson, 2000).

4. Research findings

Through a careful analysis of the data amassed through classroom observations and the interviews that followed, this study was able to formulate three themes in response to the research questions. Theme 1 highlights the challenges teachers and learners face with regards to scientific language, theme 2 explores the different pedagogical strategies and tools teachers and learners use to combat the scientific language challenges.

4.1. Theme 1: Teachers and learners struggled with pronouncing, spelling and writing scientific terminology

The four teachers acknowledged the difficulty of writing, spelling and pronouncing scientific terminology despite having a good command of English, the language of instruction at their respective schools. The teachers had to go an extra-mile when preparing for lessons to identify scientific terminology which they anticipated could be challenging for themselves and the learners. Jizal, one of the teachers said, “During first term there are physiology terminologies which my learners and myself struggle to spell.” Barry, another participant who teaches in an affluent private school also said:

Barry: With online teaching due to COVID-19 pandemic, you need your preparation to be on point because the parents are tuned in with their children, and you can't be pronouncing wrongly in front of the parents who are paying a lot of money for school fees.

The way in which one pronounces is embedded on the dialects, laws and structure of one's home language, which however has the ability to create confusions especially in multilingual classroom settings. An example is one of the lessons observed where a learner read from her workbook in response to a question asked by the teacher. The learner came across the word ‘convection’ and she incorrectly pronounced it as ‘conviction’, which has a completely different meaning. As such Nikelo, the teacher pointed out during interviews that because of the interjections from her classmates who laughed and corrected her, the learner's confidence was affected thereafter. The teachers indicated that failure to read or pronounce scientific terminologies correctly results in poor learner participation in class discussions or answering questions. In another observed lesson the researcher also noticed how learners avoided using scientific terms, instead they replaced them with a longer explanation of the scientific term or process or by simply giving an example instead. This was evident when the teacher, Busi asked the learners to explain the different types of heat transfers. Instead the terms radiation, convection and conduction, the following are the learners' responses where learners avoided stating the actual scientific terms:

Learner 1: It's like when water turns to steam *ma'am*.

Learner 2: When warm air rises over the ocean cool air replaces it.

Learner 2: Ma'am, or when you touch a hot pan on the stove and it burns your hand.

4.2. Theme 2: Teachers used different strategies and tools to facilitate conceptual understanding

During the interviews, the teachers in public schools expressed how they lacked support and resources to aid their teaching. However, they still used different strategies to facilitate conceptual understanding amongst their learners. The teachers started their lessons by asking learners to write down in their workbooks all the key scientific terms in the particular topic and their meanings. One of the teacher had this to say about the strategy:

Nileko: It opens ways to easily integrate the scientific terms later on in the lessons because by then learners know what they mean, or they can use it to refer back to their word bank to check the meaning of the words if they get confused whilst you are teaching. Writing down the words also helps teach them to learn how to spell these words.

The school where Nikelo was teaching did not have circuit boards and electric instruments to connect and demonstrate to the learners, instead he wrote notes and sketched the circuit diagram on the chalkboard while explaining the roles of the different components of an electric circuit and how current flows. This strategy enabled learners to visualize the different components and their roles in an electric circuit. When asked how that particular approach helped to eliminate or reduce scientific language barriers, he responded:

Nikelo: For this lesson we were supposed to use certain materials, like circuit boards so that learners could see, but those things don't exist here, so we end up using only theory just to illustrate, so that they can remember.

These limiting factors did not dissuade the teachers from creating a learning environment and pursuing conceptual understanding for their learners. In her classes, Busiswa continuously repeated the

scientific terms with the learners as she was writing them on the board. She would spell the term as she wrote it down and the learners would repeat after her while copying down. When she introduced a new concept or long scientific word she would either break it down or initially use a more common name for it and then continue to use the more scientific term gradually as they progressed with the lesson. She also broke down long scientific terms into syllables and sang it with the learners in class. This is what Busiswa said “It helps, not only the learners, but I also get to practise spelling and pronunciation, because some of these science words can be very difficult.”

Barry and Jizal had plenty of support and materials at their respective schools to help learners understand scientific concepts better. They had a good Wi-Fi connection in their classes, speakers, projectors, laptops, and they also received PowerPoints with relevant info-graphics and revision worksheets from their curriculum department. The books Barry’s learners used were compiled internally every term. They had a glossary with simplified definitions for scientific terms. In one of his lessons, Barry started by displaying a video of himself from the previous year explaining how circuits work and named the different components. After that the learners were given all the materials to connect their own circuit, the teacher deliberately gave them one faulty component per group so that it would not be easy for them. As learners were working in their small groups, they used the correct scientific names for the different apparatus and all of them were successful in figuring out what was wrong with their circuits and fixed it. Acknowledging the value of hands-on approach and using videos in class, Barry said:

Barry: It is not easy keeping these learners interested, but with videos, they learn better because when they see how an object or instrument looks like, they are able to remember its name. Same thing with connecting circuits, keeping them hands on helps them and encourages those who are shy to take part in class discussions a chance to interact physically with a circuit board.

The two teachers in public schools acknowledged the role of code switching in facilitating conceptual understanding in Natural Sciences lessons. However, Jizal, who teaches in a private school did not share a similar sentiment because most of her learners were English home language speakers. Barry, had a few learners that spoke isiZulu as their home language, even though he did not fully understand the language he allowed learners to discuss in isiZulu. The researcher observed how those learners communicated in a mixture of isiZulu and English when discussing work amongst themselves but fully transitioned to English when talking to the teacher or the rest of their classmates. In one incident where learners were working in groups to connect an electrical circuit, these were the notable exchanges that came from their discussions:

Learner 1: [isiZulu] Pho why ingakhanyisi? (Why is it not lighting up?)

Learner 2: [isiZulu] Enye intambo mele ithinte ku positive. (The other wire must be connected to the positive side.)

Learner 3: [isiZulu] Still ayikhanyisi *dog*, maybe le light lishile. (It still does not light up, maybe the light bulb is burnt out)

Learner 1: [isiZulu] Or maybe le battery lifile, let’s ask sir for a new one. (Or maybe the batteries have ran out of power, let’s ask sir for a new one)

When the teacher eventually came in to assist, learners immediately switched to conversing in English and asked for batteries and a new light bulb. Learners were comfortable discussing in their home language amongst themselves and that helped them to collaboratively find a solution to a scientific problem and facilitated conceptual understanding.

The teachers showed knowledge of the challenges language imposes on the teaching and learning of grade 7 Natural Sciences. They also displayed pedagogical expertise which made learning meaningful through the use of strategies that made scientific terminology and concepts accessible to their learners.

5. Discussion

The findings of this study showed that both teachers and learners face challenges with regards to writing, spelling, and pronouncing scientific terminologies. The teachers gave insight on how this affects the teaching and learning process in grade 7 Natural Sciences classrooms. The research findings revealed that learners struggle to understand scientific language even though they have good proficiency of English, the language of instruction. These findings confirms Msimanga et al.’s (2017) and Schleppegrell’s (2004) assertions that science has a language of its own that is distinct, abstract, objective and information oriented. Therefore, good English language proficiency does not automatically lead to correctly writing and speaking scientifically hence Derewianka’s (2014) suggestions that teachers need to scaffold learning as learners who are proficient in English language still experience problems in the science classrooms. Three out of the four teachers who participated in this study applied code switching

in their classes, and also recommended using the learners' home languages to facilitate conceptual understanding. The researchers found this strategy effective in closing the gap in scientific language challenges in grade 7 Natural Sciences. This is in line with the outcomes of the study done by Mavuru and Ramnarain (2020) in grade 9 Natural Sciences, which found that teachers' acknowledgement and drawing on learners' home languages are helpful in elevating linguistic challenges in learning Natural Sciences. The study by Msimanga and Lelliot (2014) also alludes to the use of learners' home languages in a class discussion as an effective strategy in facilitating constructive scientific conceptual development.

6. Conclusion

Important findings from the study showed that scientific language problems are experienced by both teachers and learners regardless of whether they are proficient in English or not which is the language of teaching and learning. It was evident from the findings that during planning teachers ought to anticipate and recognise language challenges learners are likely to experience. Important strategies were used to assist learners transcend across everyday language use to scientific terminologies in the science classrooms which prepared learners to communicate, spell and pronounce those terms and ultimately understanding the concepts. These strategies include: teachers helping learners prepare a glossary of scientific terminologies per chapter; engaging learners in hands-on activities in the classroom, which could be in the form of practical/ inquiry-based activities; use of multimedia; and code switching. Whilst these strategies have been identified previously, in the current study, the manner in which the teachers used each of the strategies made a difference as it was context dependent. These findings have implications for both pre-service and in-service teacher professional development providers to consider teacher input when planning and implementing any development as they have the practical experiences of such issues in the science classrooms.

References

- Alidou, H., Boly, A., Brock-Utne, B., Diallo, Y. S., Heugh, K., & Wolff, H. E. (2006). Optimizing learning and education in Africa: *The language factor*. Paris: ADEA.
- Brown, J. D., & Bailey, K. M. (2008). Language testing courses: What are they in 2007? *Language Testing*, 25(3), 349-383.
- Creswell, J. W., & Poth, C. N. (2016). *Qualitative inquiry and research design: Choosing among five approaches*. Sage publications.
- Derewianka, B. (2014). Supporting students in the move from spoken to written language. In *English's in multilingual contexts* (pp. 165-181). Springer, Dordrecht.
- Mavuru, L., & Ramnarain, U. D. (2020). Language affordances and pedagogical challenges in multilingual grade 9 natural sciences classrooms in South Africa. *International Journal of Science Education*, 42(14), 2472-2492.
- MacIsaac, D., Sawado, D., & Falconer, K. (2001). Using the Reformed Teaching Observation Protocol (RTOP) as a catalyst for self-reflective change in secondary science teaching. Paper presented at annual meeting of the American Educational Research Association, Seattle, WA.
- Merriam, S. B. & Simpson, E. L. (2000). *A guide to research for educators and trainers of adults*. Malabar, Florida: Krieger.
- Msimanga, A., & Lelliott, A. (2014). Talking science in multilingual contexts in South Africa: Possibilities and challenges for engagement in learners home languages in high school classrooms. *International Journal of Science Education*, 36(7), 1159-1183.
- Msimanga, A., Denley, P., & Gumede, N. (2017). The pedagogical role of language in science teaching and learning in South Africa: A review of research 1990–2015. *African Journal of Research in Mathematics, Science and Technology Education*, 21(3), 245-255.
- Ng, C. H. & Cheung, Y. L. (2018). Mediation in a socio-cognitive approach to writing for elementary students: Instructional scaffolding. *Education Sciences*, 8(3), 92.
- Schleppegrell, M. J. (2004). *The language of schooling: A functional linguistics perspective*. Routledge
- Steffanides, G. F. (1965). The role of Greek and Latin in science. *The American Biology Teacher*, 27(10), 785-789.
- Miller, R.G. (2006). Unlocking Reading Comprehension with Key Science Inquiry Skills. *Science Scope Journal*, 30-33.
- Quiegley, A., Coleman, R., Cunningham, A., Breadmore, H., Davies, S., Elliot, V., & Dachet, D. (2019). Improving literacy in secondary schools.
- Zoski, J. L., Nellenbach, K. M., & Erickson, K. A. (2018). Using morphological strategies to help adolescents decode, spell, and comprehend big words in science. *Communication Disorders Quarterly*, 40(1), 57-64.

SECONDARY TEACHERS PERSPECTIVES ON FREE ONLINE PROGRAMS TO PROMOTE STUDENT ENGAGEMENT

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Abstract

It can be challenging for teachers to keep students engaged in a physical classroom, however, in a virtual setting it is augmented further (Mobile guardian, 2020). Households can be very distracting for students and teachers are unable to walk around and cannot see if students are engaged or distracted (Farah & Barnett, 2019; McNiff, 2021). In addition, teachers can feel intimidated and overwhelmed with technology (Hertenstein, 2020; Schaffhauser, 2020). Teachers are struggling with virtual learning and have gotten little to no professional development on how to engage students in an online platform (Schwartz, 2020; Williams, 2021). This study will dive into various free online programs for virtual student engagement which will provide prospective from current teachers on the most to the least helpful program. These prospective will help provide professional development direction on which online program could be used to engage students in a virtual setting.

The 32 participants included current teachers in southeast Alabama. These participants were also enrolled in a master's of education program. The participants learned about various free online programs and were able to simultaneously implement those programs in their classroom. At the end of the semester students took an online survey asking which programs were least to most helpful for engagement, easiest to implementation, and programs they would like to know more about. Once the data was collected, descriptive statistics were used to analyze the results. The results showed the programs that were the easiest to implement were also the most helpful for engaging students. In addition, the programs they wanted to know more about were also the programs they stated were the least helpful were engaging students. A few implications of the study were at the time of the study all participants were learning and teaching virtually, this will affect the future usage as the future of virtual classroom settings is still undecided. In addition, the deep dive of each online program was limited due to the lack of time in the course.

Keywords: *Student engagement, virtual learning, online learning, secondary education.*

1. Introduction

Student engagement is an essential part of learning, they need to be actively engaged in their learning in order to achieve mastery (Linnenbrink & Pintrich, 2010). It can be challenging for teachers to keep students engaged in a physical classroom, however in a virtual setting it is amplified. Students are uprooted from their school learning environments into their households, most of which are not conducive for learning. Households can be very distracting for students and teachers are unable to walk around to see if students are engaged or distracted (McNiff, 2021; Mobile guardian, 2020; Farah & Barnett, 2019).

Another issue in virtual learning is the teacher's knowledge and comfortability with implementing technology for learning. Teachers can feel intimidated and overwhelmed with technology (Hertenstein, 2020; Schaffhauser, 2020). They are struggling with virtual learning and have gotten little to no professional development on how to engage students in an online platform (Schwartz, 2020; Williams, 2021). As a result, teachers are reverting back to lecture-based models as they are unfamiliar with online programs to help engage students. Lecture-based learning provides little to no engagement opportunities for students and, therefore, they are not active learners (Terada, 2019). This study will dive into various free online programs for virtual student engagement which will provide prospective from current teachers on the most to least helpful programs.

2. Literature review

In virtual settings teachers are unable to read the room to see if students are committed, focused, and engaged. Student engagement is associated with the physical environment classroom (Spencer, 2020). The physical environment of the classroom is a positive learning environment that promotes learning, engagement, and critical thinking. In a virtual setting it is a challenge for teacher to engage students. Bender (2003) found online classes are more work for the teacher compared to face-to-face classes. Teachers were trained to teach in a face-to-face environment not a virtual setting. When teachers were required to shift from in-person to virtual learning they were scrambling to adapt to virtual learning platforms (Williams, 2021). They received little to no training and only had a week at most to prepare. This resulted in online instruction mostly relies on lectures where students are the recipients of information in the learning process. Students are expected to learn and master the content knowledge by just listening.

Most engagement in online environments stem from adaptations of teaching strategies from face-to-face instruction. Many teachers were plagued with the myth that virtual learning was equivalent to face-to-face learning (Williams, 2021; Meyers, 2008). As a result, they are expecting the material to easily transfer to a virtual setting and for students to respond accordingly. Teachers needed professional development geared toward effectively teaching online (Williams, 2021). Teachers need tools to engage all students regardless of their circumstance in a virtual platform.

3. Methodology

This research study is a survey research design, in which the quantitative data is collected from survey (Creswell, 2015; Glasow, 2005). The results from the survey provide a general picture of the overall context of the entire set of research questions (Creswell & Plano Clark, 2007). The following research questions assisted in concluding the purpose of the study:

1. What free online programs are the most helpful for engaging students in a virtual setting?
2. What free online programs are the least helpful for engaging students in a virtual setting?
3. What free online programs are the easiest to implement?
4. What free online programs are the most confusing to implement?

4. Sample population

The sample population was 32 graduate students who were also currently secondary teachers in Southeast Alabama. These participants were either pursuing a master's degree in education or taking the courses needed to progress from a temporary to professional teaching certificate. The participants were enrolled in a secondary methods course taught in the evening via zoom for safety purposes. Concurrently participants were virtually teaching their students during the day via zoom also.

5. Data collection and analysis

To collect the quantitative data, a survey was sent to participants via email using Google Forms. The survey was comprised of five items, addressed the four research questions. The survey asked which technology programs were the most helpful in engaging students, least helpful in engaging students, easy to implement, difficult to implement, and programs they would like to know more about for a virtual setting. Each question was a multiple selection option including all the free technology programs covered (Kahoot, Google Docs, Socrative, Google Slides, Google Forms, Google Sheets, Edulastic, Go Formative, Classkick, Peardeck, and Blooket), participants weren't limited to selecting a certain amount for each question. Once the data was collected, descriptive statistics were used on each question separately.

6. Findings and discussion

The perspectives of which programs were the most and least helpful were the first two questions in the survey. The survey was given after participants had an opportunity to learn about each technology program and potentially implement it in their classroom. All participants responded to the question which programs are the most helpful for engaging students in a virtual setting and a few participants selected more than one answer. The top three programs participants selected for most helpful when engaging students in a virtual setting were Kahoot, Google Slides, and Google Docs.

Table 1. Participant Responses: Which program(s) are the most helpful when engaging students in a virtual setting? (select all that apply).

Programs	<i>n</i>	%
Kahoot	31	91.2
Google Docs	24	70.5
Socrative	7	20.6
Google Slides	27	79.4
Google Forms	17	50.0
Google Sheets	16	47.1
Edulastic	3	9.0
Go Formative	3	9.0
Classkick	2	5.9
Peardeck	11	32.4
Blooket	7	20.6

The next question asked participants which program(s) are the least helpful when engaging students in a virtual setting. Not all participants answered the questions. Only 27 participants responded to the question however there were multiple responses for some participants. Table 2 shows the results, the top four programs participants selected as the least helpful when engaging students in a virtual setting were Edulastic, Go Formative, Socrative, and Classkick.

Table 2. Participant Responses: Which program(s) are the least helpful when engaging students in a virtual setting? (select all that apply).

Programs	<i>n</i>	%
Kahoot	2	7.4
Google Docs	3	11.1
Socrative	12	44.4
Google Slides	1	3.7
Google Forms	3	11.1
Google Sheets	4	14.8
Edulastic	13	48.1
Go Formative	13	48.1
Classkick	11	40.7
Peardeck	8	29.6
Blooket	1	3.7

Questions three and four of the survey focused on which programs were easy or hard to implement in a virtual setting. All participants responded to question three about which programs were the easiest to implement in a virtual setting, most participants selected more than answer. The most selected responses were Kahoot, Google Docs, and Google Forms.

Table 3. Participant Responses: Which program(s) are the easiest to implement in a virtual setting? (select all that apply).

Programs	<i>n</i>	%
Kahoot	34	100.0
Google Docs	28	82.4
Socrative	1	2.9
Google Slides	15	44.1
Google Forms	20	58.8
Google Sheets	12	35.3
Edulastic	5	14.7
Go Formative	10	29.4
Classkick	11	32.4
Peardeck	8	23.5
Blooket	15	44.1

The fourth question asked about the programs that were difficult to implement in a virtual setting, it had a lower response rate of 25 participants. The top four programs the participants selected for hardest implementation were Edulastic, Go Formative, Socrative, and Classkick.

Table 4. Participant Responses: Which program(s) are the hardest to implement in a virtual setting? (select all that apply).

Programs	<i>n</i>	%
Kahoot	0	0.0
Google Docs	4	16.0
Socrative	15	60.0
Google Slides	1	4.0
Google Forms	10	40.0
Google Sheets	11	44.0
Edulastic	18	72.0
Go Formative	15	60.0
Classkick	14	56.0
Peardeck	10	40.0
Blooket	5	20.0

The last question on the survey asked participants which programs they wanted to learn more about. This question did not correlate to any research questions and had a response rate of 32 participants with some participants selecting multiple answers. The top programs participants wanted to learn more about was Classkick, Go Formative, Peardeck, Edulastic, and Socrative. Results are below in Table 5.

Table 5. Participant Responses: Which program(s) would you like to know more about? (select all that apply).

Programs	<i>n</i>	%
Kahoot	5	15.6
Google Docs	3	9.4
Socrative	15	46.9
Google Slides	4	12.5
Google Forms	3	9.4
Google Sheets	2	6.3
Edulastic	15	46.9
Go Formative	17	53.1
Classkick	19	59.4
Peardeck	16	50.0
Blooket	4	12.5
Other	0	0.0

7. Conclusion

As a whole, participants found some of the free online programs to be engaging and helpful in a virtual setting. Participants shared the programs they found to be most engaging in a virtual setting were Kahoot, Google Docs, Google Slides, Google Forms, and Google Sheets. In addition to most engaging they shared that these programs, with the exception of Google Sheets, were the easiest to implement. These programs help eliminate purely lecture-based lesson, students are able to engage in their learning using various programs (Khan, Egbue, Palkie, & Madden, 2017).

Unfortunately, there were some programs participants found ineffective in a virtual setting. Participants shared the programs they found to be least engaging in a virtual setting were Edulastic, Go Formative, Socrative, and Classkick. These programs were also selected as the most difficult to implement. In a virtual setting programs need to be engaged but also user friendly so it does not take time away from learning (Bowman, 2010). In addition to these four programs not being engaging and difficult to implement, the participants wanted to learn more about these programs, including Peardeck. This data leads to the conclusion that the participants were not trained effectively on the program and it could have led to ineffective usage. Therefore, more time needs to be spent on delivering the professional development for the programs the participants found nonengaging and difficult to implement. The lack of understanding surrounding the various programs could be preventing the various programs from being implemented correctly to help increase engagement in learning.

References

- Belsha, K. (2020, October 1). Teaching in-person and virtual students at once. Chalkbeat. Retrieved from <https://www.chalkbeat.org/2020/10/1/21497795/teaching-in-person-and-virtual-students-at-once-is-an-instructional-nightmare-some-educators-say>
- Bender, T. (2003). *Discussion-based online teaching to enhance student learning: Theory, practice, and assessment*. Stylus.
- Bonderud, D. (2020, August 17). Four key blended learning engagement challenges and how to overcome them. EdTech. Retrieved from <https://edtechmagazine.com/higher/article/2020/08/4-key-blended-learning-engagement-challenges-and-how-overcome-them-perfcon>
- Bowman, L. (2010). *Online learning: A user-friendly approach for high school and college students*. R&L Education.
- Creswell, J. W. (2015). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research*. Pearson.
- Creswell, J. W., & Plano Clark, V. L. (2007). *Designing and conducting mixed methods research*. Sage Publications
- Crook, A. E., & Crook, T. W. (2020, August 26). Six tips for teaching online and in personal simultaneously. Inside Higher Ed. Retrieved from <https://www.insidehighered.com/advice/2020/08/26/strategies-teaching-online-and-person-simultaneously-opinion>
- Farah, A. & Barnett R. (2019, August 28). The 3 biggest challenges of blended learning- and how to overcome them. Alliance for Excellent Education. Retrieved from <https://futureready.org/the-3-biggest-challenges-of-blended-learning-and-how-to-overcome-them/>
- Gilmour, J. (2020, February 3). What are the challenges of implementing blended learning in adult education? ProLiteracy. Retrieved from <https://proliteracy.org/Blogs/Article/505/What-are-the-Challenges-of-Implementing-Blended-Learning-in-Adult-Education>
- Glasow, P. A. (2005, April). *Fundamentals of survey research methodology*. MITRE.
- Hertenstein, E. (2020, October 1). Educators feel overwhelmed by increased by the increased workload of distance learning. Berkeley High Jacket. Retrieved from: <https://berkeleyhighjacket.com/2020/features/educators-feel-overwhelmed-by-the-increased-workload-of-distance-learning/>
- Khan, A., Egnue, O., Palkie, B., & Madden, J. (2017). Active learning: Engaging students to maximize learning in an online course. *Electronic Journal of E-Learning*, 15(2), 107-115.
- Ladd, T. (2020, June 19). Optimizing concurrent classrooms: Teaching students in the room and online simultaneously. Forbes. Retrieved from <https://www.forbes.com/sites/tedladd/2020/06/19/optimizing-concurrent-classrooms-teaching-students-in-the-room-and-online-simultaneously/#3bb0c87b3451>
- Linnenbrink, E. A., & Pintrich, P. R. (2010). The role of self-efficacy beliefs in student engagement and learning in the classroom. *Reading & Writing Quarterly*, 19(2), 119-137.
- Meyers, S. A. (2008). Transformative pedagogy when teaching online. *College Teaching*, 56(4), 219-224.
- Mobile guardian (2020). 9 Challenges of the Virtual Classroom. Mobile Guardian. Retrieved from <https://www.mobileguardian.com/9-challenges-of-the-virtual-classroom/>
- Schaffhauser, D. (2020, June 2). Educators feeling stressed, anxious, overwhelmed and capable. The Journal. Retrieved from: <https://thejournal.com/articles/2020/06/02/survey-teachers-feeling-stressed-anxious-overwhelmed-and-capable.aspx>
- Schwartz, S. (2020, November 16). Survey: Teachers and students are struggling with online learning. Education Week. Retrieved from: <https://www.edweek.org/teaching-learning/survey-teachers-and-students-are-struggling-with-online-learning/2020/11>
- Schwartz, S. (2020, August 5). How to make lessons cohesive when teaching both remote and in-person classes. Education Week. Retrieved from: <https://www.edweek.org/ew/articles/2020/08/06/how-to-make-lessons-cohesive-when-teaching.html>
- Spencer, J. (2020). The real issue isn't student engagement. John Spencer. Retrieved from: <https://spencerauthor.com/student-ownership-online/>
- Terada, Y. (2019). Students think lectures are best, but research suggests they're wrong. Edutopia. Retrieved from <https://www.edutopia.org/article/students-think-lectures-are-best-research-suggests-theyre-wrong>
- Williams, C. (2021, February 22). Virtual learning professional development for teachers. Center for Student Achievement Solutions. Retrieved from: <https://www.csas.co/virtual-learning-professional-development-for-teachers/>

ASSESSING E-PORTFOLIO ACCEPTABILITY IN AN ONLINE COURSE

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Abstract

E-portfolios play an important role in the success of online courses in higher education. They help universities to provide a more effective and efficient teaching-learning process by enabling students to track their skills and proceed towards their future career goals. In view of the rapid expansion of e-portfolios in French universities, a challenging problem arises regarding its acceptance and use by higher education students, particularly in the context of online courses. Indeed, using new technology can be considered as a process that implies the evolution of judgment over time. To address this gap, the present study has two objectives. First, it explores the key factors of acceptability (before use) and acceptance (after first use) of the e-portfolio Karuta according to the literature and the Unified Theory of Acceptance and Use of Technology (UTAUT). Second, it aims to generate appropriate assumptions and validate research instruments for a new experiment (e.g., questions, items). This is a quantitative and qualitative survey with a descriptive scope. Data were collected from 10 Master students in pedagogical and digital engineering at Aix-Marseille University, France. The research instrument is a questionnaire consisting of open and closed-end questions including: 41 items using a 7 points Likert Scale, which covers Self-Regulated Online Learning (SRSOL), UTAUT's factors and the perceived enjoyment variable administered before and after use; 2 open questions to gather more explanations from participants about their reasons to continue to (or not to) use the e-portfolio in the future; and 1 question about their feelings regarding the reflexive activity implemented when they completed or used the e-portfolio within the Karuta tool. The results showed that students seem to have the intention to continue to use the e-portfolio as part of their learning process. Besides, it appears that performance expectancy, effort expectancy, social influence predict behavioral intention to use and to continue to use the e-portfolio.

Keywords: *E-Portfolio, acceptability, acceptance, UTAUT, higher education, self-regulated learning.*

1. Introduction

E-portfolios have deeply infiltrated the field of education and are broadly used in higher education institutions to support students' learning (Kahn, 2014). Their benefits include: comprehensive performance assessment, taking advantage of technological developments, professional development, performance improvement, and stimulating creativity and innovation (Mahasneh, 2020; Mailles Viard Metz and Alberne Giordan, 2010). Still, the integration of new technologies into the teaching-learning process raises considerable challenges concerning objectivity and effectiveness in assessing learners' skills. This study explores the factors explaining the acceptance of the e-portfolio Karuta in the context of an online Master's degree in Pedagogical Engineering at Aix Marseille University (AMU), in France.

1.1. State of the art

1.1.1. Reflexivity and e-portfolio. An e-portfolio can be defined as “a collection of digital artifacts that demonstrates what a person knows and can do.” (Zhang et al., 2011, p. 1). It provides an effective way to store, organize, and showcase evidence of students' learning and achievement over time (Abdullah et al., 2016). E-portfolios have become increasingly important in higher education following a paradigm shift regarding the traditional student-teacher relationship. Students take on a central role as new autonomous actors, capable of determining their own objectives where teachers are present to accompany and support them (Boutin, 2004). For students, e-portfolios can be beneficial since they facilitate self-regulated learning through critical reflection by encouraging them to stimulate critical thinking and become independent. Educators use e-portfolios as tools for documenting students' educational performance, promoting their professional development, and encouraging them to think reflexively (Alajmi, 2019).

1.1.2. Self-Regulated Learning (SRL) as a key to success in higher online education. SRL refers to how learners set goals for themselves and then modulate their cognitive and motivational processes and the contextual factors to achieve said goals (Pintrich, 2004). Effective SRL is essential in online education where the responsibility of the learning process is fully transferred to the learner. Online SRL is theorized to consist of four specific features: Control of the learning context (time management and environmental control strategies), Procrastination (conflicts of priorities regarding responsibilities from work and personal life), Learning strategies (unlimited access to the pedagogical content can make essential strategies such as note-taking seem unnecessary) and Seeking peer support (isolation related to the asynchronous nature of online courses can affect students' motivation and thus learning achievement) (Cosnefroy et al., 2020).

1.1.3. E-Portfolios' acceptability to support SRL and Reflexivity. Given the potential advantages of e-portfolios, their implementation, use, and acceptance by higher education learners reveal vigorous challenges. In fact, most studies have focused on the benefits of e-portfolios to improve the quality of the learning-teaching process (e.g., Lim et al., 2016; Wakimoto & Lewis, 2014) but only few studies have considered the factors that affect students' acceptance and rejection of e-portfolios. For instance, Abdullah et al. (2016) have extended the Technology Acceptance Model (TAM) to assess undergraduate students' behavioral intention to use e-portfolios for learning. Results indicate that behavioral intention depends on both Perceived Ease of Use (PEOU) and Perceived Usefulness (PU). Shroff et al. (2011) examined students' behavioral intention to use an e-portfolio system based on the TAM model. Results showed that students' PEOU had a significant effect on their attitude towards usage. Subsequently, PEOU had the strongest significant effect on PU. In this sense, there is a need to carefully design e-portfolios to meet students' preferences, intentions, and purposes. Involving users at an early stage of the design to identify the acceptability factors should be a common step in the developmental process of implementing an e-portfolio.

To identify and explain the factors that affect the acceptability and acceptance of new technology, several theories and models have been developed (e.g., TAM, Model of PC Utilization, etc.). Among these theories and models, current research has focused on the Unified Theory of Acceptance and Use of Technology (UTAUT) by Venkatesh et al. (2003) because it integrates several concepts derived from eight models and theories of behavior to explain the intention to use technology. Furthermore, it explains about 70% of the variance in the behavioral intention to use technology and about 50% of the variance in technology use. The UTAUT states that behavioral intention depends on performance expectancy (PE), effort expectancy (EE), social influence (SI), and facilitating conditions (FC). Overall, the UTAUT model has received empirical support by predicting technology acceptance and use in different contexts and by different users (Venkatesh et al., 2016).

1.2. Research questions and assumptions

E-portfolios are recognized tools to promote students' ability to actively and autonomously engage in their learning process. Their acceptability and acceptance is subjected to the evolution of personal judgment over time (Martin et al., 2016). In other words, the use of e-portfolios as evaluation tools promotes SRL and the development of SRL should have an impact on the acceptance of the e-portfolio. The aim of this paper is then to present a preparatory analysis to generate appropriate assumptions and validate research instruments (e.g., questions, items) for a subsequent experiment analyzing the link between these two aspects. The current study explores the key factors of acceptability (before use) and acceptance (after first use) of the e-portfolio Karuta according to the UTAUT (Venkatesh et al., 2003) in fonction of online Master students' reflexive use of the e-portfolio and their level of SRL (Crosnefoy et al., 2020). The feedback generated by this study will be taken into account to better implement the use of the e-portfolio among AMU students.

2. Materials and method

AMUs Pedagogical Engineering Master (curriculum and evaluation processes) has been designed following a competency-based approach where portfolios are considered great tools to assess students' acquisition of skills (Tardif, 2006). The nature of the master's degree and the wish of the university to implement the e-portfolio Karuta on a large scale for all students in the following years create a great opportunity to assess student's expert opinion on the subject.

2.1. Participants

10 out of 12 online master's students in pedagogical engineering completed all phases of this exploratory study. 5 identify as female and 5 as male.

2.2. Material

Karuta is an Open Source Portfolio developed by ePortfolium and Karuta Community. For the course “Getting to know the Pedagogical Engineer profession”, master students were required to have a reflexive practice on the use of Karuta. By using the e-portfolio to give an account of their skills, students were able to get familiar with the portfolio as an evaluation tool to later analyze its utility, usefulness, and limits.

The **Self-Regulation Scale of Online Learning (SRSOL)** is a 7-point Likert type scale consisting of 24 items divided equally into four subscales: Control of learning context (CTXT), Procrastination (PROC), Learning strategies (STRAT), and Seeking peer support (PAIRS). The Index of Self-Regulated Online Learning (ISROL) can be calculated after reversing the procrastination score (PROC(r)). $ISROL = \text{Mean}(PROC(r), CTXT, STRAT, PAIRS)$ (Cosnefroy et al., 2020).

The **Unified Theory of Acceptance and Use of Technology (UTAUT)** is a 7-point Likert-type scale measuring factors determining behavioral intention to use new technology. The questionnaire consists of 5 scales: The performance expectancy (PE) 4-items scale (e.g., I would find Karuta useful in my learning (before use), I found Karuta useful in my learning (after use)). The effort expectancy (EE) 4-items scale (e.g. Learning to operate Karuta would be easy to me (before use)...). The social influence (IS) 3-items scale (e.g., Professors who influence my behavior think I should use Karuta (before use), ...). The perceived enjoyment (PENJ) 3-items scale (e.g., Using Karuta would be fun (before use), ...). And, the behavioral intention (BI) 3-items scale (e.g., I intend to use Karuta in the future (before use), ...). (Venkatesh et al., 2003, 2016).

Additional open questions: For the post-test, our team designed 4 questions to have complementary information on the use of Karuta and the reflexive practice. For example: “Do you plan to repeat this reflexive activity with Karuta even though it is not required for the validation of the next semesters?”.

2.3. Tasks and protocol

The experiment was organized in three phases: pre-test (t1), use of the e-portfolio (t2), and post-test (t3). In the first phase, students had 4 days to complete 2 questionnaires on online SRL, and their intention to use new technology (t1). Then, they had 4 weeks to watch an explanatory video on the use of Karuta and to complete their e-portfolios (t2). Finally, 10 days after submitting their e-portfolios, students had 4 days to complete again the SRL survey, an “after use” version of the intention to use (keep using) new technology questionnaire, plus 4 additional open questions to assess students' opinion on Karuta and their reflexive practice (t3). All participants completed the entirety of the tasks on their personal computers.

Completion of Karuta: Students were asked to use 3 main functionalities of the e-portfolio: Listing the skills they acquired, uploading traces of their development, and answering reflexive questions about the Integrative Evaluative Situation (IES) that assessed their level of competency. For example, for the IES “Designing an e-portfolio”, participants listed “Supporting the implementation of digital education and innovation” as an acquired skill, uploaded evidence such as a “Typology of evaluation practices” and answered 3 reflexive questions (e.g., “What resources do you lack to achieve the competency addressed by this IES? If you had to do it all over again, what would you change?”).

3. Results

We conducted a descriptive analysis to assess students' SRL and Karuta's acceptance before (t1) and after use (t3). Regarding the SRSOL, students believe to have a better control of their learning context over time (CTXT: 6 items, $M(t1)=29.4$, $SD(t1)=3.89$; $M(t3)=34.8$, $SD(t3)=6.00$) and they give more importance to seeking peer support (PAIRS: 6 items, ($M(t1) =24.2$, $SD(t1)=9.04$; $M(t3)=28.3$, $SD(t3)=8.56$). Their views on learning strategies and procrastination remain mostly constant (STRAT: 6 items, $M(t1)=27.6$, $SD(t1)=6.96$; $M(t3)=28.3$, $SD(t3)=8.07$, and PROC(r): 6 items, $M(t1)=30.2$, $SD(t1) =7.64$; $M(t3)=30.5$, $SD(t3)=6.88$). Regarding the UTAUT, students perception of Karuta as useful, enjoyable and easy to use decreased after use (PE: 4 items, $M(t1)=18.4$, $SD(t1)=5.99$; $M(t3)=16.1$, $SD(t3)=6.28$, PNJ: 3 items, $M(t1)=13.1$, $SD(t1)=4.68$; $M(t3)=10.5$, $SD(t3)=5.08$, and EE: 4 items, $M(t1)=21.7$, $SD(t1)=5.31$; $M(t3)=18.3$, $SD(t3)=6.15$). Students gave more importance to the mandatory aspect of completing Karuta overtime based on their teacher's opinion (IS: (3 items, $M(t1)=15.5$, $SD(t1)=3.37$; $M(t3)=17.9$, $SD(t3)=3.03$). In general, students' intention to use Karuta decreased in comparison with t1 (BI: 3 items, $M(t1)=17.6$, $SD(t1)=3.78M(t3)=14.2$, $SD(t3)=5.69$). To examine the differences between t1 and t3, we applied paired t-tests and wilcoxon signed rank because the normality assumptions were not satisfied (Hyde, 2000). Results indicate that the only significant ($p<0.05$) evolution regarded IS (increased) and BI (decreased).

The number of participants in this study was too low to perform any generalizable statistical tests. To counterbalance this, we analyzed not only the available quantitative data but also the answers to the open questions and participants' answers to the reflexive questions on IES. Qualitative data (83 coded quotes) was then interpreted through a predominantly inductive thematic analysis (Braun & Clark, 2012). Participant's answers were organized into 4 main themes: Reflexivity on usability (47% of the data, referring to students' thoughts on how something is able or fit to be used), Reflexivity on utility (30%, enclosing student's thoughts on Karuta's state of being useful, profitable, or beneficial), Reflexivity on reflexivity (14,5%, students reflexion on their own reflexive practice through the use of the e-portfolio) and Reflexivity on learning strategies (8,5%, student's description of their learning practices). These 4 themes may be rearranged into 6 sub-themes including Academics (25% of the data, referring to students' thoughts on academic framework, regulation, and coherence), Karuta's functionality (24%, the reasons and ways to use or not use Karuta), Required effort (24%, the costs of completing the portfolio), User Interface (12%, remarks on Karuta's template as suitable or unsuitable), Support (8,5%, usefulness of support tools or lacks of it), and Opinion about Karuta (6%, personal judgment formed about the e-portfolio Karuta). Based on this double categorization, we calculated which combination of themes and subthemes appeared the most through de data and got the 3 most noticeable nods: Reflexivity on utility and Karuta's functionality (15,5 %), compiling data about student's understanding of Karuta's utility in function of their benefit. For example, "The portfolio activity allowed me to rethink about the expected skills and to make the link between the work that's actually done, the notions studied during the master and the grid of skills seen at the beginning of the courses (and that we tend to put aside.)". Reflexivity on Karuta's usability and Requested effort (14,5%): putting into perspective the correlation between ease of use and actual use of a device. This node mainly evokes the important workload of completing the eportfolio and how time-consuming it may be, one student even refers to it as a "work factory". Reflexivity on usability and User interface (12%), refers to the important link between e-portfolios' layout and components, and students' actual use. From this, we report the fact that various students see Karuta as "incomplete", meaning that they would like to see other functionalities, particularly being to export Karuta's content as a compatible file in the form of a Curriculum Vitae, for example.

4. Discussion

The findings of our preliminary study shed light on the importance of e-portfolios as tools to promote learning and document professional skills in an online education context. Based on the results, students seem to believe that the use of Karuta is beneficial and they understand the importance of a reflexive practice. Abdullah et al. (2016) pointed out a significant relationship between perceived utility and behavioral intention to use e-portfolios. Furthermore, students tend to use Karuta, because it's easy to understand how to use it. These findings are consistent with Abdullah et al. (2016) who suggest that behavioral intention to use an e-portfolio depends on perceived ease of use. Results also indicated that students use Karuta because its use is mandatory in their training. In this sense, students' behavioral intention to use Karuta may be affected by the beliefs of the educational staff (whose opinion is crucial for students) regarding the benefits of e-portfolios (Venkatesh et al., 2003). To go further into this issue, the answers to the open questions can help better understand students' intentions. One student points out that he intends to continue using Karuta during the master's program but he's "more uncertain about its use after the master" because "for the moment Karuta doesn't seem adapted to fulfill" his attents (exporting the e-portfolio and personalizing it). This example shows that judgment on Karuta's utility and usefulness can evolve over time and influence the intention to continue to use it.

Indeed, results also showed that the use of Karuta influenced initial representations with negative judgment for some factors (e.g., PE, EE, PENJ, BI). In this line, (Martin et al., 2016) highlighted that it is crucial to understand factors that lead to the interruption of use. The answers to the open questions and the IES can bring some clues to this topic. As reported by Buckley et al. (2012), students using portfolios often struggle with its realization, the amount of work needed to do it is quite important. It is suggested that the portfolio's completion is carried into teachers' and students' everyday practice so it's not redundant. The use of the portfolio shouldn't be reduced to a single moment at the end of the semester where students need to revisit everything they've done and learned so far. For students to benefit from the reflexive practice, it's important to have time to understand what they're doing and adjust if necessary.

5. Limits and future research

The main limit of this study is the limited sample size (< 30n). From a statistical point of view, no generalizable results were achieved, results were therefore solely interpreted as tendencies. Nevertheless, students' feedback (considered expert because of their field of education) will be taken into account to modify Karuta's current template to better suit the specific needs of AMU.

The direction of the results encourages us to do a confirmatory study with a representative sample size to investigate the relationship between the evolution of SRL and the acceptance of Karuta. As for the method, this preparatory study allowed us to validate our materials and protocol. It also highlighted the benefits of assessing qualitative information, this kind of data allows us to not only study the evolution of students' perception and behavior but the reasons that could explain these tendencies.

References

- Abdullah, F., Ward, R., & Ahmed, E. (2016). Investigating the influence of the most commonly used external variables of TAM on students' Perceived Ease of Use (PEOU) and Perceived Usefulness (PU) of e-portfolios. *Computers in Human Behavior*, 63, 75–90. <https://doi.org/10.1016/j.chb.2016.05.014>
- Alajmi, M. M. (2019). The impact of E-portfolio use on the development of professional standards and life skills of students: A case study. *Entrepreneurship and Sustainability Issues*, 6(4), 1714.
- Boutin, G. (2004). L'approche par compétences en éducation: un amalgame paradigmatique. *Connexions*, 81(1), 25. <https://doi.org/10.3917/cnx.081.0025>
- Braun, V., & Clarke, V. (2012). Thematic analysis. *APA handbook of research methods in psychology, Vol 2 : Research designs : Quantitative, qualitative, neuropsychological, and biological.*, 57-71. <https://doi.org/10.1037/13620-004>
- Buckley, S., Coleman, J., Davison, I., S. Khan, K., Zamora, J., Malick, S., Morley, D., Pollard, D., Ashcroft, T., Popovic, C., & Sayers, J. (2012). Les effets éducatifs des portfolios sur l'apprentissage des étudiants pendant le cursus prégradué: une revue systématique de la collaboration Best Evidence Medical Education(BEME). Guide BEME N° 11. *Pédagogie Médicale*, 13(2), 115-145. <https://doi.org/10.1051/pmed/2012013>
- Cosnefroy, L., Fenouillet, F., & Heutte, J. (2020). Construction et validation de l'échelle d'autorégulation des apprentissages en ligne (EAREL). *Canadian Journal of Behavioural Science / Revue canadienne des sciences du comportement*, 52(3), 255-260. <https://doi.org/10.1037/cbs0000147>
- Hyde, K. F. (2000). Recognising deductive processes in qualitative research. *Qualitative Market Research: An International Journal*.
- Kahn, S. (2014). E-Portfolios: A Look at Where We've Been, Where We Are Now, and Where We're (Possibly) Going. *Peer Review*, 7.
- Lim, C. P., Lee, J. C.-K., & Jia, N. (2016). E-portfolios in pre-service teacher education: Sustainability and lifelong learning. In *Quality and Change in Teacher Education* (pp. 163–174). Springer.
- Mahasneh, O. M. (2020). A Proposed Model for the University Students' E-Portfolio. *Journal of Education and E-Learning Research*, 7(1), 28–33.
- Martin, N., Jamet, É., Erhel, S., & Rouxel, G. (2016). From Acceptability to Acceptance: Does Experience with the Product Influence User Initial Representations? In C. Stephanidis (Ed.), *HCI International 2016 – Posters' Extended Abstracts* (pp. 128–133). Springer International Publishing. https://doi.org/10.1007/978-3-319-40548-3_21
- Metz, S. M.-V., & Alberne-Giordan, H. (2010). E-Portfolio: A pedagogical tool to enhance creativity in student's project design. *Procedia - Social and Behavioral Sciences*, 2(2), 3563–3567. <https://doi.org/10.1016/j.sbspro.2010.03.552>
- Pintrich, P. R. (2004). A Conceptual Framework for Assessing Motivation and Self-Regulated Learning in College Students. *Educational Psychology Review*, 16(4), 385-407. <https://doi.org/10.1007/s10648-004-0006-x>
- Shroff, R. H., Deneen, C. C., & Ng, E. M. (2011). Analysis of the technology acceptance model in examining students' behavioural intention to use an e-portfolio system. *Australasian Journal of Educational Technology*, 27(4).
- Tardif, J. (2006). *L'évaluation des compétences*. Chenelière Education.
- Tricot, A. (2017). *L'innovation pédagogique* (Teacher's éd.). RETZ.
- Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User Acceptance of Information Technology: Toward a Unified View. *MIS Quarterly*, 27(3), 425–478. <https://doi.org/10.2307/30036540>
- Venkatesh, V., Thong, J. Y. L., & Xu, X. (2016). *Unified Theory of Acceptance and Use of Technology: A Synthesis and the Road Ahead* (SSRN Scholarly Paper ID 2800121). Social Science Research Network. <https://papers.ssrn.com/abstract=2800121>
- Wakimoto, D. K., & Lewis, R. E. (2014). Graduate student perceptions of eportfolios: Uses for reflection, development, and assessment. *The Internet and Higher Education*, 21, 53–58.
- Zhang, X., Olfman, L., & Firpo, D. (2011). An information systems design theory for collaborative eportfolio systems. *2011 44th Hawaii International Conference on System Sciences*, 1–10.

PEDAGOGICAL EVALUATION PHASES – LESSON STUDY SURVEY

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Abstract

The results of international cooperation in the field of vocational education and training are reported in the Erasmus+ international project LS4VET (Lesson Study for VET, 2021) and the implementation of the lesson study theory of Stigler and Hiebert has been explored. Our pilot lesson study on classroom evaluation in primary schools fits into this line of research and explores further aspects of the theory. The project was launched in Hungary, in the academic year of 2021/2022.

Our action research was conducted in the fields of sciences, humanities, and physical education in Grades 5–8. We wanted to find out how assessment methods and tools in these areas are adapted to the age group, the situation, and the curriculum. We must highlight that the focus of the project was not on the measurement of the growth of the learners' learning ability, but rather on the teacher-student-student interactions. During the research, different lessons and lesson segments were visited and video recorded, then discourse analysis (Burgess and Cargill, 2013) – a new approach to content analysis – was applied to investigate the evaluation methods in the lessons.

Our main research questions are: (1) What are the consciously used evaluation methods? (2) What is the distribution of the evaluators? (3) Are there subject or science specific tools applied in the evaluation process? (4) How personal, supportive, and tactful is the evaluation? (5) What is the quality and quantity of verbal and non-verbal feedback? (6) What activities are emerged to support learners' self-evaluation skills?

Keywords: *Lesson study, discourse, evaluation.*

1. Introduction

Education efforts cannot be effective unless the theoretical findings of educational research are put into practice. The way to bring theory and teaching practice closer together is for educational research in universities to focus on public education and to seek relevant answers to the problems it faces. As long as this does not happen, the education system, without the incorporation of research-based knowledge, will only reproduce the shortcomings of previous periods. To avoid this and to achieve valid results (Brookfield, 1995; Carr, 1986; Lister, 2008), modern educational research needs to be evidence-based and scientifically sound. In this paper, we follow Shavelson and Towne's (2003) principles of scientific research in education in asking empirically testable research questions. We link research from the practice of teaching to relevant theory, offer methods replicable by others accompanied with arguments, present our non-representative sub-results for public peer review. In general, our pilot research findings can form the bases for further studies in lesson study (*jogyokenkyu*) (APM, 2015; Corey, 1953; Gambhir, 2019; Lewis, 2002; Yoshida, 1999) research on the subject of classroom evaluation.

2. Lesson study

Teachers, working groups, and teaching staff at a school often face similar or identical practical problems. Once problems are identified, members of the teaching team may be interested and motivated to solve them together. Teachers, primarily through peer learning, seek solutions and try to build up usable knowledge (Wenger et al., 2002). The leaders of the school can play various roles in this process. On the one hand, they can initiate collaborative thinking. On the other hand, they can provide support to those teachers who approach them. This support can be in the form of an intellectual agreement, but also in the form of concrete practical, material research support.

The expectations and difficulties of teachers' work are constantly changing, and their pedagogical knowledge must change in parallel. Today, teachers can no longer rely on old routines, tried and tested procedures, because if they do, they may very quickly face failure in their daily work. The triad

of *what, why, how* I do in the classroom requires constant attention, self-evaluation and necessary adjustments to the methods used. Meanwhile, it is worth consciously managing the teacher's self-image, self-efficacy (Chen, 2015) and professional development. The ability to observe, analyze and evaluate is a fundamental requirement of the teaching profession. This continuous evaluative attitude, professional attention and reflection is effective when it is based on data and classroom research (Hattie, 2012; Lister, 2008). In their primarily informal meetings, teachers often talk about what they experience in the classroom, but it is less common for them to build up plan(s) for measuring the effectiveness of the teaching method (Lister, 2008). This purposeful and intentional shared reflection can be the professional reflection, action-teaching research that, linked to teaching to achieve a particular goal, can produce knowledge that connects theory to practice in a structured way, capable of change and improvement.

Schön (1983) characterizes reflection as a kind of experiment in which the role of reflection is none other than to enable a dialogue between the reflector and the problematic situation. He emphasizes the importance of the problematic situation and its characteristics, arguing that true reflectivity is only evoked by a problem situation that affects the individual emotionally. His assertion that what distinguishes the 'expert' from the 'novice' or 'experienced' is the way in which the expert, using his theoretical and practical knowledge, frames the problem using the cognitive structures and schemas at his disposal, can be seen as a precursor of cognitive psychology. These findings are in complete accordance with Hattie's results published in his well-known book entitled *Visible Learning for Teachers: Maximizing Impact on Learning* (2012).

In our opinion, the method of action research provides an opportunity to identify and deal with problems emerged during classroom activities. In this context, reflection can be defined as a way of thinking that involves the ability of the teacher to choose rationally between ways of solving problems and to take responsibility for their choices. In action research, reflexivity is a guiding tool that teachers use to argue for methods that are considered effective by the members of the research team. In such a case, reflexivity is an informing tool: through trial and error, effective teaching theories and methods are jointly evaluated according to teachers' own experiences and their students' prior experiences and background knowledge. In this way, reflexivity shapes collective thinking about the teaching-learning process, while organizing and reorganizing experiences in relation to the interpretation of a given situation.

Collaboration plays a key role in the process of productive learning. Of all the ways of organizing learning, the collaborative group work is one of the most accepted ways for sharing the responsibility of solving a task. According to Juknat (1937), success might increase the pace of work and performance, require increasingly difficult tasks, and develop appropriate social contact during the activity, while the effect of failure is the opposite. For teachers, we want to demonstrate, through lesson study research, how becomes part of their pedagogical culture what they learn in personal interactions working cooperatively in a professional community.

3. The role of classroom evaluation in a lesson study

3.1. The research group

The research group was formed at the University of Debrecen Teacher Training Elementary Schools in the academic year of 2021/2022. The team consisted of four teachers at the school of various school subjects: informatics (computer science), history, physical education, and Hungarian literature. Considering the students, Grades 5–8 are involved, students of 11–15-year-old. The advisor of the team was a research teacher with a PhD in pedagogy, who is a teacher at the school.

The primary consideration of the research was classroom assessment. In the preparation phase, primarily the advisor researched the literature on the topic of classroom assessment and shared her findings with the team. Later on, the theoretical background was discussed in meetings with the other members of team, and the lessons were selected to be involved in the research. The lessons were planned individually by the members of team, without any further discussions. Each member decided on their own which lesson could best serve the goals of the planned lesson study research.

3.2. The lessons

The research lesson in Hungarian literature was video recorded first, in December 2021. After the first lesson, a meeting was arranged to discuss the experiences and to plan further classes. At the beginning of January, the recoding of a lesson of informatics took place. Later on, relevant sections of lessons of history and physical education were recorded. Our research data and results were generated from the evaluation of the visited lessons. We were interested to see how the assessment methods and tools in these subjects fit the age group, the situation, and the curriculum. We did not measure the development of the students' learning ability, but rather focused on the teacher-student, student-teacher, and the student-student interactions.

4. Research questions

The following research question were formulated on the subject of classroom assessment.

- What types of assessment are consciously used?
- What is the distribution of those who carry out the classroom assessment?
- How personal, supportive and tactful is the evaluation?
- What is the quality and quantity of verbal and non-verbal feedback?
- What activities are organized to support learners' self-evaluation skills?

Based both on the materials collected and developed for the lessons and on the video records, the evaluations of the lessons were carried out by using corpus analysis. Corpus analysis within the field of content analysis is a relatively novel approach in pedagogical research, primarily borrowed from corpus linguistics and adapted to lesson studies (Burgess and Cargill, 2013).

5. Results

The conscious use of external, summative, qualitative assessments was present in the traditional subjects. The teacher gave the students marks in Hungarian literature (poetry recitation), history (presentation), and physical education (presentation). In these observed lessons, mainly the teachers did the evaluation but there was an increasing tendency towards internal, developmental assessments. In connection to these presentations that type of developmental assessment was tracked where – in addition to the teacher's descriptive, text assessment – the students also reflected on the performances in the forms of pair and self-assessment. In the evaluation process, the teachers' behavior rather preserved the deviation from the norm verbally, e.g., the PE teacher warned those students who did not pay attention to the presenter. However, in almost all cases, the students' self- and pair-assessment expressions were accompanied by motivating non-verbal means.

The informatic lesson was different from the others in the sense that both the teacher and the students used digital contents and tools to carry out evaluation. At the beginning of the class the teacher presented the student's results on an optional homework in an Excel-worksheet which the students were familiar with (Figure 1). The worksheet was composed of the following contents:

- the task broken down into meaningful items along with the maximum points for each item
- the sum of the collected points, calculated with the SUM() function, in case the homework is handed in (cell J3 and copied to the other cells J4:J15): =IF(B3="", "", SUM(B3:H3))
- the range of points for calculating the marks (array M3:M7)
- the marks computed with the binomial search algorithm by calling the MATCH() function (array K3:K15): {=IF(B3:B14="", "", MATCH(J3:J14,M3:M7))}

Figure 1. The evaluation sheet used in informatics lesson.

	A	B	C	D	E	F	G	H	I	J	K	L	M
1		filename	plan	copy of slide	textbox_pos_size	size of L	groups of Ls	naming objects		point			
2		2	5	2	6	4	4	6		29			
3	UOA												0
4	ANU												10
5	DEAKIN												15
6	FLINDERS	2	3	0	4	4	3	4		20	4		20
7	GRIFF	2	5	2	6	4	4	6		29	5		25
8	LATR	2	3	1	4	4	4	2		20	4		
9	MACQ												
10	MELB	2	5	0	4	4	4	6		25	5		
11	MONASH												
12	NEWC	1	1	1	0	2	4	0		9	1		
13	UNE				0								
14	UNSW												
15	UQ												

After presenting the points and marks, the students had to opportunity to decide whether they accept the afford mark or not. This method of evaluation with the presented items and the automated calculation in spreadsheet workbooks can be adapted to any other subjects.

Group work was organized to support self-assessment in the visited lessons and class sessions, developing personal competences, like cooperation, conflict management and self-assertion. The research results could confirm the observers that modern assessment is no longer “training” but motivating, criterion-oriented competence development. It is not a ranking system, but a cooperative work for the development of students, where the narrative develops personal competences that encourage improvement, a realistic self-image, cooperation, conflict management, self-assertion.

In the informatics lesson the Error Recognition Model (Sebestyén et al, 2022) was applied, where the correctness of a digital text was carried out in groups. The students were familiar with the method because they had already practiced it with different contents. They should analyze the text, discuss the findings, decide on the errors, mark and provide descriptions of them by using the Comment tools and the accompanied comment boxes of Acrobat Reader (Figure 2). Finally, each group must upload one file into the Moodle system of the school. After uploading the files with the marked errors, a teacher conducted class-level reasoning, arguing, and discussion started to decide which group' idea was correct. A competition for collecting points started. One of the advantages of this method is that it can be applied to any text-based document regardless of the content and the subject, as it is considered as a fundamental digital skill for everyone and required in the National Base Curriculum (OFI, 2020).

Figure 2. The marked errors in the sample file.

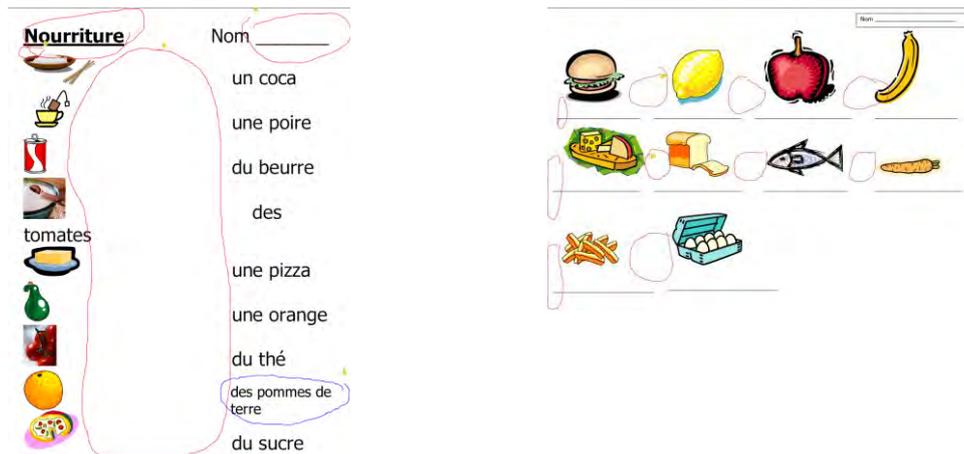


Table 1. Methods and aims of evaluation in the visited lessons.

Methods	Aims
Informatics	
collecting points	motivating
uploading products	measuring practical application
optional homework	students decide on accepting or rejecting the marks
homework	practicing, building up knowledge, original plans and solutions
digital-text error recognition (group work)	shared decision making, practice-oriented, student-reflection, reasoning
Hungarian literature	
poem recitation self- and pair-assessment, with teacher assessment	developmental and motivating
homework	individual solutions, words of acceptance
presentations with self- pair-assessment and teacher assessment	competence development
group work	assessment of product and cooperation
reflection on the lesson as a whole	reflection, reasoning
History	
presentations with self- pair-assessment and teacher assessment	building a realistic self-image, developmental tasks
Physical Education	
presentation with self- and teacher assessment	building self-confidence, sharing information

6. Summary

The significance of this research for the field of education is that we have provided an example to support the enhancement of organizational knowledge through targeted means. In doing so, we have also provided a model for various teaching-learning experiences. (1) Developing a researcher method, where the focus is not on individual goals, but on the shared learning goals of small research communities of 4–6 people. (2) Identifying problems that arise during the teaching-learning process; exploring possible solutions; developing knowledge together; and then testing it in practice. The research approach is a way

of linking theory and practice and sharing ideas between school subjects and sciences. It is a way of learning the skills of the teaching profession, of deepening the understanding of the specialties of the age group and further educational actors, while analyzing and revising their own responses to school situations. The method can help teachers to deal more effectively with new challenges, allowing them to develop their self-reflection and to broaden their methodological culture. Our research thus contributes to more effective schools and quality education.

References

- APM (2015). A different approach to teacher learning: Lesson study. APM Reports. Accessed 24. 01. 2022 from <https://www.apmreports.org/episode/2015/08/26/a-different-approach-to-teacher-learning-lesson-study>.
- Brookfield, S. (1995) *Becoming a Critically Reflective Teacher*. San Francisco: Jossey-Bass.
- Burgess, S., & Cargill, M. (2013). Using genre analysis and corpus linguistics to teach research article writing. In V. Matarese (Ed.), *Supporting Research Writing: Roles and Challenges in Multilingual Settings*. Cambridge: Woodhead Publishing Limited.
- Carr, W., Kemmis, S. (1986). *Becoming critical: education knowledge and action research*. Lewes: Falmer Press.
- Chen, J. A., Morris, D. B. & Mansour, N. (2015). Science Teachers' Beliefs. Perceptions of Efficacy and the Nature of Scientific Knowledge and Knowing. In *International Handbook of Research on Teachers' Beliefs*. (Eds.) Fives, H. & Gill, M. G. Routledge, pp. 370–386.
- Corey, S. M. (1953). Action research to improve school practices. Teachers College Columbia University, New York.
- Gambhir, V. (2019). Learn with colleagues through jugyokenkyu. Accessed 24. 01. 2022 from <https://www.monday-8am.com/learn-with-colleagues-through-jugyokenkyu/>.
- Hattie, J. (2012). *Visible Learning for Teachers: Maximizing Impact on Learning*. Routledge.
- Juknat, M. (1937). Leistung, Anspruchsniveau und Selbstbewusstsein. *Psychologische Forschung*, 22, 89-179.
- Lewin, K. (1946). Action research and minority problems. *Journal of Social Issues*, 2, 34-46.
- Lewis, C. C. (2002). *Lesson study: A handbook of teacher-led instructional change. Research for Better Schools*, Philadelphia.
- Lister, R. (2008). After the gold rush: Toward sustainable scholarship in computing. In *ACE '08: Proceedings of the tenth conference on Australasian computing education*. vol. 78, 2008, pp. 3–17.
- OFI (2020), National Base Curriculum 2020. In Hungarian: 5/2020. (I. 31.) Korm. rendelethez a Nemzeti alaptanterv kiadásáról, bevezetéséről és alkalmazásáról szóló 110/2012. (VI. 4.) Accessed 24. 01. 2022 from http://ofi.hu/sites/default/files/attachments/mk_nat_20121.pdf.
- Schön, D. (1983). *The Reflective Practitioner*. Temple Smith, London.
- Sebestyén, K., Csapó, G., Csernoch, M. & Aradi, B. (2022). Error Recognition Model: High-mathability End-user Text Management. *Acta Polytechnica Hungarica*, Vol. 19, No. 1, pp. 151-170.
- Shavelson, R. J., Towne, L. (Ed.) (2003): *Scientific research in education*. National Academy Press, Washington.
- Stigler, J. W., & Hiebert, J. (1999). *The Teaching Gap: Best Ideas from the World's Teachers for Improving Education in the Classroom*. Free Press.
- Stigler, J. W., & Hiebert, J. (1999). *The teaching gap: Best ideas from the world's teachers for improving in the classroom*. New York: The Free Press.
- Wenger, E., McDermott, R. & Snyder, W. (2002). *Cultivating communities of practice: A guide to managing knowledge*. Harvard Business School. Accessed 24. 01. 2022 from <http://hbswk.hbs.edu/archive/2855.html>.
- Yoshida, M. (1999). Lesson study [Jugyokenkyu] in elementary school mathematics in Japan: A case study. Paper presented at the American Educational Research Association (1999 Annual Meeting), Montreal, Canada.

THE INFLUENCE OF ONLINE FORMATIVE ASSESSMENT IN EUCLIDEAN GEOMETRY ON THE ATTITUDES OF GRADE 11 LEARNERS

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Abstract

Formative assessment (FA) can potentially provide valuable insights into learners' conceptual knowledge of Euclidean geometry and contribute to the development of appropriate assessment activities which focus on developing a conceptual understanding of Euclidean geometry. Research indicates that geometry is an abstract yet crucial topic in the school Mathematics curriculum because it helps learners to develop logical thinking, problem-solving skills, deductive reasoning, and analytical reasoning. Due to the Covid-19 pandemic, teachers were forced to integrate technology to continue with teaching, learning, and assessing Mathematics. Following this, the purpose of this study was to determine the influence of online FA in Euclidean geometry on the attitudes of Grade 11 learners in a public school in South Africa. Learner attitudes contribute to performance in Mathematics. Attitudes are formed by the past experiences, observations, and imitations of learners who enter the mathematics classroom with their pre- and misconceptions. Assessing mathematics concepts anywhere facilitates individual assessment, and supports differentiated instruction of Mathematics, which ultimately can lead to an increase in using pedagogical approaches that are learner-centred. Therefore, technology in assessment plays a pivotal role in mathematics teaching and learning. This study was conducted using mixed research methods utilizing semi-structured interviews and a questionnaire to collect data. The participants that were purposively sampled in this study were 104 Grade 11 learners. This study was underpinned by Bandura's Self-efficacy theory derived from the Social Learning Theory. The main findings of this study revealed that learners enjoy online FA, they find it meaningful, it motivates them, and contributes to their self-confidence. The theoretical and practical implications of the findings are discussed in this research study.

Keywords: *Online formative assessment, Euclidean geometry, online quizzes, learner attitudes.*

1. Introduction

The use of online formative assessment (FA) may assist Mathematics teachers with useful information regarding conceptual understanding of Mathematics (Martin et al., 2015). The flexibility in online assessment allows for FA to be conveniently completed provided that learners adhere to the submission dates (Ogange et al., 2018). Additionally, online FA makes provision for multiple attempts in one assessment which can be used until a desired mark is attained. The multiple attempt option also furnishes learners with an opportunity to use the feedback on the previous FA, evaluate their own learning and ultimately improve on the content. Many opportunities through FA are created for learners to receive automated grading, and the ability to complete assessment anywhere and at any time (Padayachee et al., 2018). According to Wang and Tahir (2020), learners' attention and the level of their engagement can be improved, and enjoyment and motivation increased, because of FA.

However, sometimes learners perform poorly on FAs, and there are many factors that contribute to this poor performance. Sa'ad et al., (2014) argue that poor performance in FA taken for Mathematics can be influenced by anxiety, fear, and a negative attitude towards Mathematics. Hence, helpful ways to improve the performance is by developing a positive attitude towards Mathematics, through increased motivation, learner-centered approaches to teaching and assessing, and the integration of technology (Sa'ad et al., 2014).

The implementation of online assessment resources in Mathematics for FA are not void of problems, specifically in the topic of Euclidean geometry among Grade 11 learners. It is not uncommon that performance in Euclidean geometry has been poor across countries. In Turkey, Kutluca (2013) investigated Grade 11 learners' attitudes on this topic and concluded that learners have been estranged to Euclidean geometry and often failed. The same is true in the South African context because of conventional assessment of Euclidean geometry using outdated methods such as fostering memorisation and recall of

theorems and proofs that learners need to present on paper which do not often aid in understanding (De Villiers & Heideman, 2014). Thus, this study explored the influence of online formative assessment in Euclidean Geometry on the attitudes of Grade 11 learners at a public school in South Africa.

2. Literature review

There is a plethora of dynamic geometry software such as GeoGebra which is an interactive online software designed to stimulate learners by presenting instant dynamic visuals on the behaviour of graphs such as the transformation of trigonometric functions (Naidoo & Govender, 2014). Using dynamic software in teaching, learning, and assessment in Euclidean geometry may improve learners' geometric reasoning (Bayaga et al., 2019). Kahoot! boasts in its functionality to allow teachers the freedom to design online questions learners can answer with the use of smart digital devices and obtain feedback immediately (Prieto et al., 2019). Moodle is another platform which can be used as a FA platform and it is enacted, and students can engage with material by downloading or uploading work (Padayachee et al., 2018). All these existing online tools can be effectively used to generate online tests and quizzes, whether formative or summative. However, as stated on the aforementioned paragraphs, the availability of online tools to conduct FA and the learners' ability to use these online tools to take the given FA, as well as their performance on these Mathematics FA should not be understood separately from their attitudes and behaviour towards Mathematics.

Learner attitudes towards Mathematics are considered as a crucial element in describing how Mathematics is learned which is characterised by the emotions of learners and consider what they value including their prior experiences (Fuqoha et al., 2018). Cerbito (2020) defined attitude as an action, behaviour, and the individual's level of thinking. Learner attitudes can influence behaviour that contributes to the learners' reaction towards teachers, peers, and Mathematics learning material. Moreover, self-confidence is one of the factors that can positively influence learner attitudes, and contribute to persistence and a successful completion of Mathematics problems (Cerbito, 2020). A positive attitude toward Mathematics may be affected by consistently experiencing success in Mathematics performance. On the other hand, constant failure or poor performance in Mathematics discourages and negatively influences learners' self-confidence because learners might not want to engage with complex Mathematics problems (Cerbito, 2020).

According to Fuqoha et al. (2018), motivation involves learners' personal interest, hence, directly impacts learner performance in Mathematics. Some are self-motivated (intrinsic motivation) and others are externally driven by others (external motivation) (Fuqoha et al., 2018). Therefore, motivation, whether intrinsic or external, is essential for learners' learning process. Fuqoha et al. (2018) postulate that using online FA tools (e.g., Kahoot!) impacts class motivation and learner performance. Additionally, as online FA can improve attention, concentration, motivation and engagement, the level of confidence and self-efficacy are likely to increase (Wang & Tahir, 2020). It is therefore safe to say that a variety of factors need to be considered since they can have either a positive or negative effect.

3. Theoretical framework

The Self-efficacy theory derived from Bandura's (1977) Social Learning Theory (SLT) was used to underpin this study. Bandura (1977) argued that learning is modeled through observation and intrinsic reinforcement. According to Bandura and Adams (1977), self-efficacy affects the choices of tasks, behavioral settings, and learners' persistence when faced with difficulties. Essential to the self-efficacy theory is the four main sources which involve learners' achievements, considering their prior experiences. Secondly, it is influenced by vicarious experiences which are concerned with the observation of others and their successful experiences through their effort. Thirdly, verbal persuasion which is influenced by encouragement and positive feedback from others. Lastly, Bandura talks about the physiological or emotional arousal which also impacts the level of anxiety and how learners are able to maintain or control that (Bandura & Adams, 1977). More specifically, self-efficacy in Mathematics focuses on the perceptions of learners regarding their ability and successful learning in Mathematics Education (Damrongpanit, 2019).

4. Research methodology

The study adopted a mixed method research to understand the influence of online FA in Euclidean geometry on the attitudes of Grade 11 learners. A mixed method study is one in which the research employs at least one quantitative method and one qualitative method to gather, analyse, and report data in a single study (Creswell, 1999).

4.1. Selection of the participants

This study purposively selected 104 Grade 11 learners from a public school in South Africa to collect data. The study consisted of both male (43) and female (61) learners with more than 80% of learners classified as black and they all specialised in Grade 11 Mathematics.

4.2. Data collection and analysis

Quantitative data was accumulated using a standardised questionnaire that consisted of 40 items adopted from Tapia and Marsh's (2004) Attitude of Mathematics Inventory questionnaire. The questionnaire was divided into two sections. Section A considering the graphical information of 104 learners, and Section B considering 96 learners' views about online FA in Euclidean geometry on their attitudes. This study reports on the data accumulated from Section B. Additionally, six learners were purposively selected to conduct semi-structured interviews to collect qualitative data. The interviews were transcribed and coded using four themes suggested by Tapia and March (2004) namely (1) enjoyment; (2) motivation; (3) self-confidence; and (4) value.

5. Findings

Key findings emanating from the study are categorised according to four broad themes, namely: Enjoyment, Motivation, Self-confidence, and Value.

Theme 1: Enjoyment

Part of the aim of the study was to establish how the Grade 11 learners felt being assessed through online FA in Euclidean geometry. Evidently, working with peers to complete online FA on this topic proved to be more fun and entertaining for the learners. The following excerpt illustrates.

"I enjoyed the online assessment and the group I was in; we were all participating you know..." (Participant 2, Interview 2, Aug).

"I mostly enjoyed like socialising it was a nice experience overall". (Participant 3, interview 3, Aug).

This suggests that learners enjoy working on online FA tasks with their peers which benefits their learning of Euclidean geometry in Grade 11. Some learners also mentioned that Kahoot! To be specific was the most fun online tool for the FA. The participants found the assessment to be a *"nice experience overall"*. As a result of enjoying the online FA, majority 34 (35,42%) of learners strongly agreed that they would prefer to do an assignment or any assessment in mathematics online rather than to do a written test/examination. 23 (23,96%) Of the learners strongly disagreed, whereas 16 (16,67%) have neutral views, 9 (9,38%) disagreed and 14 (14,58%) agreed. 7 (7,29%) Learners strongly agreed that they have usually enjoyed being assessed online in mathematics in schools; 18 (18,75%) strongly disagreed; 15 (15,63%) agreed as well as disagreed, but majority of the learners 41 (42,71%) had neutral views. Also, 20 (20,83%) strongly disagreed that online assessment in mathematics is dull and boring (item 25). Whereas 42 (43,75%) held neutral views; and 9(9,38%) strongly agreed.

Theme 2: Motivation

Motivation is an imperative aspect of learning. The data pointed to the importance of internal motivation which challenges the learners to think and move to the higher order level of cognitive level where they can solve equations efficiently. The work became bearable for some students when they were doing online FA within groups and it can be safely posited that this encouraged the students to complete the online FA. The learners sentiments are captured in the following excerpts.

"...makes you think more but then I tried to answer them as best as I could...for me to be able to solve uhh...equation quicker then...I think I can". (Participant 1, Interview 1, Aug).

"I think it was easier doing things as a group although I don't like eh...group work". (Participant 3, Interview 3, Aug).

Seemingly, internal and external forces of motivation are important in completing online FA on Euclidean geometry for Grade 11 learners. As a result of the expressed above sentiments, about 22 (22,92%) of the learners agreed that they were willing to do more online assessments than prescribed by the teacher, with a few 13 (13,54%) learners who strongly agreed that they are willing to do more online assessments than the teacher prescribes. However, few learners 12 (12,4%) admitted that they are not willing to do more online assessments in mathematics than the required number of assessments prescribed by the teacher. Those who have strongly disagreed were 21 (21,88%) among the 28 (29,17%) who held neutral views.

Theme 3: Self-Confidence

Based on the findings, 22 (22,92%) Strongly agreed, 20 (20,83%) disagreed, and 34 (35,42%) of the learners had neutral responses that online mathematics assessments are difficult. This suggest that the 20 (20,83%) learners that agreed had self-confidence regarding online mathematics FA while the other 22 (22,92%) did not have comparable confidence. The majority 34 (35,42%) chose to remain neutral instead

so it cannot be deduced whether or not there were self-confidence or a lack thereof. Nonetheless, the element of self-confidence is reflected in the excerpts below:

“It was very easy. However, considering the network we have...it might be a little challenge.” (Participant 4, interview 6, Aug).

“You should make longer...”. (Participant 5, interview 6, Aug).

Although the learners pointed to issues such as network issues and the duration of the online FA, stating that it should be longer, the data indicate that learners were confident. The self-confidence evident in learner’s responses could suggest that perhaps learners need to be taught with similar online tools to be confident in the Euclidean geometry content. This is mainly because the data had also shown that the learners guessed the correct answers. Thus, even though there is a level of self-confidence in using the online FA tool, the conceptual understanding of the participant does not seem to suggest that the learner can confidently solve geometry questions using a traditional pen-and-paper based assessment involving the topic.

Theme 4: Value

The value of online FA in Euclidean geometry was associated with a number of benefits by the learners. When asked if online assessments in mathematics were worthwhile and necessary, 15 (15,63%) learners strongly agreed; 18 (18,75%) agreed; and 12 (12,5%) strongly disagreed. Their views are captured on the excerpts below.

“...it helps with the group work...it could help the ones who didn’t understand...helping me especially when it comes to exams...” (Participant 1, Interview 1. Aug).

“The colours of ya’ll put for the options...ja that was actually really helpful instead of the A, B, C kind of thing because then I tend to forget that I was there at C...”. (Participant 6, Interview 6, Aug).

“I would recommend that it should be more accessible to for everybody. So, a lot of people can actually learn how to do Math or something...”. (Participant 3, Interview 3, Aug).

Participants seem to propose that online FA supports learning that is socially constructed and helps solve mathematical questions easily, thus preparing them for formal examinations and they also valued the colourful presentation of the assessment tool. Lastly, the recommendation of the use of online FA in improving learning of Euclidean geometry suggest that learners value online FA in learning this topic.

6. Discussions

According to Barana et al. (2019), the immediate interactive feedback provided by online FA tools can help learners develop and identify problem-solving strategies as they engage with mathematical tasks. In their study, the same writers (Barana et al., 2019), found that online FA increased the level of engagement in learners who had demonstrated little interest toward Mathematics prior to the online FA. In other words, the attention of learners increased because of the interactive feedback which they found to be useful. Similarly, in this research study, majority of the learners showed more interest in the online assessment than the traditional (paper-based) assessment. Furthermore, Barana et al. (2019) contended that the content knowledge and procedural understanding of learners can be improved when utilising online FA. This research study, however, indicates that although learners value and enjoy online mathematics assessment, the procedural understanding of learners did not necessarily improve immediately. In fact, there was a group of learners who were still guessing responses which pointed to their lack of conceptual understanding of the content. However, an interesting trend on the data also pointed to the enforcement of critical thinking while taking the online FA which is crucial in Euclidean geometry. Critical thinking is particularly important in developing self-efficacy as learners may either have high levels of self-efficacy that motivates them to put effort into their learning, or low levels of self-efficacy where they might not be as motivated to solve challenging questions.

7. Conclusion

The use of online FA in Euclidean geometry during teaching and learning is stimulating and engaging to most Grade 11 mathematics learners in this study. These online FA tasks are especially enjoyable for learners when they work in groups, thus highlighting the significance of collaboration when working with Euclidean geometry and online assessment tools. Furthermore, learners' positive attitudes towards the usefulness of online FA show that using Kahoot! allows them to overcome prevalent knowledge gaps, stimulates them, and enhances their confidence. The data showed that continued usage of the online FA in assessing Euclidean geometry could lead to increased learning because these activities have been proven to be beneficial and essential for the learners' higher cognitive development. Therefore, it is vital to take advantage of the pedagogical benefits of online tools for FA like Kahoot! to enhance learners' academic experience in basic education and ensure greater access to the conceptual understanding of Euclidean

geometry. Online FA will probably assist learners who have trouble learning the fundamental concepts in Euclidean geometry. Moreover, the consistent use of online FA in Mathematics is critical for the learners' preparation of the summative evaluation, which is often the most difficult assessment for learners, according to research.

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References

- Bandura, A., & Adams, N. E. (1977). Analysis of self-efficacy theory of behavioral change. *Cognitive Therapy and Research*, 1(4), 287–310.
- Barana, A., Marchisio, M., & Rabellino, S. (2019). Empowering engagement through automatic formative assessment. *Proceedings - International Computer Software and Applications Conference*, 1, 216–225.
- Barana, A., Marchisio, M., & Sacchet, M. (2019). Advantages of using automatic formative assessment for learning mathematics. *Communications in Computer and Information Science*, 1014, 180–198.
- Bayaga, A., Mthethwa, M. M., Bossé, M. J., & Williams, D. (2019). Impacts of implementing geogebra on eleventh grade student's learning of Euclidean geometry. *South African Journal of Higher Education*, 33(6), 32–54.
- Cerbito, A. F. (2020). Comparative analysis of mathematics proficiency and attitudes toward mathematics of senior high school. *International Journal of Scientific and Research Publications*, 10(5), 211-222.
- Creswell, J. W. (1999). Mixed-method research: introduction and application. In G. J. Cizek (Ed.), *Handbook of Educational Policy* (pp. 455-472). New York: Academic Press.
- Damrongpanit, S. (2019). From modern teaching to mathematics achievement: The mediating role of mathematics attitude, achievement motivation, and self-efficacy. *European Journal of Educational Research*, 8(3), 713–727.
- Fuqoha, A. A. N., & Indriati, D. (2018). Motivation in mathematics learning. *Pancaran Pendidikan*, 7(1), 202-209.
- Martin, B. C. S., Polly, D., Wang, C., Lambert, R. G., Pugalee, D. K., Martin, C. S., Polly, D., Wang, C., Lambert, R. G., & Pugalee, D. K. (2015). Perspectives and Practices of Elementary Teachers Using an Internet-Based Formative Assessment Tool: The Case of Assessing Mathematics Concepts. *International Journal of Technology in Mathematics Education*, 23(1), 3–11.
- Ogange, B. O., Agak, J., Okelo, K. O., & Kiprotich, P. (2018). Student perceptions of the effectiveness of formative assessment in an online learning environment. *Open Praxis*, 10(1), 29-39.
- Padayachee, P., Wagner-Welsh, S., & Johannes, H. (2018). Online assessment in Moodle: A framework for supporting our students. *South African Journal of Higher Education*, 32(5), 211–235.
- Tapia, M., & Marsh, G. E. (2004). The relationship of math anxiety and gender. *Academic Exchange Quarterly*, 8(2), 130-134.
- Wang, A. I., & Tahir, R. (2020). Computers & Education The effect of using Kahoot! for learning – A literature review. *Computers & Education*, 149, 1-22.

PRE-SERVICE TEACHERS' CONCEPTIONS OF THE INTEGRATION OF SOCIOSCIENTIFIC ISSUES IN LIFE SCIENCES TEACHING

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Abstract

Debates have been going on regarding what the goals of science education are and how those goals could be achieved. Developing scientific literacy in learners has gained traction over the years among other goals. It has been documented that by engaging learners in socioscientific issues (SSIs) in the science classrooms learners acquire complex competencies and skills necessary for scientific literacy. Learners also get motivated to learn science and take up careers in science. The current paper reports findings from a qualitative case study which sought to determine pre-service teachers' conceptions of the integration of SSIs in Life Sciences teaching and learning. A total of 50 third year pre-service teachers enrolled for a Life Sciences methodology course at a South African University, were selected to participate. After covering a theme on SSIs in Life Sciences teaching and learning, the participants were asked to document their conceptions of SSIs and how argumentation could be used to teach SSIs in specific Life Sciences topics. Their submissions were subjected to content analysis. Two themes emerged: 1. Teachers' conceptions of the integration of specific SSIs when teaching controversial concepts in Life Sciences; and 2. Teachers' conceptions of argumentation as a suitable strategy in addressing SSIs in some Life Sciences topics. In addition to the previously found benefits of integrating SSIs such as developing learners' critical thinking skills, ability to make negotiations, and developing learners to make informed decisions, the pre-service teachers brought in a new angle. They showed how failure to teach SSIs could impact on the livelihood of humans as related to SSIs associated with the current COVID-19 pandemic and other diseases humans are grappling with such as cancer. Some brought in the role of SSIs in teaching the nature of science, an area neglected in many Life Sciences classrooms. Other participants mentioned how argumentation as a teaching strategy equips learners with life skills such as abilities to raise their opinions and stance in a world where most young people are failing to take criticism or challenges positively thereby resorting to suicide as an easy way out of challenging situations. The pre-service teachers' conceptions were based on real life experiences considering that they were also still young. There were some who did not conceptualise integrating SSIs in the positive manner as they argued that addressing such issues in the classroom would be intrusive. These findings have implications for both pre-and in-service teacher professional development.

Keywords: *Argumentation, life sciences, pre-service teachers, socioscientific issues, teachers' conceptions.*

1. Introduction

There have been debates regarding what the goals of science education are and how those goals could be achieved. Because of such interrogative discussions, the need to develop scientific literacy in learners has gained traction over the years among other goals. The argument is that scientifically literate learners are capable of confronting, negotiating, and making decisions on the everyday issues and challenges in their daily lives that relate to science (Roberts, 2007). Learners become informed citizens who can engage in scientific discourses beyond the school level. Such capabilities are more important in the 21st century citizens considering that there is a flood of information on scientific and technological discoveries and research which is in the public domain. Previous studies have documented that by engaging learners in the teaching and learning of socioscientific issues (SSIs) in the science classrooms they acquire complex competencies and skills necessary for scientific literacy (Hancock, Friedrichen, Kinslow, & Sadler, 2019; Sadler, 2011). Addressing SSIs when teaching controversial science topics provides a well-suited approach for developing science literacy (Hancock et al., 2019). Because of

scientific literacy, learners would interrogate the many issues raised in the media which impact on their lives and make informed choices.

There has been a myriad of benefits that come with the integration of SSIs in the science teaching and learning. These benefits include engagement of learners in debates, dialogues, discussion, and argumentation (Zeidler, 2014); equipping learners with knowledge and skills to make claims and justifications with reasons and evidence (Zeidler, 2014); interrogation of controversial issues (Janasoff, 2010); contextualising science learning within a challenging social and political background (Hancock et al., 2019); equipping learners with skills to make well-informed decisions (Han-Tosunoglu & Lederman, 2016); and motivating learners to continue learning science and take up careers in science (Relela & Mavuru, 2021). Considering that teachers are the main role players in the integration of SSIs for these benefits to be realised, the current study sought to determine pre-service teachers' conceptions of the integration of SSIs in Life Sciences teaching and learning.

2. Literature

The underlying objective and principle of science education for the next generation remains and will always be aimed at promoting science literacy, which provides learners with the ability to critically evaluate and debate scientific issues, along with the processes and logical thinking skills vital to substantiated decision-making (Association for Science Teacher Education, 2013; National Research Council [NRC], 2012). The research to date strongly suggests that the socioscientific issues have had profound implications for the betterment of science literacy in learners within the field of science education over the last two decades (Zeidler, Herman, & Sadler, 2019). SSIs are personally relevant, controversial, ill-structured problems that require scientific evidence-based reasoning to inform decision-making on such topics (Zeidler, 2014).

As underscored by Sadler (2009) the incorporation of SSIs in science teaching and learning has the potential to promote moral reasoning and learners' personal engagement with conflicting perspectives on issues relevant to their pattern of life and society in which they live in. This insinuates that learners explicitly bring their own experiences and perspective to the learning situation, thereby creating the potential to bridge the gap between school science and the learners' worlds (Bossér et al., 2015). The above scholars underlined that using social interactions and argumentation, science learners are given the opportunity to take a stance on issues related to science and society, while at the same time challenging learners to explore their own values and attitudes and those of others.

The ability to discuss controversial topics, in a logical manner while being respectful of learners' beliefs and sensitive to their emotional states, forms a cornerstone of democracy (Sutherland & L'Abbe, 2019). Chikoko, Gilmour and Harber (2011) underscored that true democracy strives to increase interest in science teaching and learning and to facilitate active citizenship, in which individuals can make wise and informed choices and, as such, learners are required to behave in a democratic manner in their daily lives. However, the above scholars propound that due to lack of adequate content knowledge, South African Life Sciences teachers are not capable of managing the discussion of controversial topics in their classrooms (Chikoko et al., 2011).

Religious and cultural dissatisfactions are not the only stumbling blocks impacting the teaching and learning of controversial topics, but the teachers' inability to address the socioscientific issues surrounding such topics also play a major role (Sutherland & L'Abbe, 2019). As defined by Kus (2015), the overriding objective of the inclusion of socioscientific controversial topics in the science curriculum is to enrich learners in gaining values and skills necessary to become informed citizens. Whilst argumentation has been suggested as a suitable strategy in developing scientific literacy in learners (Zeidler, 2014), teachers have indicated their inability to create learning environments conducive for debate and argumentation in their classrooms (Relela & Mavuru, 2021).

3. Methodology

The study adopted a qualitative interpretive paradigm and employed a qualitative case study design. The interpretive qualitative approach allowed the researcher to make sense of the participants' justification or rebuttal of the importance of integrating specific SSIs and use of argumentation as a teaching strategy when teaching controversial concepts in Life Sciences. After covering a theme on SSIs in Life Sciences teaching and learning, the participants were asked to document their conceptions of SSIs and how argumentation could be used to teach SSIs in specific Life Sciences topics. This was a task given to them in the module Methodology and Practicum for Life Sciences, a course that prepared them for classroom practices and experiences. Through a qualitative case study (Creswell, 2014), the participants' conceptions of the integration of SSIs could be deduced.

3.1. Selection of participants

A total of 50 third year pre-service teachers were selected to participate in the study. These students, herein referred to as pre-service teachers were enrolled for a Life Sciences Methodology course at a South African University.

3.2. Data collection and analysis

After covering a theme on SSIs in Life Sciences teaching and learning, each pre-service teacher was tasked to document own conceptions of the integration of SSIs when teaching Life Sciences and evaluate the suitability of argumentation as a teaching strategy. The specifications of the task were that each participant should work independently; and should be honest as this would have a bearing on the approaches to be used when developing the next cohort of pre-service teachers. Each participant's submission was subjected to content analysis where the researcher carefully reviewed the conceptions to identify pertinent information from non-pertinent information and to make sure the information was organised into categories related to the research question (Bowen, 2009).

4. Research findings

Two themes emerged from the content analysis of data: 1. Teachers' conceptions of the integration of specific SSIs when teaching controversial concepts in Life Sciences; and 2. Teachers' conceptions of argumentation as a suitable strategy in addressing SSIs in some Life Sciences topics. Findings are presented under each theme.

4.1. Theme 1: Teachers' conceptions of the integration of specific SSIs when teaching controversial concepts in Life Sciences

The pre-service teachers indicated that the teaching of SSIs in Life Sciences is important because learners should not blindly believe and follow everything that science says. Rather learners need to have an open view and be able to make decisions based on not only science but the applicability of such knowledge in their daily lives. They justified this when they pointed out that controversial concepts in biology have the extra feature of needing some moral reasoning or the appraisal of ethical considerations in the process of making decisions about how to best resolve challenges. Examples were given of such practices in the classrooms. This included the teaching of the lungs and respiration or kidneys and the excretory system where SSIs arising from substance abuse e.g. drugs, alcohol and more may be brought up. The participants were adamant that by teaching such real-life situations promotes awareness to the learners and the community at large on the importance of living healthy lifestyles. With such knowledge, learners are empowered to make informed decisions based on evidence. The pre-service teachers argued that by only teaching the Life Sciences concepts without addressing SSIs, it defeats the objective of making concepts relevant and applicable to learners' lives.

The pre-service teachers pointed out that the integration of SSI and Life sciences equips learners with moral reasoning skills as they engage with concepts that have relevance and a bearing in solving some of the social influences they encounter in their lives as the youths. Issues of COVID-19 pandemic and the inflow of different information which includes conspiracy theories surrounding the causes of the disease and the effects of vaccinations, were some of the current SSIs that were mentioned. The participants strongly felt that Life Sciences teachers cannot afford to ignore the discussion of such issues when teaching concepts on microorganisms, diseases, and immunity. Discussions of such SSIs allows the learners to take interest in investigating and studying the given controversial issues and then evaluate the authenticity of the different views before they make their own moral decision based on reasoning.

The analysis of data showed the pre-service teachers conceived the teaching of SSIs in Life Sciences as crucial to stimulating learners' interest in exploring the Life Sciences concepts being learned. Based on the school teaching experiences they had during the year, pre-service teachers indicated that learners become actively engaged and participate more during lessons. They indicated that a typical constructivist learning environment is created when the teacher engages learners in such classroom discussions. As such, learners are better able to relate concepts and construct their own knowledge not only based on textbook content but also on their experiences. The participants identified critical thinking, analytical reasoning, moral and ethical reasoning, and meaningful communication as some of the skills learners are likely to develop because of engaging in robust discussions of SSIs in the topics they learn in class.

The participants conceptualised the integration of SSIs as an essential part of teaching controversial topics in Life Sciences. They pointed out that the knowledge learners acquire from such classrooms will no longer be one dimensional but multi-dimensional. Another example given was that of the issue of global warming and its effects on the lives of both living organisms and the environment.

They indicated that learners are most likely to pay attention in class when concepts such as the impact of humans on the environment are taught because learners have witnessed the effects of global warming in their everyday lives, where floods and droughts are a constant occurrence within their communities. The learners would share their ideas on the topic based on their experiences, which brings more meaning and relevance to the Life Sciences concepts learned.

Pre-service teachers pointed out that the teaching of SSIs promotes the integration of concepts from different subject areas a concept one participant referred to as cross-disciplinary discussion. One participant explained how SSIs creates open mindedness in learners when she gave an example of herself: Cleo (pseudonym): As a university student I have developed a more critical approach to knowledge as well as the ability to apply critical questioning to religious beliefs and scientific knowledge due to the integration of SSIs.

This is in line with one of the Life Sciences specific aims which stipulates that learners should understand “the applications of Life Sciences in everyday life, as well as understanding the history of scientific discoveries and the relationship between indigenous knowledge and science” (Department of Basic Education, 2011, p. 13). The participants indicated that by integrating SSIs when teaching controversial topics teachers are addressing this aim.

4.2. Theme 2: Teachers’ conceptions of argumentation as a suitable strategy in addressing SSIs in some Life Sciences topics

The pre-service teachers indicated that engaging learners in argumentation when integrating SSIs in controversial Life Sciences concepts is important. They pointed out that essential skills such as critical thinking, collaboration, communication and listening skills are developed. Debates and discussions were conceptualised as crucial aspects of argumentation which encourage cooperation and permits learners to rely on and learn from each other. Learners share opinions and ideas and validate them based on evidence provided by individuals who justify and back their claims during the argumentation process. In the participants’ view and experiences, learners learn better from each other and increase their knowledge banks. During such discussions, learners can think critically and creatively providing new ideals and solutions to an issue. They gave an example of the debating about nuclear power plants as a source of energy and its impact on the environment, which allows learners to participate in the scientific and societal discussions.

An important issue was raised that by implementing argumentation in one’s lesson, a teacher opens doors for learners who would not normally raise an argument out of the blue, hence facilitating social interaction and active participation. They indicated that for successful use of argumentation in the Life Sciences classroom, a teacher needs to be well equipped to maintain classroom control and offer guidance where needed. As such the teacher should be more knowledgeable than learners about issues under discussion.

The pre-service teachers viewed argumentation in the positive way as they pointed out that during argumentation learners get an opportunity to challenge each other’s viewpoints and their knowledge thereby learning from one another. In this way learners are able to judge their ideas based on those that have been provided by their peers. They suggested that teachers need to be careful and be prepared before using argumentation in their lessons. They specifically identified the need for teachers to be more conversant with the content of the topic under discussion but should also research about the possible claims, rebuttals, evidence etc. The teacher should identify topics that will foster a debate in the classroom. The participants viewed the arguments learners make as based on the evidence from the observations learners make, their experiences, realities in their communities, which are therefore essential in hence SSIs are an essential part of the argumentation process. The participants pointed out that the use of argumentation in addressing SSIs in some Life Sciences concepts will go a long way in minimising learner development of misconceptions.

There were some reservations raised by a few of the pre-service teachers with regards to the use of argumentation when integrating SSIs in Life Sciences teaching. They pointed out that SSIs by their very nature are sensitive issues hence addressing them using argumentation will make it worse as learners will raise aspects that are offensive to some cultural practices and beliefs. According to these teachers SSIs should not be addressed in the science classrooms as this will be very intrusive.

5. Discussions, conclusions, and recommendations

The pre-service teachers showed that they were aware of the need to address SSIs when teaching controversial concepts in Life Sciences. They also showed appreciation of the role of argumentation as a teaching strategy that allows learners to articulate their different opinions and opportunity to share their beliefs, experiences, and challenges they encounter in their communities. Some participants indicated that

the Curriculum and Assessment Policy Statement is silent on how teachers can tackle such issues in the classrooms. This is also confirmed by previous studies (e.g. Mnguni, 2018) who posited that the curriculum is unable to guide Life Sciences teachers to select scientifically reliable sources of information on how to address those topics during the teaching and learning process. In the current study, teachers attested that argumentation requires teachers who are not only knowledgeable about the content and SSIs being discussed, but that the teacher needs to be skilfully equipped in terms of classroom management. Such important issues raised questions on the viability of addressing SSIs issues in the South African classroom context where there are higher learner teacher ratios and ill-discipline has become a concern these classrooms.

In conclusion, the recent cohort of graduate teachers have been taught how the SSIs in some controversial Life Sciences topics can be addressed and how the process of argumentation can be implemented in the classrooms. The same cannot however be said about the teachers who received their training some years ago. As such, there is need to provide in-service teacher development targeted at teaching and addressing SSIs in some Life Sciences topics. This is more important than before because of the surge of controversial issues because of the COVID-19 pandemic and the information flood due to social media.

References

- Chikoko, V., Gilmour, J.D., Harber, C. & Serf, J. (2011). Teaching controversial issues and teacher education in England and South Africa. *Journal of Education for Teaching*, 37(1), 5-19.
- Creswell, J. (2014). Research design, qualitative, quantitative, and mixed method approach, 4th ed. Thousand Oaks, California: Sage Publications.
- Hancock, T. S., Friedrichsen, P. J., Kinslow, A. T., & Sadler, T. D. (2019). Selecting socio-scientific issues for teaching. *Science & Education*, 28(6-7), 639-667.
- Han-Tosunoglu, C., & Lederman, N. G. (2016). *The development of an instrument for assessing pedagogical content knowledge for socioscientific knowledge (PCK-SSI)*. National Association for Research in Science Teaching (NARST). Baltimore, USA.
- Kuş, Z., 2015. Science and social studies teachers' beliefs and practices about teaching controversial issues: Certain comparisons. *JSSE-Journal of Social Science Education*, 84-97.
- Mavuru, L. (2018). *Teaching Evolution to Grade 12 Learners: Teachers' views and pedagogical practices*. In M. Carmo (Ed.) Education Applications & Developments IV: Advances in Education and Educational Trends Series (pp. 148-158). Portugal: In Science Press. <http://hdl.handle.net/10210/274375>
- Mnguni, L., 2018. The curriculum ideology recommended by novice teachers for life sciences in South Africa. *EURASIA Journal of Mathematics, Science and Technology Education*, 14(7), 3099-3108.
- National Research Council (2012). Education for life and work: Developing transferable knowledge and skills in the 21st century. National Academies Press.
- Relela, M. & Mavuru, L. (2021). *Life Sciences teachers' conceptions about socioscientific issues in the topic evolution*. A paper presented (virtual) at the International Conference on Education and New Developments (END) 2021, 26-28 June, Porto, Portugal.
- Roberts, D. A. (2007). *Scientific literacy/science literacy*. In S. K. Abell & N. G. Lederman (Eds.), Handbook of research on science education (pp. 729-780). Mahwah, NJ: Lawrence Erlbaum Associates.
- Sadler, T. D. (2011) (Ed.). Socio-scientific issues in the classroom: Teaching, learning and research. *Contemporary trends, and issues in science education* 39. Amazon: Springer Science. DOI 10.1007/978-94-007-1159-4_1
- Sutherland, C. & L'Abbé, E.N. (2019). Human evolution in the South African school curriculum. *South African Journal of Science*, 115(7-8), 1-7.
- Tidemand, S. & Nielsen, J.A. (2017). The role of socioscientific issues in biology teaching: From the perspective of teachers. *International Journal of Science Education*, 39(1), 44-61.
- Zeidler, D.L. (2014). Socioscientific issues as a curriculum emphasis. Theory, research, and practice. In NG Lederman & SK Abell (Eds.). *Handbook of research on science education*, 2, 697-726.

SPEAKING IN A LANGUAGE VERSUS SPEAKING A LANGUAGE IN COMMUNICATIVE COMPETENCE ATTAINMENT

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Abstract

This article aimed to promote speaking skill as part of communicative competence acquisition, under the auspices of Communicative Language Teaching approach in English as a First Additional Language in intermediate phase (Grade 4-6) in Free State province township primary schools. Moreover, this article aimed to ensure that proficient learners in English are produced for the senior phase, and that the conducive communicative environment is created as well as to be sustained by all stakeholders, to enable the learners' communicative competence acquisition, hence English is adopted as the Language of Learning and Teaching (LoLT) in most Free State township primary schools. In the same vein, this article seeks to promote the adoption of English as LoLT in foundation phase, for better communicative competence acquisition in intermediate phase. English beyond the classroom approach, and English across the curriculum, are the two approaches advocated by this article to make communicative competence to be the goal and the responsibility of all the stakeholders inside and outside the teaching and learning classroom environment. For the intensive and the extensive knowledge regarding speaking as part of communicative competence, scholarly articles were consulted by the researcher.

Keywords: *Speaking in a language, speaking a language, speaking skill, communicative competence.*

1. Introduction

Speaking English is defined by Yudar, Aditomo, and Silalahi (2020: 15-16) as being able to effectively communicate information, express ideas and opinions, to build a social relationship in the form of different, normal, engaging, and exciting activities. Additionally, Gurler (2015: 14) states that, speaking amongst all four language skills is entirely important particularly in verbal communication as verbal communication constitutes a bigger part of communication. However, regardless of speaking constituting a bigger part of communication in general, Aprianto, Ritonga, Marlius, and Nusyur (2020: 149) are of the view that, speaking is one of the most challenging language skills, as speaking takes some requirements of the linguistic that the speaker consider. This point of view of the speaking skill being the most challenging skill, Irawan (2018: 518) posits that, in developing the ability of learners to speak fluently and accurately, it is not an easy task. In the same vein Gurler (2015: 15) explains that self-confidence at its maximum level is required to minimise the challenges posed by speaking.

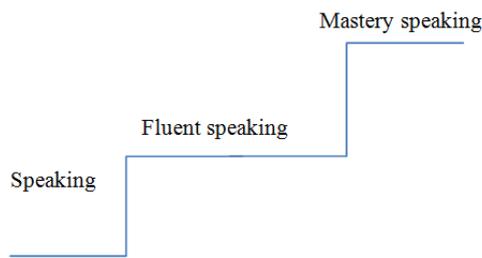
In relation to speaking being the most challenging skill as posited by Aprianto et al. (2020: 149) the researcher is of the view that, various language speaking activities play a pivotal role to make speaking exercises interesting, enjoyable, effective, and they also serve as the cornerstones of the speaking skill. In addition to speaking activities, Teng (2020), Liao (2009), Maca (2020: 336) have highlighted the importance of manageable group sizes which seemed to be more effective than pair work, individual, and big groups for the effective speaking activities, as well as the using some techniques and learner interesting topics can help stimulating learners to participate, and at the same time they stimulate English fluent speaking by learners.

According to the researcher, speaking is the important first step of the language learning, and *speaking fluently* it is the second step or the milestone of the language learning. Therefore, if learners can minimally speak a language, they should not be expected to be perfect, but they should be engaged more in speaking activities as well as to be motivated for their attempts, and that will help to boost the learners' confidence in the language learning journey that is leading them towards language fluent speaking. From language fluent speaking level, learners' cognitive levels must be continuously raised until the language mastery level is reached as demonstrated on the figure below (Figure 1).

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Figure 1. Speaking as the cornerstone of other speaking levels.



Mastering speaking is defined by Maca (2020: 330) as another level of speaking the language, which is the pivotal part of second language learning, and it is measured by the learner’s ability to conduct a conversation in the second language. Additionally, Apriato et al. (2020: 149) state that, once the mastery of linguistic terms have been achieved by the learners, it is the clear indication that the speaking skills have been achieved. However, the researcher posits that, in *language learning* process it is *striving for mastering speaking* (speaking in a language) that should be prioritised, than mastering the language (speaking a language).

2. Speaking in a language versus speaking a language

On the same subject of speaking as a skill, the researcher found it imperative to distinguish between *speaking in a particular language* and *speaking a particular language* as there is a fine line between the two as demonstrated on Table 1. Speaking in a particular language is to *use the specific language as a tool* particularly by the non-native speakers to convey a certain message, and the message is given a priority over the language. It is at this point whereby the language grammatical errors are not prioritised, even though they would still be considered. On one hand, speaking a particular language has to do with *prioritising the language over the message* that is conveyed through that language. Home language speakers are the ones who are mostly used to speak a language rather than speaking in a language.

In the school context what is implied by speaking in a language for English First Additional teachers as well as the subject content teachers is that, teachers need to be developed to understand that, learners in township primary school are the English First Additional Language users, and therefore speaking in a language is what they need to be guided through to reach the point of speaking a language. Moreover, the CLT approach goal which is communicative competence must not be forgotten or be compromised.

Table 1. Differentiating between speaking in a language and speaking a language.

SPEAKING IN A LANGUAGE	SPEAKING A LANGUAGE
It is for the non-native speakers	It is for the native speakers
Message is prioritised	Language is prioritised
Language errors are not prioritised	Language errors are prioritised
A cornerstone of speaking a language	An identity of the native speakers
The language usage is somehow limited	Language usage is vast

3. Research questions

- (1) Do EFAL teachers prioritise meaningful communication over grammatical perfection?
- (2) What is the level of learners’ participation in comparison with the teacher’s participation during the English FAL period, particularly during the speaking activities?

4. Research objectives

- (1) To establish whether EFAL teachers prioritise meaningful communication over grammatical competence or not.
- (2) To investigate the level of learners’ participation in comparison with the teacher’s participation during the English FAL period, particularly during the speaking activities.

5. Methodology

5.1. Design

The study used a quantitative design to collect data, and the application of quantitative design as the sole research method was due to a time constraint of the researcher.

6. Instrumentation

6.1. Questionnaire

The questionnaire was first piloted, and then distributed to 128 (39 males and 89 females) English FAL teachers across the three districts i.e., Motheo, Lejweleputswa and Thabo Mofutsanyana. Questionnaire questions were related to the teaching and learning of the speaking skill under the auspices of Communicative Language Teaching approach which should be consistent and continuous inside and outside the classrooms, and inside the classroom the learners' participation should be dominant to that of the teacher.

6.1.1. Results from the questionnaire data. From the completed and analysed questionnaires, more especially for questions or items related to speaking, the following findings were made: About 67.9% of the participants have indicated to know that CLT is based on meaningful communication rather than on grammatical communication. Conversely, to one specific question related to communicative competence versus grammatical competence, 74% of the respondents have agreed that grammatical competence is more important than communicative competence, and to another question again related to communicative competence versus grammatical competence, it was only 30.4% of the respondents who have agreed on not focusing on the learners' grammatical mistakes, but they have agreed on paying their attention on what learners were trying to say, while 60.6% have demonstrated to be too much focused on the learners' grammatical competence. This clearly indicates that, communicative competence is only known in theory, but in practice, the respondents were still applying Grammar Teaching Method than Communicative Language Teaching approach.

It was revealed again by majority of the participants that, English speaking as well as speaking in English by learners that was so highly compromised by the following key role players i.e., content subject teachers, and parents who fail to continue speaking with learners in English at home. Learners' negative attitude and lack of proficiency were also highlighted by majority of the respondents as one of the hindrances against the learners' active involvement in speaking activities. On the same subject of learners' active participation in speaking activities, 56% in Motheo, 42% in Lejweleputswa, and 60% in Thabo Mofutsanyana districts of the respondents have shown to agree with the fact that learners' participation must dominate the teachers' participation during speaking, for the attainment of communicative competence. Regarding the effective engagement of learners in speaking activities through the usage of the effective and the relevant strategies such as the *inclusive text usage* that seemed not to be used by majority of the respondents.

7. Conclusion

This research indicates that speaking skill as the most used component of communication cannot not be achieved through Communicative Teaching approach (CLT), and as the results communicative competence becomes the unreachable goal based on the fact that CLT activities are not satisfactorily implemented. Moreover, three environment in which speaking had to be inculcated and promoted are not giving any stimulus to the learners, i.e., classroom environment, outside classroom environment, and home environment. The reason being that the key role players EFAL teachers, contents subject teachers, department, the school management, and parents are not effectively playing their roles in making a contribution in as far as speaking or communicative competence is concerned. Then, if learners are expected to master the speaking skill, rather than to be taught, supported, or guided first to speak in a language as a strategy, learners cannot ultimately find themselves speaking a language or mastering the language, and in the process they cannot be actively involved, neither to be dominant in a teaching and learning process. Actually, learners' active and free involvement in speaking activities, it is a demonstration of a CLT aligned lesson plan, and also an indication of the achievable communicative competence.

References

- Aprianto, A., Ritonga, M., Marlius, Y., & Nusyur, R. (2020). The Influence of using Audio-Lingual Method on Students' Speaking Skill in Madrasah Diniyah Takmiliyah Awwaliyyah. *Journal of Arabic Language Teaching, Linguistic and Literature*, 3(2), 147-160.
- Gurler, I. (2015). Correlation between Self-Confidence and Speaking Skill of English Language Teaching and English Language and Literature Preparatory Students. *Curr Res Soc Sci*, 1(2), 14-19.
- Irawan, S.S. (2018). English Teacher's Methodological Competence in Implementing Communicative Language Teaching in Teaching Speaking. *Advances in Social Sciences, Education and Humanities Research*, 253, 518-521.
- Maca, S. (2020). Teaching English Speaking Skill through Pair and Group Interview Techniques. *Ethical Lingua*, 7(2), 329-337.
- Teng, M.F. (2020). The Effectiveness of Group, Pair and Individual Output Tasks on Learning Phrasal Verbs. *Language Learning Journal*, 48(2), 187-200.
- Yudar, R.S., Aditomo, D.S., & Silalahi, N.S. (2020). The Movie as a Helper for Students' Pronunciation in Speaking Skill Class. *Journal of English Language Studies*, 2(1), 15-19.

PHILOSOPHICAL GAMES IN PRIMARY EDUCATION: AN INTERDISCIPLINARY APPROACH

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Abstract

Philosophical games provide an innovative transformative structure in the learning process for all levels of formal education. The motivation is to provide elementary school teachers with an innovative methodology for Game-based-Learning of Philosophy/in Philosophy teaching. A combination and attentive collaboration of Philosophy, Art and games/ Game-based Learning provides new tools in approaching and solving the problems that education faces today. Since Game-based Learning constitutes a strong trend in technologically enhanced learning, is the, where/with the employment of gaming elements both in learning content and learning pathways, the proposed methodology leads to a series of novel applications about teaching philosophy that enable young agents to cultivate hypothetic-deductive and critical thinking with a positive attitude towards others and developing feelings of constructive antagonism. The teaching scenario proposed aims at cultivating hypothetic – deductive and critical thought/moreover, enhances the linguistic ability in the vocabulary of ancient Greek philosophy as well. The scenario is part of a game suite entitled “Entering the Socratic school” and targets 10–12-year-old children. It is easy to implement on any digital platform with open-source tools used by almost every teacher. The game elements rely on the structure of the learning content rather than on the digital tools themselves. The methodology consists in designing a concept map and defining the game narrative, the game levels and transitions between levels, the mechanics to be used, such as polls, badges, and leaderboards. Online activities include digital games such as quizzes and crossword puzzles, student generated comic stories, and a digital guide. They are complemented by physical activities involving movement and dialogue using fishbowl techniques and Socratic circles. The proposed teaching scenario will be implemented in the classroom in the following academic year and our work team applies interdisciplinary approaches inspired by at least three different fields of expertise.

Keywords: *Socratic games, gamified learning, philosophy, art, Moodle.*

1. Introduction

Philosophical reflection on games was present from the beginning of the history of thought (Heraclitus, Plato, Aristotle) until the interest in this theme stopped in Middle age and came back to the attention of philosophy only in the 18th century and later (Kant, Schiller, Hegel, Huizinga etc.). Games involve cultural and anthropological elements depending on the period, place, human beings themselves, and their needs. Human activity in general consists in interactive mechanisms and symbolisms; according to Ludwig Wittgenstein, philosophy and language are to be understood on the whole as a series of games and a rule following activity in general.

A game is a basic/fundamental/essential linguistic and cultural element in all European languages (e.g. in ancient Greek, *παίγνιον*, modern Greek *παίγνιον*, *παιχνίδι*, *latin iocus*, ital. *gioco*, fr. *jeu*, sp. *juego*, engl. *joke*, here & after “game”). A game can be understood as a free activity, regulated by internal principles, carried out individually or by groups, sometimes competing, to realize itself, with no other immediate purpose than the recreational, and, at the same time, to develop physical, spiritual, and intellectual attitudes and skills. Main game elements are: goals, rules, challenge, and interaction. Games generally involve mental or physical stimulation, and often both.

The work presented in this article is part of a larger project aiming to use gamification technology towards interfacing philosophy and philosophical games with state-of-the-art ICT learning platforms. Gamification, the use of game elements in non-game environments, often displays a persuasive intent, ranging from enhancing engagement and affective response with a system to the triggering of specific behaviors such as buying or interacting (Rao, 2013). Another gaming application is the use of game data in non-gaming situations.

Over the last two decades, gamification's potential as a learning methodology has been thoroughly investigated. It has been applied in both formal education in the traditional classroom environment as a complementary learning tool or in e-learning and distance learning platforms (Dominguez, et al, 2013; McCombs and Vakili, 2005; Lee and Hammer, 2011) as well as in informal education and behavior intervention or modification (Carr, Taylor, Hunt, and Mejia, 2014; Mohr, et al., 2014). Its application in learning activities are based on the inherent features of cognitive interaction, sensory triggering, and motivation all of which enhance the student's attraction and engagement. According to Karl Kapp, it is a teaching approach which/that facilitates learning and increases motivation using gaming elements and mechanics as well as game-based thinking (Kapp, 2014). The game elements and approach used do not constitute a game in themselves, but they are employed to attract and engage people, regardless of age, in interactive activities of continuous feedback, as in an actual game. Gamification as a learning strategy is an excellent methodological tool for the teacher since it facilitates cognitive processes throughout the learning taxonomy due to the inherent elements of challenge for individual development (Kapp, 2014).

Philosophical games develop practical skills (such as learning the main vocabulary used in ancient Greek philosophy), serve as a form of exercise, or otherwise perform an educational, simulational or psychological role. That is why a main aspect of our research deals with language and concepts, among else because the philosophical games we design teach young people and adults the vocabulary of ancient Greek philosophy. According to Demeurt (2014: 797), linguistics, and particularly, sociolinguistics, focuses on gaming as a socialization tool for L2 learners (Second Language Learners). Demeurt (2014: 797), also, states that up to now there is a little linguistic research promoting new players to negotiate interaction in highly synchronous and frequently multimodal settings and this would be another fruitful area for additional exploitation. It has been supported that computer games are not just changing the way we use language; they are changing the way we think about it. When the most visible medium for written language was print, our metaphor for language was the book: fixed, authoritative, slow to change. Now that most of written language is informal and online, our collective metaphor is shifting to language as a network: fluid, collectively negotiated, constantly altered. Language, as McCulloch (McCulloch, 2019) puts it, is humankind's largest open-source project; and the internet, like computer games, makes it much easier for all of us to interact as and become, contributors. Further liaisons with linguistics can be also found in the relationship of the digital games for the teaching of ancient Greek language and history. For example, history digital games like *Assassin's Creed* or *Civilization* are an active teaching tool that does not impose the "consumption" of history in a one-dimensional way. On the other hand, we must note the fact that in Greece for now there is not any philosophical digital game that can help adolescents and adults to learn ancient Greek philosophy in an alternative and pleasant way.

Another element that can be traced in the philosophical type of digital games we explore is their pedagogical dimension. A philosophical digital game has an educational character based on theories about motivation, "flow", and self-determination. This means that a variety of creative and enjoyable learning starting points converge in games. Since generation Z entered the education field, due to their familiarity with the use of internet and social media, students require adaptive learning methods in all educational levels and in any type of learning activity. New tools and methodologies do therefore become necessary for enhancing the learning process.

Motivation and positive emotions, not only support by enhancing the learning process, but also they can be an important stimulus, a trigger to learn the basics in ancient Greek philosophy. Although they are not an exclusive condition for achieving learning outcomes, they must be supported by the teaching of the fundamentals of ancient Greek language (vocabulary and grammar). With the use of philosophical games by the students, this will help them to reinforce their linguistic competence in contemporary Greek language together with and plus the development of critical thought and an /interactive and experiential approach of the philosophical *logos*. And this is a strong motive for other researchers or teachers to take this type of game as a base to go further with their research or to refer to the cognitive and social dimensions that a digital philosophical game can support.

Additionally, in the educational practice of gamification we apply and expand previous philosophical elaborations of teaching philosophy through forms of art in general proposed in bibliography by members of the work team (Lazou-Patios, 2017).

In our work, as previously said, we use *παίγνια*/games or playing as a means for promoting and cultivating hypothetic – deductive and critical thought, as well as the linguistic ability in the vocabulary of ancient Greek philosophy; we are elaborating on the other hand a specific kind of knowledge - educational games, that will provide the users with the opportunity to learn while having fun. Moreover, since games have been always related with the human efforts to orientate positively in the actual space and facilitate creative activity by allowing the emergence of new abilities and imaginative qualities of man's intelligence for a better emotional and social life, through philosophical digital games we intend to

transfer the creative gamifying influences in the sphere of obtaining and teaching philosophical knowledge.

Ultimately, our project may be seen as a first attempt at a paradigm shift: philosophy is not a luxury for the few selected ones (elitism), it does not reside in the clouds, it is not at odds with technology: it is part of everyday life as much as technology, it is as necessary as technology, must be linked to technology and be accessible and useful to everyone.

More specifically, the teaching scenario presented in this work targets primarily 10-12 years old school students, which means that they are at the final stage of primary education.

Our philosophical and pedagogical approach is based on the human learning theory of social constructivism. Lev Vygotsky, one of the main representatives of social constructivist learning theories, highlighted the role of social interactions in the full-fledged development of the individual establishing that the specific qualitative characteristics of the social framework, within which the individual grows, constitute a significant learning factor. Furthermore, there is no age-dependent background as prerequisite for the knowledge base that a child must construct. The cognitive development is not linear, but it is enhanced by appropriate triggers which form the zone of proximal development which will enable the child's transition from the actual to the potential development (Vygotsky, 2000). In his work 'Imagination and Creativity in Childhood' (Vygotsky, 2004), a creative activity is determined as the action that generates something new, is oriented towards the future and recreates the present. As far as children are concerned, they fully manifest their creativity in game activities where they not only reproduce their actual experiences, but they recreate them with imaginary content: 'He combines them and uses them to construct a new reality, one that conforms to his own needs and desires (Vygotsky, 2004).

2. Methods

The scenario presented here starts from an existing proposition for new teaching material which exists in the 'Photodentro' repository used by primary school teachers in Greece (Photodentro-ugc: Socrates...a model philosopher and teacher). The content and flow of the original scenario have been restructured to take advantage of the game dynamics and mechanics as well as the digital learning tools and capabilities. The gamified version presented here is particularly appropriate for group distance learning. It is also inspired by the Attention, Relevance, Confidence, Satisfaction (*ARCS*) model which aims at motivating the engaged learners through pleasant experiences and positive feedback (Keller, 1987), which is particularly important for children. The digital implementation of the gamified content is based on the open-source Learning Management System Moodle. The flipped classroom methodology is also employed to partially shift of teaching from the space of group learning to that of individual learning for each one of the students, mainly through video-lectures to allow more time in the classroom for interactive activities (Bishop & Verleger, 2013).

3. The design

3.1. The Scenario

The scenario is part of a game suite entitled "Entering the Socratic School". Its aim is to introduce students 10-12 years old to the life of Socrates and his theory. The module - game is divided in three phases.

In the first phase, the young learners watch a video on the life and work of the philosopher. The video is uploaded on the online platform so that they may watch it as many times as they want on their own and keep notes (asynchronous mode). This first phase individual "mission" will allow them to prepare for the topic in question and get ready for the next phase.

In the second phase, they work as a group under the guidance of the teacher. They engage in a guided discussion about the video, through successive cycles of observation and dialogue, for about two hours (Anagnostou, 2021a). Acting on the information they have acquired, they reenact live dialogues with emphasis on active listening and oral expression aiming at enriching their vocabulary with extra lingual and paralinguistic elements (Anagnostou, 2021b). The activity is coupled with the mission to follow the directions stated in the student worksheet and carry out the assignment on the digital platform (asynchronous mode). The students are given instructions and clarifications about the digital tools they are going to use so that they may create their own content. This lasts for one teaching hour.

In the third phase, children are divided into groups. Every group creates their own avatar and carries out digital tasks – challenges in the form of cooperative assignments using the gamification mechanics of the Moodle platform. While carrying out a given task, members of each group communicate via chat. The first assignment is to build their own digital games using LearningApps.org - interaktive und multimediale Lernbausteine, and the information acquired through the video and the game experiences of the second phase in the classroom. When the task is completed by all groups, the games are uploaded to be evaluated. Each student votes through the platform using the scale 1-10 (workshop).

The results are visualized by a progress bar block. The next mission challenges each group to develop comics using Create Comics Online, it's Fun & Free at MakeBeliefsComix!. Each comics story will also be evaluated by all students in the classroom based on the following criteria: a) humor, b) content, and c), use of graphics. Each criterion is graded using the scale 1-10. The final mission consists in the development of a Dialog Guide which is a multimedia presentation via Lino: a digital and cooperative bulletin board. - EdTech.gr proposed by the children as a means of communication with emphasis on rational arguments and active listening.

The designed missions are of increasing difficulty, each with the respective immediate feedback and rewards. The results are summarized in a leaderboard in the form of a bar graph where the final score of each group is shown. Upon the successful completion of each mission, a special badge is awarded. The badges are designed as to strengthen the motivation of each student and their engagement in the learning process. For example, for the first digital mission of the third phase, the badge is the icon of a star which reads: 'You are awesome game creators!'. The badge for the second mission is a pen icon carrying the comment: 'To the team of the most fantastic comic writers!'. Finally, the third mission leads to the big award of the icon of Socrates himself with the comment: 'Well done! You made it!'. The scenario concludes with an individual questionnaire with short answers for the teacher to receive feedback on the content for future fine tuning and improvement. Upon completing the questionnaire online, each student receives the digital "Diploma of Cooperation and Participation". It is also possible to extend the editing of the diploma during a meeting in the classroom, where all students discuss the role of rewards and get to draw their own badges.

3.2. The gamified content

In this section we present the Moodle gamification plugins (Mele, Tatiopoulou, Ktena, 2020) that are used to support the scenario presented in the previous section. More specifically, we briefly discuss the learning maps, the progress bar, quizzes, the leaderboard, badges, and awards.

The learning map is used to improve the visualization of the succession or course of activities inside the gamified course. Activities are presented as locations on the map, using colored dots, which relate to paths. The user must complete a given activity to move on to the next location. Every time an activity is completed, the corresponding location changes its color (e.g., from red to green) and the relevant paths and locations are gradually revealed. It is possible to have more than one map in the same game, e.g., smaller maps may be embedded in a mega-map where each bullet represents the completion of all activities contained in one of the smaller maps. In Socrates game presented here, the map features at least 5 locations: About Socrates (video in asynchronous mode), Digital Game, Comic Story, Dialog Guide, Questionnaire.

The progress bar is a simpler way to present the progress of the course. It offers immediate feedback to the students about what they have accomplished and what they must accomplish to reach the next location.

The video, which is to be watched in asynchronous mode, is compatible with the Sharable Content Object Reference Model (*SCORM*) module which enables interoperability, accessibility, and reusability of web-based learning content. By using this plugin, after a student has completed viewing the video, the activity will be set as completed and the student will be able to move to the next location. The presentation may be accompanied with quizzes through which the students receive extra points. This is easily accomplished via the H5P Moodle plugin which provides a variety of quiz types such as multiple-choice questions, drag and drop, true or false, memory games, flashcards et al.

The second phase takes place in the classroom. We have not designed any digital or gamified content for this phase; however, the previous plugins may be used to revamp it so that it may be offered online if needed.

In the third phase, students work in groups. They first must decide on their own avatar/group banner and carry out all activities-challenges online through Moodle. The plugins used in this phase vary from badges, levels and leaderboards to quizzes, sticker boards and interactive content.

Where specific applications, external to Moodle, are used, as in the case of the digital game or the comic story, each group carries out the activity via the respective application. The output is then exported and integrated into Moodle. The output of each group will be visible to all through the platform.

The poll with a scale 1-10 is also implemented via Moodle. The results are visualized using the leaderboard plugin to depict the relative position of a group with respect to others. They are considered as an effective way to motivate students since it appeals to both their emotional and social areas.

The final group mission is the Dialogue guide which may be supported by the Board plugin.

Each mission completed by a group grants level points as well as badges. Badges reflect the level of expertise attained or the type of mission accomplished. They are designed to motivate and engage the group towards achieving certain objectives and to provide feedback and social recognition.

The scenario will be implemented during the following academic year in classroom and the results will be reported in our future works (here we may note the delay in the implementation of the project in the classroom, because of the covid-19 pandemic).

4. Conclusion

The gamification approach has been employed to develop a teaching module for introducing students of 10-12 years old to the life and work of such an exemplary philosopher, as Socrates. The scenario is designed based on a social constructivist approach aiming at the active participation of students and the playful promotion of knowledge. The proposed approach allows children to communicate authentically with each other, co-create the content of the work plan and increase their commitment to the learning process, gradually enriching their knowledge in an environment of challenges and escalating trials. The proposed module will be offered to students and evaluated regarding its efficacy on making lessons more attractive to students while at the same time cultivating their social skills. In future works, we shall also assess whether the cultivation of students' digital literacy in combination with/involving artistic expression (e.g., dramatization of Socrates figure) might strengthen internal learning motivations in children.

References

- Anagnostou, M. (2021a). Socrates ... a model philosopher and teacher. (in Greek) Retrieved 10/05/2022, from Photodentro-ugc: Σωκράτης...ένας μεγάλος φιλόσοφος και δάσκαλος
- Anagnostou, M. (2021b). Philosophy for children: The gang who charmed arrogant friendship. (in Greek) 7th International Conference for the Advancement of Innovation in Education, Larissa 15-17 October 2021. Retrieved 30/03/2022, from <http://synedrio.eepek.gr>
- Bishop, J., & Verleger, M. A. (2013). *The Flipped Classroom: A Survey of the Research* Paper presented at 2013 ASEE Annual Conference & Exposition, Atlanta, Georgia. 10.18260/1-2—22585. Retrieved 2/05/2022, from ASEE PEER - The Flipped Classroom: A Survey of the Research
- Carr D., Taylor H., Hunt R., Mejia T. (2014). *Gamification and adult literacy*, Report of Literacy Link South Central's Job Creation Partnership Project.
- Deumert, A. (2014). *Sociolinguistics and Mobile Communication*. Edinburgh: Edinburgh University Press.
- Domínguez A, Saenz-de-Navarrete J, de-Marcos L, Fernández-Sanz L, Pagés C, Martínez-Herráiz JJ. (2013). Gamifying learning experiences: Practical implications and outcomes. *Computers & Education* 63, 380–392.
- Kapp, k. (2014). *Separating fact from fiction*, Chief Learning Officer, Vol. 13 Issue 3, p.p 45-52. 5p. Retrieved 10/05/2022, from Educator Resources (nheducatorresources.com)
- Keller, J. M. (1987). Development and use of the ARCS model of instructional design. *Journal of instructional development*, 10(3), 2-10. Retrieved 5/04/2022, from Development and use of the ARCS model of instructional design (tudelft.nl)
- E. Mele, A. Tatsiopoulos and A. Ktena, "Gamifying E-learning Course Content," 2020 9th Mediterranean Conference on Embedded Computing (MECO), Budva, Montenegro, 2020, pp. 1-4, doi: 10.1109/MECO49872.2020.9134195.
- Lazou, A.- Patios, G. (eds.) (2017). *Art, Philosophy, Therapy*, Vs. A & B (in Greek), Arnaoutis Books, Athens.
- Lee, J.J., Hammer, J. (2011). Gamification in Education: What, How, Why Bother? Definitions and Uses. *Exchange Organizational Behavior Teaching Journal*, 15(2), 1-5.
- McCombs B, Vakili D. (2005). A Learner-Centered Framework for E-Learning. *Teachers College Record* 107 (8) 1582-1600.
- McCulloch, Gr. (2019). BECAUSE INTERNET: Understanding the New Rules of Language. NY Times, August 2019. <https://www.nytimes.com/2019/08/16/books/review/because-internet-gretchen-mcculloch.html>
- Mohr DC, Schueller SM, Montague E, Burns MN, and Rashidi P. (2014). The Behavioral Intervention Technology Model: An Integrated Conceptual and Technological Framework for eHealth and mHealth Interventions, *J Med Internet Res*. 16(6): e146.
- Rao, V. (2013). Challenges of Implementing Gamification for Behavior Change: Lessons Learned from the Design of Blues Buddies. *Chi*, 5–8.
- Vygotsky, L. (2000). *Mind in society*. USA: Harvard University Press.
- Vygotsky, L. (2004). Imagination and Creativity in Childhood, *Journal of Russian and East European Psychology*, vol. 42, no. 1, pp. 7-97. Retrieved 2/05/2022, from 01vygotsky-imagination.p65 (ucsd.edu)

INVESTIGATING CHALLENGES FACED BY INTERMEDIATE PHASE EDUCATORS IN THE TEACHING OF READING IN ENGLISH FAL. A CASE STUDY OF SELECTED PRIMARY SCHOOLS IN NYLSTROOM CIRCUIT

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Abstract

Reading challenges by learners has been a widely researched topic by a lot of researchers. Poor teaching of reading by educators result in learners not being able to read. English is mostly used as a language of teaching and learning and that has influenced the rationale for this research project. The purpose of this study was to investigate challenges faced by the English Intermediate Phase educators. Learning cannot be successful without mastering reading as it is a basic tool for learning, it is not only in South Africa whereby English educators are not English speakers, yet learners are expected to master to English. Educators seem not to have good instructional practices as learners struggle to understand in English on its own. The study used a qualitative research approach with case study research design. The researcher used purposive samples, and selected 5 primary schools in which the population comprised of English Departmental Heads, and 3 English educators from each of the selected primary schools. Data was collected through semi-structured interviews, documentations and note-taking. The theory of Rosenblatt, who believes in a relationship between the text and the reader, has been followed on the premise that, what the reader already knows will determine how much he interprets or understands in the text. Thematic approach was used to analyse data. The study found that teachers who are not thoroughly trained are unable to produce good performing learners and that has influenced the whole system of education. Overcrowded classes to practice good reading strategies, no proper reading assessment strategies, and no monitoring and moderation of reading by SMT. The study recommended extensive training of and teachers through in-service-training for lengthier periods, clear guidelines of teaching reading, monitoring and moderation. Mostly, educators indicated their desire to be trained in technology as learners prefer it rather than books and chalkboard.

Keywords: *Teaching strategies, educators reading, learners, schools.*

1. Introduction

Reading is central to learning, in order to learn one must be able to read. Educators have to teach reading so that learning can take place even in other subjects. Reading has to be taught from an early age in order for learners to be able to learn successfully at school (Worthington, 2013:23-24). It was previously stated that obtaining basic language skills in the early grades is not only significant for a child, but for the benefit of the country as a whole because when these learners have completed their education, they will contribute to the economic development of the country (Motsepe, 2018: 2). In view of the above statement, Motsepe (2018:2-3) states that learners who are unable to read are not beneficial to the country and do not gain much from the democracy. More researchers agree that the effect of the inability to read confidently with comprehension can result in learners dropping out (Dietz and D'Angelo, 2014:98). Powerful instruction comprises the following: teaching skills, strategies, models; providing differentiated instruction for all learners; providing explicit instruction, systematic instruction, and giving opportunities for application; and measuring the learners' progress (Denton, 2016:121). Teaching reading is then the most important task of educators (Moats, 2020:4).

Reading approaches need to be updated because they are also changing. Educators lack the expertise to teach reading, and their lack of teaching reading strategies causes learners to lose interest in reading (DBE, 2014, p. 26). The Annual National Assessment (ANA) as conducted by DBE (2014) results indicated that learner's reading ability is very low. To produce effective readers, educators should be

capable of employing some reading strategies, such as predicting, text-mapping, and summarising (Mistar et al., 2016, pp. 67-70). Educators, as revealed by Phindane, (2020) feel guilty of teaching English in Sesotho, yet they also feel that it cannot be taught like a native language. Educators that are teaching English First Additional Language are mostly not English Home Language Speakers. Other reading strategies that are applicable in order to be effective readers have been listed (Fitrisia et al., 2015, p. 89). They include slowing down the reading text by adjusting the reading speed, pausing and thinking about the text, and visualising and guessing the meaning of unfamiliar words. These learning conditions may also hamper learning reading comprehension skills. If they follow their teacher's steps, they may get lost.

Educators also have to use technology so that their learners are up to the fourth Industrial Revolution era. Other studies have examined the effect of using technology on reading comprehension, observing that using technology enhance students' reading comprehension (e.g., Lenhard, et al. 2013; Delacruz, 2014). For instance, Redcay and Preston (2016) examined the impact of using teacher-guided iPad app instruction on the reading fluency and comprehension skills of second graders. The outcomes of that quasiexperimental study showed that students who were taught through the use of teacher-guided iPad app instructions demonstrated higher score on reading comprehension and reading fluency when compare to students who did not receive teacher-guided iPad app.

The study by Kuyatt et al. (2015) investigated whether there is a difference in student performance on state-wide achievement measures following high-level technology integration. The teachers in the study incorporated varying degrees of technology in their classrooms prior to end of the year state-wide testing. The analysis of variance (ANOVA) results of achievement data were significant, and it was determined that higher test score proficiency was positively correlated with educators who implemented high levels of technology in their classrooms. Learners who scored in the non-proficient range did have technology integrated within their classrooms, however the levels of implementation were not high or implemented with advanced levels of fidelity (Kuyatt et al., 2015).

1.1. Cognitive challenge

Instruction must take into account cognitive challenges. Educators need to match the texts with the ability of the learners they teach. There needs to be a healthy distance between frustrations, and it must be easy for struggling readers. Educators must find texts that are age appropriate and thought provoking (Robertson, 2014). Educators must also use extended texts. This can build the stamina of the learners. Finally, the educators should find ways to mediate challenging texts. This might include offering read aloud, assisted readings, choral readings, and even reader's theatre (Robertson, 2014).

2. Research objectives

The aim of this study was to investigate the challenges that are experienced by IP educators in the teaching of English First Additional Language (FAL) reading.

2.1. The objectives of this study were to

- 2.1 Identify the challenges that are experienced by IP educators in the teaching of English reading.
- 2.2 Indicate the predominant effects that are brought-up by lack of good strategies of teaching reading in the IP.
- 2.3 Devise relevant strategies that will improve the teaching of reading by the IP educators.
- 2.4 Explore age and grade appropriate models and strategies for teaching reading in the IP.

3. Research methodology

For this study, the researcher made use of a case study design. A case study scientifically investigates a real-life phenomenon in-depth in its natural environment (Yin, 2015, p. 67). A case can be an individual, a group, an organisation, or even an event, a problem, or an anomaly. The benefit of using a case study is highlighted by Rider (2016, p. 88) who mentions that case study research seeks to identify "gaps and holes". The purpose of this study is to identify the gap in the teaching of reading by IP educators. It has been argued that in recent times researchers have become particularly focused on testing theories – mature theories as well as intermediate theories (Delbrige & Fiss, 2013, pp. 104-106).

Interviews are the main method of data collection in case studies (Yin, 2014:79) so the researcher planned to discuss the idea with the participants first, and this was achieved by visiting the schools in person. The desired information was therefore collected through interviews and documentation. For interviews, questionnaires were both closed and open-ended.

4. Research design

The researchers advocated for the use of a case study methodology as opposed to other methods Lucas, (2019:56-60). They add that the benefit of using a case study methodology is that it is a flexible approach suitable for developing research, as the topic of reading difficulty is a well-researched. The researcher investigated the role that educators play in teaching reading, and the kinds of reading strategies they use to teach reading. It was discovered that learners who are considered to be struggling readers typically read one or more years below their current grade level, but do not have an identified disability or challenge of any kind, which means they are struggling because they lack basic teachings (Hall, 2014:45). The use of a case study research design also allowed for triangulation to enrich the findings (Rider, 2016:78). The use of triangulation will narrow problems of construct validity. Semi-structured interviews were conducted, reflective note taking, and documentation were part of the tools for collecting data. A number of data analyses strategies as indicated by Yin (2014:78) were also employed, for instance, case description, examining rival explanation, and going through documents.

5. Sampling

The researcher used a purposive sample, which is also called judgemental sampling, to gather and obtain the correct information, because Creswell (2014, p. 134) and Crossman (2018, p. 345) declare that sample members are chosen on the basis of the researcher's knowledge and judgement. Maree (2016, p. 85) echoes the same words as Creswell and Crossman in that qualitative sampling generally uses purposive sampling. From the population of the Waterberg District, with 56 primary schools, the researcher sampled five (5) primary schools and 16 educators. The total sample comprised 16 IP educators. To guarantee that the selection was the best and that respondents would answer the research questions and meet the objectives of the study, the sample was composed of Grade 4, 5 and 6 English educators. Departmental Heads were also sampled as part of the respondents in a view to establish their effectiveness in managing the subject, as Milondzo and Seema (2015, p. 234) argue that the quality of teaching and learning depends on the competency of the school management teams. However, the sample of schools was motivated by convenience.

The research sample consisted of 16 IP English teachers from the five (5) selected primary schools in the Nylstroom Circuit. There was one Grade 4, one Grade 5, and one Grade 6 educator, and a subject head from each of the five schools. The specific sample of participants in the five schools that were utilised within the district were selected based on familiarity and practice with the district's focus on improving the reading levels of the IP learners. Every respondent was sampled based on experience, those that had at least taught for 10 years, including a subject head from each school. In three of the identified schools, four of the educators did not meet the 10-year criterion as advised by the researcher, but were not excluded and participated in the study. Each of these participants were interviewed, and one of the educators was requested to conduct a reading lesson to be observed.

6. Results and discussion of findings

The results and discussions of findings as revealed by data analysis were obtained through the use of themes. Documents were viewed and semi structured interviews were conducted by the researcher. The researcher used exactly the same words from the participants, used her own interpretation and also probed them when they were not clear. The general outcomes of the discussions reflected a number of constraints for not to master the teaching of reading English FAL reading to the Intermediate Phase (IP) learners. The findings are indicated below. Younger educators revealed the need for the use of computer sciences, which were infact available but not used in the schools. They were saying the IP learners are more interested in Information Technology (IT) than in books, chalk and chalkboard.

7. The findings reflected by discussions

Educators exposed the department as not affording learners the opportunity to enjoy their learning because learners are more interested in technology than the use of 'books and chalkboard'. This backwardness was also frustrating some of the young educators. Learners who are in the IP enjoy cartoons, pictures and graphs than books. Referring to resources, there were resources as provided by both DBE and NECT, but none of them were relevant especially the texts that were not related to learners' environment. Learners had smartphones, but schools did not allow them to utilise them for learning, for example googling information instead learners use them for unimportant stuff. Parents and community were less interested in the education of their children and that alone led to learners not doing homework as there is no monitoring at home.

The impact of Covid 19 also brought problems regarding the teaching of English FAL reading as well as other languages. As the days of teaching were reduced, the content was also skimmed. Reading was one of the skills that was removed because the process of rotation could not accommodate all the topics. Learners forgot even the basic information of reading. This brought much struggle especially to the struggling readers.

8. Conclusion

There were no specific reading approaches that were mentioned as the best. Managing reading by the School Management Teams was also not clear. When they were responding to questions regarding “appropriate strategies for teaching reading, they were found wanting”. The importance of the teaching of reading cannot be over-emphasised, however not all English FAL educators have the expertise to instruct reading. Books are still valuable asserts and most of all the main source of information, but the arrival of the 4th Industrial revolution should be infused in our education system. Learners who are not advanced in technology are no longer relevant in the present day living. The Department of Basic Education has introduced many Teacher colleges, so there is hope that Educator-learner ratio will be improved in the near future

References

- Basic Education Rights Handbook (2014). *General Household Survey 2011*. Focus on schools. Pretoria.
- Cantrell, S. C., Almasi, J. C., Carter, C. & Rintamaa A (2013). Reading Intervention in Middle High Schools: Implementation fidelity, teacher efficacy, and student achievement. *Reading Psychology* 34 (1), 26-56.
- Cheung, A. C., & Slavin, R. E. (2013). Effects of educational technology applications on reading outcomes for struggling readers. *A best evidence synthesis. Reading Research Quarterly*, 48(3), 277. Doi: 10.1002/rrq.50.
- Creswell, J. W. (2013). *Qualitative inquiry & research design choosing among five approaches* (3rd ed.). Sage.
- Creswell, J. W. (2014). *Research design. Qualitative, quantitative and mixed methods approaches* (4th ed). Sage.
- Crossman, A. (2018) *Understanding purposive sampling. An overview of the method and its applications*. <http://www.statisticshowto.com/total-population-sampling>.
- Delacruz, S. (2014). Using Near pod in Elementary Guided Reading Groups. *Tech Trends: Linking Research and Practice to Improve Learning*, 58(5),62-69. doi: 10.1007/s11528-014-0787-9.
- Delbrige, R., and Fiss, P.C. 2013. Editor’s comments: styles of theorizing and the social organization of knowledge. *Academy of Management Review* 38: 325-331
- Department of Basic Education, 2017. *The Early Grade Reading Study Summary Report*, Pretoria: DBE, 2017.
- Denton, C. 2016. Classroom Reading Instruction that supports struggling Readers: Key Components for Effective Teaching. Retrieved January 27,2017 from <http://www.ritnetwork.org/essential/tieredinstruction/tier1/eeffectiveteaching>.
- Fitrisia, D., Tan, K. E., & Yusuf, Y. Q. (2015). Investigating metacognitive awareness of reading strategies to strengthen students’ performance in reading comprehension. *Asia Pacific Journal of Educators and Education*, 30, 15-30.
- Phindane, P. (2020). The Influence of Mother Tongue in Second Language Learning in Primary School. *Education and New Developments*, 380.
- Redcay, J. D. & Preston, S. M. (2016). Improving second grade students reading fluency and comprehension using teacher guided iPad ® app instruction. *Interactive Technology and Smart Education*, 13(3), 218-288. Doi.10.1108/ITSE – 12 – 2015 – 0035.
- Rider, H.G. 2016. Case study research Approaches, methods, contribution to theory. *Sozialwis-senschaftliche Forschungsmethoden*, vol. 12. Munchen/Mering: Rainer Hump Verlag.
- Robertson, J. (2014). The neuropsychology of modern foreign language learner. In L. Peer & G Reid (Eds.), *Multilingualism, Literacy and Dyslexia*. A challenge for educators (pp. 8-9). Routledge.
- Worthington, J.D.2013. *Teaching Children to Read Guidance and Research*. Hauppauge, N.Y.: Nova Science Publishers Inc.
- Yin, P.K 2014. Case study research. Design and methods, 5th ed. London, Thousand Oaks: Sage Publications.

An illustration featuring several graduates in black gowns and yellow stoles, wearing white face masks. They are shown in various celebratory poses, some holding their black mortarboard caps high. The graduates are positioned as if they are emerging from or standing on large, light-blue rectangular frames that are scattered across a light blue, hazy background. The word "WORKSHOPS" is written in a bold, black, sans-serif font, centered horizontally and slightly below the middle of the image.

WORKSHOPS

HOW TO DEVELOP DIGITAL CITIZENSHIP EDUCATION? – A WORKSHOP FOR FOREIGN LANGUAGE EDUCATORS

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Abstract

Digital Citizenship Education (DCE) has emerged as an international priority. As a result, we aim to propose a workshop on implementing teaching and learning practices and developing DCE in Foreign Language Learning (FLL) classrooms.

The workshop is an opportunity to develop the participants' digital literacy by putting in evidence the importance of oriented educational practices and the creation of unit plans and pedagogical resources for the development of DCE in FL education.

In addition, it seeks to discuss the concept of DCE and share practices, methodologies and resources to improve professionals' knowledge. The participants will be able to empower younger citizens to participate actively and responsibly in a digital society and to foster their skills of using digital technologies effectively and critically.

The workshop would consist of a 45-minute session, divided into three parts:

- a brief introduction to the concept of DCE in FLL and an overview of the activities of the workshop (10 minutes);
- group-work in which the participants analyse teaching units developed by the authors, within an Erasmus+ project, to be used in FLL classrooms for different school levels, following specific guidelines (20 minutes);
- presentation and discussion of the analysis of the teaching units by each group (15 minutes).

The workshop addresses in-service and pre-service teachers, as well as teacher trainers or researchers. It is designed in a flexible and context-sensitive way to enable participants from diverse educational contexts in different countries to attend. The number of participants should be limited to 25.

Keywords: *Digital citizenship, education, foreign languages, teaching, pedagogical resources.*

1. Introduction

Nowadays, the constant presence of technologies everywhere presents new challenges to the education field, specifically in what teacher training is concerned. In view of this it is essential to promote and develop teachers and consequently students' digital citizenship. As languages work as bridges that take us to others and help develop democratic competences, reflection and critical thinking, as well as media literacy, the Erasmus+ project DiCE.Lang (2020-1-DE01-KA203-005712;10/2020-09/2023) aims to create new paths on educational resources, professional development and updating teachers on new frameworks about digital citizenship education in foreign language classrooms. The DiCE.Lang project was financed within the Erasmus + Key Action 2 Strategic Partnership for Higher Education: it is a three-year long project, it started in September 2020 and will end in August 2023.

The consortium is composed of five institutions: University Ludwig Maximilien of Munich (Germany), University of Limerick (Ireland), Universidade de Aveiro (Portugal), Latvijas Universitate (Latvia) and Siena Italian Studies (Italy).

The DiCE.Lang project includes 4 intellectual outputs (InO):

- 1) A Survey to be implemented within pre- and in-service teachers to evaluate their knowledge, skills and attitudes related to the teaching of DCE in FLE. Such a survey was necessary because the implementation of Digital Citizenship Education in Foreign Language Learning presents researchers with the novel challenge to develop programmes, resources and solutions that are directed at teachers for implementing DCE in subject-specific ways.
- 2) Open Educational Resources (OER) – The second intellectual output developed, piloted and evaluated by the project consortium is a set of open educational resources for DCE in FLE that can be used by teachers and educators to teach DCE for learners at all school types and for students at universities. This OER package entails two dimensions. First, there will be fifty educational resources taking the form of concrete teaching units, available in English and other European languages. Second, the project will construct and compile a digital inventory of sixty original and authentic multilingual resources for DCE in FLE (including digital texts, literature, films and digital games).
- 3) Teacher Training Package (TTP) – this third output for DCE and foreign language education includes 5 items: the one-off event within the local communities; a free online self-study course for teachers to engage them in digital literacy development; a teacher training education module available for curricula integration at university level thinking of teacher training degrees; the fourth element includes a handbook that will demonstrate in theory the possibility of implementing DCE in FLE contexts and eventually a multilingual guide which will introduce and explain the whole teacher training package. The workshop we are presenting in this conference is part of the work undertaken within this TTP, as part of the One-off event.
- 4) Policy Framework, which includes the creation of a new set of domains to be considered when looking specifically at DCE in FLE and it is structured in four phases: (1) specification of the FLE domains for DCE, (2) construction of the framework domains, (3) construction of a digital trajectory and establishment of a citizenship trajectory across all domains of the framework and (4) design of a holistic and coherent policy framework via these trajectories. The policy framework – constructed as a European policy framework – is designed to be useful for all member states, including their Ministries of Education, federal and regional educational authorities, and local school boards. Based on the policy framework, they can revisit and reconceptualize national and federal curricula as well as school syllabi by aligning DCE with FLE as educational innovation.

2. Design

This workshop has been structured on the basis of a previous event that took place last February, as part of the project's Intellectual Output 2. It consisted of a one-off event divided into two main parts: the first part took place online and involved two keynote speakers, major experts in the field of DCE, and the second part was organised independently in each partner country of the consortium, according to each one's availability and plans, in the form of an in-presence or online workshop open to teachers and educators in general.

Therefore, based on the structure of the previous one, this workshop would consist of a 45 minutes session, divided into three parts. There will be an introduction of 10 minutes, in which the trainers will give a short presentation on the concept of Digital Citizenship Education and will explain the activities of the workshop.

Then, the participants will be divided into groups of a maximum of 5 people. Each group will analyse a different teaching unit developed by the authors, within the above-mentioned Erasmus+ project, to be used in FLL classrooms for different school levels.

These Teaching Units were designed based on one of the 5 categories of the DiCE.Lang project: Critical Digital Literacy, Critical and Metareflective Component, Content Oriented Perspectives, Identity Oriented Component, Inter & Transcultural Perspectives on Digital Exchanges. The Teaching Units are structured in a way that can be adapted to different school contexts and teachers are able to choose from a range of activities and resources related to the topic of the unit. Participants will have specific guidelines to analyse the practices, methodologies and resources. They will have no more than 20 minutes to do it.

In the end, each group will present their comments and feedback on the teaching unit they have analysed. This activity will work as an evaluation and reflection of the workshop and will take 15 minutes, equally divided for each group. For this activity participants will use the feedback form elaborated by the consortium for the one-off event.

3. Objectives

It is essential that foreign language teachers develop students' skills and abilities to act as responsible citizens online, within their rights and duties. In addition, while they promote students' competence in this area, they can also reflect on their own professional development and education practices. Thus, this workshop is an opportunity to develop the participants' digital literacy by putting in evidence the importance of oriented educational practices and the creation of unit plans and pedagogical resources for the development of digital citizenship in foreign language education and to update educators in the field of digital citizenship education.

4. Methods

This workshop will follow an active methodology and cooperative learning approach, in order to develop competences and the critical thinking of the teachers enrolled. The participants are involved in an activity of reflection, by a small group discussion of the materials provided as well as by the potential experience and background to be shared together.

References

- Council of Europe (2018). Reference Framework of Competences for Democratic Culture: Descriptors of Competences for Democratic Culture. Council of Europe Publishing.
- Council of Europe. (2019). Digital Citizenship Education Handbook. Council of Europe Publishing.

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