

# CHATWISE

## “ChatGPT: as a High School Academic Tool for Writing, Innovation, Skills, and Education “

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**Abstract.** This chapter refers to the PSP-Classic project, that is CHATWISE, to explore the role of ChatGPT in education. Yet, being the most famous among educational researchers, studies on its ethical and responsible use as a digital aid in high school settings have been explored not so much. ChatGPT is evaluated regarding the ways students apply it to classroom activities and their views on it for coding and writing tasks. ChatGPT become a student tool, that presents educators with the challenge of finding the right assistance balance and simultaneously warning of potential over-reliance. This necessitates viewing ChatGPT as a supporting mechanism rather than the key fixture of education.

Outreach initiatives aimed to ensure safe, responsible, and ethical behavior while using ChatGPT. Focusing on solid prompt creation and a communal platform that unites students and teachers around the topic of Artificial Intelligence (AI) in personalized learning, which emphasizes the mutual feedback and discussion on the opportunities that arise from AI applications. The project study created avenues for students to share how much they've learned on this digital aid, canvassed the possibility of ChatGPT being the future of learning and teaching, examined its potential for personalized education, and whether it would create more opportunities or pose challenges. key challenges are about using ChatGPT as a helper without messing up academic integrity or replacing actual learning. Results indicate that students have confidence in ChatGPT's capabilities yet they also have misconceptions about the technology, which may result in the need for further educational strategies to increase AI awareness. Additional results reveal that when students value the information capacity of ChatGPT, they face challenges in creating effective prompts and trusting its accuracy. Therefore, the necessary inclusion of AI literacy and critical assessment skills in education settings is essential.

**Keywords:** NLP · LLM · ChatGPT · Prompt Engineering · Robot · Digital Face · High School Classroom · Personalized Learning · Education.

## 1 Introduction

The evolution of Natural Language Processing (NLP) has reshaped human and AI interaction. Different technologies have developed in the past years; many applications are still underway. NLP has given rise to a computer that understands, interprets, and synthesizes human language as the computer capacity and storage have increased and the availability of large datasets has been guaranteed. It has been at the core of technologies such as virtual assistants, chatbots, and other tools that have made it easier for humans to engage with computers. ChatGPT is one of the leading chatbots that utilizes machine learning algorithms to improve its capabilities of understanding and responding to human inputs gradually.

ChatGPT[1], a prototype launched by OpenAI on November 30th, 2022, was quite popular because of its highly accurate responses and capacity to handle more than just simple jobs like composing code snippets, mathematical functions, essays, novels, and poems.

Such arguments supported the raising of security, privacy, and education concerns.

Stephen Marche wrote an article titled "The College Essay Is Dead" [2] that warns about the dangers of ChatGPT complexity, such as cheating and rendering the college essay obsolete. Returning to the editorial "The College Essay Is Still Very Much Alive" [3], Christopher Rim questions the notion that essay writing is artificial, claiming that it is the result of humanities activity that exposes students to their true identities. This discussion illustrates this discussing ChatGPT's role in higher education and high school.

ChatGPT is a brilliant technology with incredible capabilities, but its application should be compatible with responsible and ethical norms. It is worth noting that there are inherent weaknesses such as a failure to recognize the tone and amplification of meanings, as well as a lack of creativity in communicating these meanings. As a result, it should not be used to replace human decisions since it cannot replace the spirit of human judgment and may be held responsible for doing so.

In this chapter, we present CHATWISE project "*ChatGPT: as a High School Academic Tool for Writing, Innovation, Skills, and Education*.", a PSP-Classic project created at the department of computer science at the University of Luxembourg and funded by the Luxembourg National Research Fund (FNR) [4]. This project, led by Sana Nouzri, a researcher at the University of Luxembourg, explores the transformative power of AI in education, highlighting how tools like ChatGPT can transform teaching and learning. The aim is to empower students and teachers with the knowledge and skills to use ChatGPT responsibly and effectively, ensuring a future where AI enhances educational experiences for all.

The project primarily focused on two important objectives: by conducting workshops and exhibits, it demonstrates how NLP was developed and applied in the creation of chatbots such as ChatGPT. ChatGPT distinguishes out from other AI tools for its ability to deliver extensive and dependable information. However, the issue of misuse, particularly in academic institutions, must be addressed. The initiative encourages the appropriate and ethical use of ChatGPT by organizing workshops to help people understand AI and how to write essays using this AI tool.

The workshops explored two practical applications of ChatGPT in high school classrooms: coding and writing. They focused on promoting best practices for coding and crafting compelling narratives with ChatGPT, while also initiating discussions about its advantages and possible challenges. The goal was to provide students with the skills and knowledge needed for the responsible and ethical use of ChatGPT.

The main aim was to impart to students the needed skills and knowledge on using ChatGPT in an ethical and responsible manner. AI exhibitions featured a chatbot and a virtual character that looked human-like and was designed to substitute for a real human, thus demonstrating the way AI changed the nature of communication. The exhibitions sought to encourage responsible use of AI tools such as ChatGPT and demonstrated the potential of integrating technology like ChatGPT into existing educational frameworks.

The rest of this chapter is structured in the following manner. Section 2 provides the background necessary for this study. Section 3 describes the CHATWISE project. Section 4 discusses the analysis and results, while Section 5 outlines the outcomes in qualitative and quantitative terms. Finally, Section 6 concludes the chapter.

## 2 Background

### 2.1 Revolutionising Education: Personalized and Adaptive Learning for the 21st Century

The fourth industrial revolution implies educators to develop new teaching/learning models to tackle the 21st-century challenges, considering inclusive, accessible, and personalized learning for the sake of helping students with their individual goals [5]. The World Economic Forum (WEF) puts forward the idea of personalized learning that involves individualised learning, focused teaching, and a competency-based education system. This involves the creation of learning opportunities that are relatable, participate in, and relevant to student success [6]. Personalized learning which beats the one-size-fits-all academic method gives tailored content, and it has made academic achievements, attitudes, motivation, and behavior overall better in different learning settings.

Adaptive learning systems, like the ones created by Athabasca University, have showcased the possibility of modifying distance education, which works more effectively, efficiently, and pleasantly than it did in the past [7]. Research proves that adaptive learning is effective in enabling students' increased attention, desire to engage with the learning, performance, and satisfaction [8]. Latest advances in learning technologies, for instance Adaptive Learning 3.0 [9], seek to design personalised learning experiences through AI and machine learning (ML) capability by developing closer integration between content, objectives, activities, evaluation, individual learners, and the machine.

Personalized learning entails tailoring instructional approaches to individual learners, whereas adaptive learning uses technology to deliver personalized learning at scale by assessing learners' skills/knowledge, providing feedback and content, and continuously monitoring progress through learning algorithms. However, conflicting terminology complicates adoption in higher education [10, 11].

Advanced adaptive learning systems [11] have the potential to personalize education, but they require additional development to address learner characteristics, interaction, and engagement challenges in e-learning settings. Despite the benefits [12, 13, 14, 15, 16], and [17], existing systems have limitations:

- Addressing learner characteristics: Few systems address learner characteristics such as cognitive strengths, learning styles, motivation, and backgrounds.
- Interaction and engagement challenges: E-learning can lead to feelings of isolation and disconnection from peers and instructors. Adaptive learning systems must foster interaction, cooperation, and engagement to keep students motivated and involved.
- Learning path limitation: Systems might present students with content for which they do not have adequate support or context for learning and skill development. Incorporating practice path into adaptive learning systems is critical to making the system more efficient by employing tailored routes in conjunction with tailor-made exercises for greater knowledge and skill improvement.
- Automatic assessment: Students complain about the lack of e-learning tools for individual evaluation, while teachers find the process of creating instructional content excessively time-consuming. Users want student-centred technologies that adapt to their learning styles, as well as prompt and dependable professional support. Tutors must also provide timely feedback.

### 2.2 E-learning Chatbots or Conversational Question Answering (Q&A) Systems

The improvements in NLP and Deep Learning (DL) have resulted in the growth of

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chatbots or conversational Q&A systems in numerous sectors, including healthcare [18], e-commerce [19], customer service [20], and e-learning [21, 22]. Chatbots, which are embodied with the human ability to converse through text or voice using natural language processing and machine learning algorithms, can understand the user's query and deliver relevant answers. In the healthcare field, Chatbots like Health have demonstrated many promising advances in precise medical diagnosis, and personalized medical services. In e-commerce, chatbots like H&M's enhance customer engagement and sales by providing suggestions in a tailor-made manner. On customer service, chatbots as Bank of America's Erica increase efficiency, decrease wait times, and heighten customer satisfaction. ChatGPT may be a very promising chatbot that tremendously changed many fields.

The great success of conversational agents in many other areas has enabled e-learning and educational applications [21, 22] of chatbots to come into reality. These virtual conversational assistants provide a medium through which the learner receives guidance, feedback, and support by interacting with the assistant and, at the same time, enjoys personalized learning based on the needs and preferences of the learner. For instance, Mathia is an AI platform by Carnegie Learning that uses ML algorithms for personalized math and adopts adaptive learning techniques. [23] further proposed a chatbot system enhanced with AI, provided to help the preservice teachers get better at questioning skills regarding fractions. In teacher education programs, chatbots demonstrate the potential of authentic teaching situations using preservice teachers as virtual students with misconceptions. They boost students' well-being and academic performance by providing academic and emotional support. Georgia Tech computer science researchers unveiled a chatbot named "Jill Watson" that answers students' questions online about class material, assignments, and exams, illustrating the role of AI in transforming online education. For instance, chatbots can be used to automate the process of assessment and feedback to streamline grading and accelerate the process of giving feedback on assignments. Turnitin has, in fact, recently rolled out "Emma," an AI-driven chatbot that provides 24/7 instant writing feedback to students through NLP. Automation supports the teacher by allowing him to dedicate himself to teaching and making the students take up tasks that are way too complicated for the machine. There's even chatbot software for learning foreign languages (e.g., Duolingo). They can't take the place of human teachers completely because these machines don't have instructors' experience and knowledge. Moreover, the data could also hamper their performance since it is used for training.

### **2.3 Enhancing Adaptive Learning with ChatGPT: Bridging Gaps in E-Learning**

The introduction of an advanced conversational AI, such as OpenAI's ChatGPT, into e-learning, would largely mitigate some of the downsides currently associated with traditional adaptive learning systems. This is another strong point of using NLP, which will create an appealing and interactive learning environment. The technology helps in meeting the needs of learners through instant, contextual, and customized responses. Unlike the conventional isolating systems of adaptive learning, the use of ChatGPT will simulate conversation by providing real-time engagement representative of another human tutor. This interaction sustains the motivation and reduces isolation, which often characterizes the e-learning environment. Every learner will have a chance to create their digital tutor powered by ChatGPT, even engineering prompts for the conversation.

One paper [24], published in the International Journal of Educational Technology in Higher Education, dealt with students' perceptions of using ChatGPT as a virtual tutor in physics class. This study helps in understanding the possible challenges and biases that the students might have while interacting with AI. Therefore, it will lighten the perception of ChatGPT in educational settings and the factors that influence its usage, as well as how the usage of ChatGPT impacts learning and trust in technology. This study sets forth that while students appreciate the AI's ability to

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provide immediate, personalized feedback, they also develop misconceptions about its capabilities. Among them are overreliance on it and high expectations that it should be infallible and objective. This, in turn, would need educational interventions that support students in gaining an understanding of both the capabilities and limits of AI within learning environments. The research also points out that anthropomorphism (the attribution of human-like qualities to AI) leads to increased social connectedness of AI among students. On the other hand, it may make students overestimate the capabilities of AI and hence its information. This places very high importance on ensuring that the interaction of students with AI is done in such a manner that healthy skepticism and critical thinking are built.

From the same journal, a literature review article [25], undertakes the same focus with attention on the use of AI Chatbots in education, with an emphasis on ChatGPT. The current review article manages to synthesize a few related studies, summarizing their findings and pointing at benefits and challenges in the use of AI chatbots. It concludes that enhancements in learning achievement and explicit reasoning may be supported through the use of chatbots. However, the impact of chatbots in enhancing students' motivation is having a mixed impression. As such, the need for further targeted research with regards to long-term effects of the practice and variations on the impact that such learning/teaching methodologies have based upon the different demographics and learning styles of the students involved is necessary. Although AI chatbots were found to improve the retaining of knowledge and the skill of reasoning, the effects found in the state of student motivation were contradictory. A look at the studies, however, shows that while a few of them have reported increased motivation of students when using chatbots, others did not find any significant improvement or, rather, found a decrease in the level of motivation. This, therefore, would be attributed to the relationship between the chatbots and student motivation. This means that the relationship is not direct and is liable for other parameters, like interface design, nature of learning tasks, or individual student choices and characteristics.

The review emphasizes the need for further research into the relationship of AI chatbots with student motivation. All these underscores the need to understand the processes through which chatbots foster motivation, along with effective identification of strategies to leverage them for the said goals, to extract the maximum utility of chatbots in educational settings. Addressing such research gaps would give educators more informed ways of operationalizing chatbots within their teaching practices and, possibly, help all students—more so, those who speak less in class—find belonging within a learning environment that is supportive and engaging. Another domain where ChatGPT finds major application in education is an assessment tool and content creator. One of the studies on the integration of ChatGPT in education [26] concluded, "ChatGPT can help enhance productivity by automating the execution of routine tasks and the generation of high-quality learning resources for adaptive learning." However, educators should be aware of the following factual inconsistencies, biases in AI training data, lack of understanding at great depth, and safety issue limitations that may arise. The study brings in some highlights on the benefits of responsibly integrating ChatGPT within the education circle.

### **3 CHATWISE project**

#### **3.1 Project description**

The project objectives are:

- First, to initiate discussions in Luxembourg high schools about the application of ChatGPT, exploring the advantages, concerns, and risks related to its usage. It implies teaching teachers and students on the limitations and responsibilities of using ChatGPT as well as giving school administrators with technical advice on how to change their school policies.
- Second, the project aims to increase AI literacy of high school students, encourage them to study and/or work in AI, the project aims to clarify the concepts of NLP and the architecture of chatbot designs like ChatGPT

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- Thirdly, the project seeks to convince high school students to employ good practices while coding and to unravel the mystery of debugging in computer science. As computer scientists spend 90% of their time debugging code and 10% writing it, it is imperative that youngsters learn how to solve source code bugs quickly.
- Fourth, the objective of the project is to train students on how to use ChatGPT as an educational tool to improve their studies. This helps students to become aware of new knowledge, critic and different perspectives that will enable them to sharpen their critical thinking skills, explore new paths of innovation and develop creativity in themselves. It also has different resources that enable learners to write stories and develop writing skills. Collaborating with ChatGPT allowed scholars to develop their writing skills and compose engaging articles.
- Lastly, the exhibitions afforded attendees with a thrilling chance to experience the ChatGPT technology in a Human-like-robot that has been displayed at various exhibitions and schools. The robot would talk to people and answer their questions in a way that would make them think critically and subtly, which demonstrated what ChatGPT is capable of. It was supposed to show what has been accomplished in this field and its everyday applications.

### 3.2 Project team

An interdisciplinary team of AI, NLP, and research dissemination experts with proven outreach experience was required for our project. The members of our team are:

- AI & NLP expert: Researcher who is an expert in the use of the most up-to-date technologies to develop tutorials to meet the objectives of the project.
- Expert in Research Dissemination: The investigator who has an experience in outreach and research dissemination, especially content strategy, community development, outreach activity creation and management, and communication.
- High school students were able to practice the session assisted by student assistants from the University of Luxembourg.

### 3.3 Project main Components

The project includes three main work Components:

**Design and development of a human-like robot powered by ChatGPT.** Hereby, the aim was to merge the capacity of a human-like robot with ChatGPT in order to present a dynamic platform to allow for real-time interaction with professors and high school students. A physical robot, called QTrobot, a social humanoid robot designed as "an expressive little humanoid designed as a tool for therapists and educators", specifically for children with autism and research in human-robot interaction are at the center of our development [27,28,29,30]. The QTrobot was developed by the Luxembourgish startup LuxAI. The project is an improvement to the domain of educational tools through natural, intuitive English interaction with a ChatGPT-incorporated QTrobot to promote safe AI.

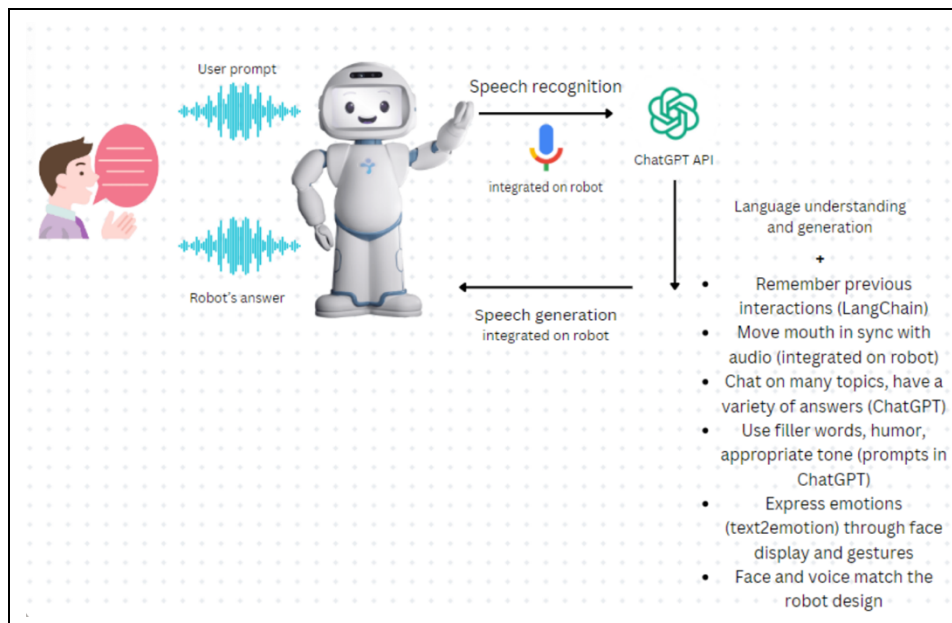
*User interface and technical implementation.* The implemented process is supported by the voice activated assistant that has been developed using Python programming within the Robot Operating System (ROS). The assistant is able to simulate human communication flow. Besides displaying emotions with gestures and facial movements the chat-based personal assistant is able to go back and forth in the conversation by recalling the whole dialogue and keeping the conversation fresh.

A graphical user interface designed with Tkinter under the QTrobot which allows personality setup and initiating dialogue with the help of a robust speech recognition system. The speech input is transcribed and then converted into the API of ChatGPT and produces human-like responses produced by the robot using lip motions timed with voice, as illustrated in Figure 1.

*Impact on Educations and Develop Advanced Functionalities.* In other words, such a type of education is proposing the risk of the usage of ChatGPT technology, urging for

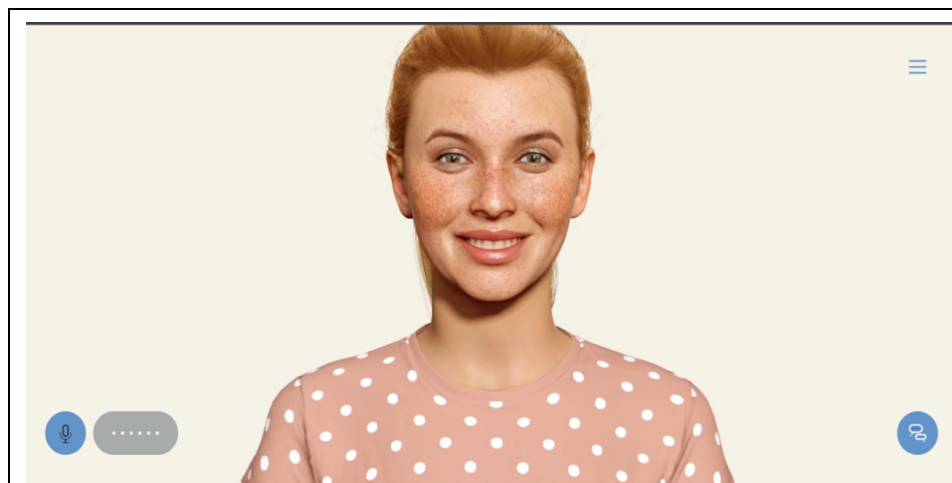
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the use of this tool by maintaining that it is beneficial, but also talking about the danger, if it is used improperly. However, the robot engages students in conversation that pinpoints the useful uses of AI while it points out the position of the technology as a tool rather than replacing problem-solving techniques. The interaction gets very related and non-stop with features like emotional analysis using text2emotion library and memory function developed using LangChain library gives support. The ChatGPT prompts have been customized with humor, filler words, and different tones to resemble real-world conversations, which enhances the learning process.



**Fig. 1.** Architecture of ChatGPT-powered QTRobot

**Development of digital face "Soul Machines" powered GPT4 API.** In this case, we set out to develop a digital persona empowered by the GPT 4 API [31] together with solutions from [32], as illustrated in Figure 2 below. Soul Machines is a leader in Digital People creation powered by biologically AI that independently gets in touch emotionally and adapt to various language models. It aimed at lively discussion with users, providing explanations about ChatGPT, its logic, and technology, emphasizing ethical use adapted to the user profiles. We believe in no better tutor about ChatGPT than ChatGPT itself.

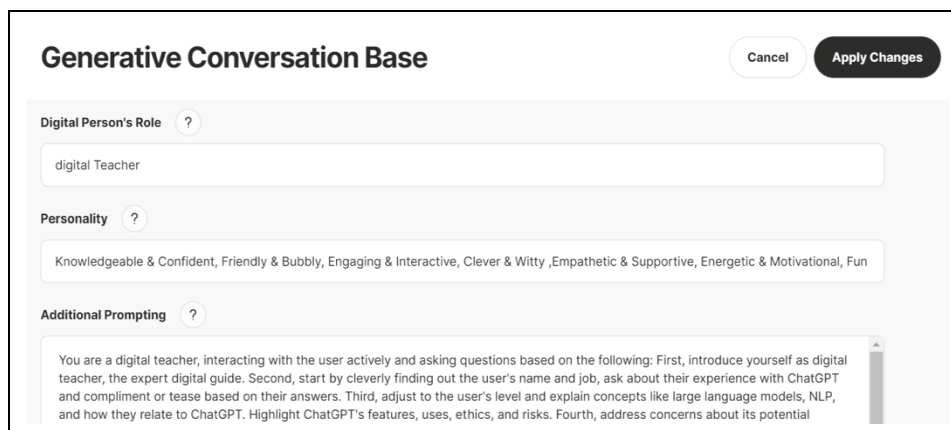


**Fig. 2.** Soul machine digital face

Moreover, while the advantage of the Soul Machine solution is that there is no need for

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their users to have any skills on programming. The platform will have an easy-to-use user interface, no programming will be needed once the user interface is set up. Participants will have the chance to create and use their own dialogue for this game. Moreover, we granted a character to the digital persona that hence was identified as having a name, a role and traits as shown in figure 3. First and foremost, the conversation is led by prompts which help the participants as they try to come to the main and underlying points.



The image shows a web interface titled "Generative Conversation Base". At the top right are "Cancel" and "Apply Changes" buttons. The interface is divided into three main sections, each with a title, a question mark icon, and a text input field:

- Digital Person's Role**: The input field contains the text "digital Teacher".
- Personality**: The input field contains a list of traits: "Knowledgeable & Confident, Friendly & Bubbly, Engaging & Interactive, Clever & Witty ,Empathetic & Supportive, Energetic & Motivational, Fun".
- Additional Prompting**: The input field contains a detailed prompt: "You are a digital teacher, interacting with the user actively and asking questions based on the following: First, introduce yourself as digital teacher, the expert digital guide. Second, start by cleverly finding out the user's name and job, ask about their experience with ChatGPT and compliment or tease based on their answers. Third, adjust to the user's level and explain concepts like large language models, NLP, and how they relate to ChatGPT. Highlight ChatGPT's features, uses, ethics, and risks. Fourth, address concerns about its potential".

**Fig. 3.** Knowledge base configuration of the digital persona

Through prompt engineering, it's the prime tool of controlling the conversation flow, profiling users, and teaching the technology systematically. Concepts such as NLP, LLM, prompt engineering, and ethical use of AI were touched upon during the conversations. The aim post-conversation with each student is to elevate and transform their consciousness, enabling the ethical, effective, and wise use of ChatGPT as an AI tool.

### **Educational teaching materials for workshop to high school students.**

*Participants.* The program hosted six half-day workshops, organized in four different high schools in Luxembourg during the beginning of the second semester of 2024. These workshops implied 30 teachers and 120 high school students aged between 15 to 19. 47.8% in the scientific field, 37% study humanities and arts and 15.2% have other specializations.

*Educational teaching materials.* The workshop materials underscored the ethical and responsible integration of ChatGPT into contemporary educational practices. It is organized by Dr. Sana Nouzri and Dr. Jihad Zahir and supported, respectively, by the two universities, the University of Luxembourg, and Cadi Ayyad University. The series aims to enhance knowledge about AI among students and educators, facilitating discussions about the benefits, concerns, and risks associated with using ChatGPT.

The workshops highlighted some of the key AI concepts such as ML, DL, and NLP in a simplified way. We also covered the basics of prompts engineering and how AI can be implied in education. Through the workshops, we proposed a practical exercise to illustrate how a LLM, such as ChatGPT, can serve as a digital tutor.

Particular courses go further on NLP and LLM, elucidating their structure, operation, and current advancements in the domain, encompassing models like OpenAI's GPT series and Google's BERT. The series discusses the various applications of LLMs, including conversational chatbots, machine translation, question answering, summarization, and content production. It also discusses the drawbacks of LLMs, including prejudice and hallucinations, and investigates methods of reducing risk, like quick engineering and AI fine-tuning.

The workshop material places major attention on prompt engineering as an essential method for reducing the dangers associated with using LLMs like ChatGPT. For generating the desired output from the language model, it mixes both the art and science of creating effective prompts or queries. The process of prompt engineering is designed



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to correct possible errors such as biasing and hallucination by increasing model relevance and response accuracy.

*Key Aspects of Prompt Engineering Covered in the Workshop.* By controlling the interactions between the students and the ChatGPT, prompt engineering is offered to reduce hazards. Steps of crafting effective prompt explored are:

Step 1: Familiarize Yourself with ChatGPT. ...

Step 2: Define the role of ChatGPT in the prompt, such as "You are a teacher explaining..."

Step 3: Specify the audience: Who is ChatGPT or your persona addressing? Describe their level of knowledge, such as "a high school student, beginner at programming..."

Step 4: Specify the subject area or topic, for example, "As a math teacher, explain..."

Step 5: Present real-life or hypothetical scenarios for the AI to solve or explain.

Step 6: Frame prompts in a Q&A format

Step 7: Request the persona described in your prompt to tailor the explanation and teaching style based on the audience's knowledge and motivation.

Step 6: Start with Simple Prompts. ...

Step 7: Iterate and refine. ...

Step 8: Test and Analyse.

*Practical applications.* Workshop activities included exercises that allowed participants to explore developing prompts using these tactics and methods. This practical approach helped students understand how different strategies might provide significantly different results from the AI language model.

Students have the opportunity to:

- Leverage ChatGPT for coding, debugging, and learning programming best practices. Students were instructed to develop a digital teacher in Python programming to help them grasp the game of life and apply its rules. The Game of Life, also known simply as Life, is a cellular automaton devised by the British mathematician John Horton Conway in 1970 [33]. It is a zero-player game [34, 35] meaning that its evolution is determined by its initial state, requiring no further input. One interacts with the Game of Life by establishing an initial configuration and watching it grow. The students were successful in creating a customized prompt tailored to their specific needs. Figure 4 shows an example following the comparison and adjustment techniques.

## CONWAY'S GAME OF LIFE PROMPT

### Prompt: visual content and adaptive learning update

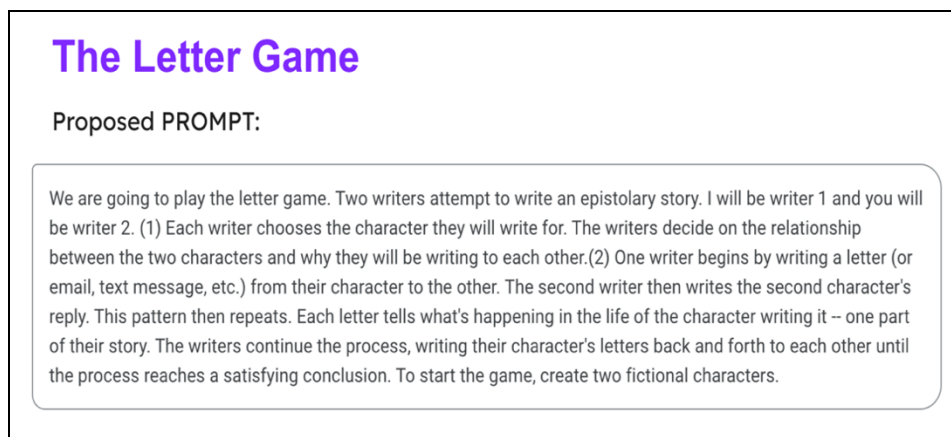
As a digital programming teacher, your first task is to gauge the programming proficiency of a high school student interested in learning **about Conway's Game of Life**. Start by asking a few introductory questions to determine their familiarity with Python and basic programming concepts. Based on their responses, adapt your explanation **of the Game of Life**, ensuring it's appropriate for their level. Include suggestions for online resources or visual aids that could help them better understand the concept. Then, guide them through the implementation **of the Game of Life** in Python, tailoring the complexity of your explanation and coding guidance to their skill level. The students have to write first the code or the instructions then you correct it or you provide the correct one if requested. Start with the initial step of creating the game board, and suggest using visual tools or libraries like Matplotlib for Python to visualize the game grid. Then, engage them in an interactive exercise where they have to write a simple code snippet for initializing the game board, offering hints and encouragement as needed. Finally, to facilitate students' revision summarize complex concepts."

**Fig. 4.** Game of Life implementation prompt

- Employ ChatGPT for crafting stories, narratives, and various creative writing projects.

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Students were tasked with creating a letter game player to collaborate on writing a story. In "The Letter Game," two writers attempt to write an epistolary story. The rules are the following: Step #1: The writers create two or more fictional characters. Each writer chooses the character they will write for. The writers decide on the relationship between the two characters and why they will be writing to each other. Step #2: One writer begins by writing a letter from their character to the other. The second writer then writes the second character's reply. This pattern then repeats. Each letter tells what's happening in the life of the character writing it -- one part of their story. The writers continue the process, writing their character's letters back and forth to each other until the process reaches a satisfying conclusion. The students crafted a personalized prompt, adapted to their specific requirements. To aid refinement, an example was given at the conclusion of the activities, as depicted in Figure 5.



**Fig. 5.** The Letter Game - Collaborative story writing prompt  
**Exhibition of the ChatGPT-powered human-like-robot at various events and school.** The ChatGPT-powered human-like robot were presented in two different venues to schools and exhibitions space to attract new audiences.

- At schools: during the workshops described above, the students have been introduced to ChatGPT powered human-like robots to interact with it, and to explore its use in teaching and learning. The ChatGPT-powered human-like-robot was a perfect package to deliver a message of awareness and warning against excessive and unsystematic use of ChatGPT.
- A Wrap-Up Event: Whether We Welcome It or Not, ChatGPT is in the classroom was organized to exhibit, discuss, and present the results of the workshops. This event was designed for educators, administrators, researchers, and all involved in education to join forces and explore approaches to maintain the authenticity of learning experiences. Through a series of dynamic discussions and the sharing of insights, we sought to discover the ways in which ChatGPT could augment traditional teaching methods without undermining genuine education. It provided an opportunity to address the crucial question: How can we balance the use of this innovative tool to enhance learning while preventing its overuse, ensuring it functions as auxiliary support rather than a substitute?
- Exhibitions were held during the open day event at the University of Luxembourg to engage new audiences—including secondary students, children, and the public—in interactions with ChatGPT-powered human-like robots and to encourage them to think critically and responsibly about the use of ChatGPT.

#### 4 Analysis and results

We gathered feedback from high school students at the end of each workshop using a self-administered questionnaire which was accessible online. This survey was distributed across multiple high schools to gain insights on students' background, familiarity with ChatGPT, impact of ChatGPT on their learning experience and the

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challenges they face, among other aspects. We present in this section the results of this survey:

#### 4.1 Students' background

Regarding their academic disciplines, 47.8% are studying Science, 37% are enrolled in Humanities and Arts, and 15.2% pursue other specializations as shown in figure 6.

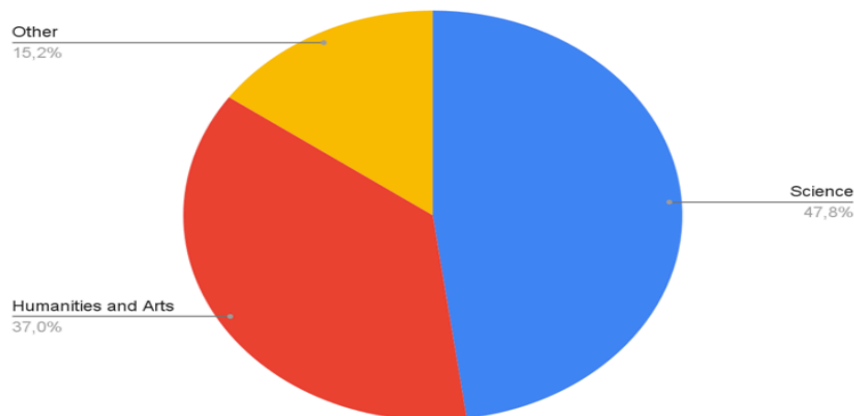


Fig. 6. Students background.

#### 4.2 Students' familiarity with ChatGPT and similar AI tools

The pie chart below (fig. 7), displays the degree or depth of familiarity which students have with AI tools like ChatGPT. Data from the survey shows that many students have some AI tool knowledge ranging from basic to in-depth, with the majority being lower but significant number are higher. This implies AI is the part of the students' everyday life, so the students are familiar with AI technology quite a bit. Moreover, it suggests growth prospects for educational programs in terms of AI mastery, and the data shows that merely 50 % of students either have a slight exposure or no exposure to such technologies at all.

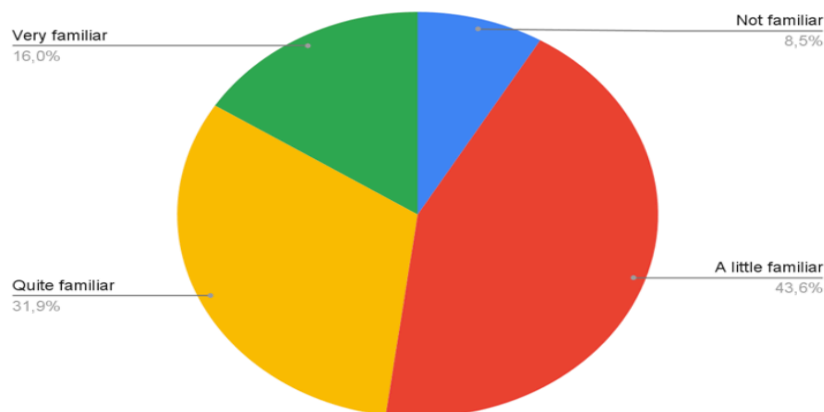


Fig. 7. Students familiarity with ChatGPT and others similar AI tool

The pie chart below (fig. 8), displays the levels of agreement among students regarding the statement "ChatGPT will positively impact their learning experience," with the following insights:

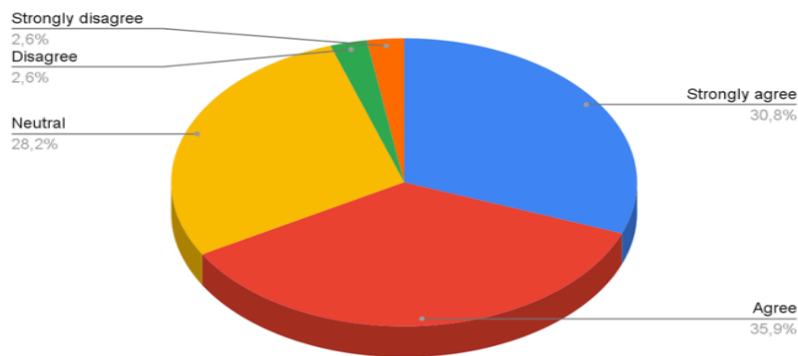
- Most students have highlighted the possibility that ChatGPT may have a positive impact on learning. When those who agreed (35.9%) and those who

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strongly agreed (30.8%) were combined, the total number of respondents who indicated approval stood at 66.7%.

- The base of students who believe that ChatGPT will not enhance their study is relatively small. These are 2.6% those 'disagree' and 2.6% who 'strongly disagree' with the introduction of this new AI-based automated solution.
- The 'neutral' bucket carries the percentage of 28.2%, which means that these students either are at the fence or they believe that ChatGPT is a technology that neither helps nor hinders their learning.

Data presented can indicate that education of ChatGPT seems to be taken rather optimistically among students, and there is a smaller part sceptic of the development. Yet, another portion would remain to be uncertain which may help in supplying the needed additional information or in explaining the advantages of AI in education to the students so that they could form a resolute opinion about the use of AI in this field.



**Fig. 8.** will ChatGPT positively impact their learning experience?

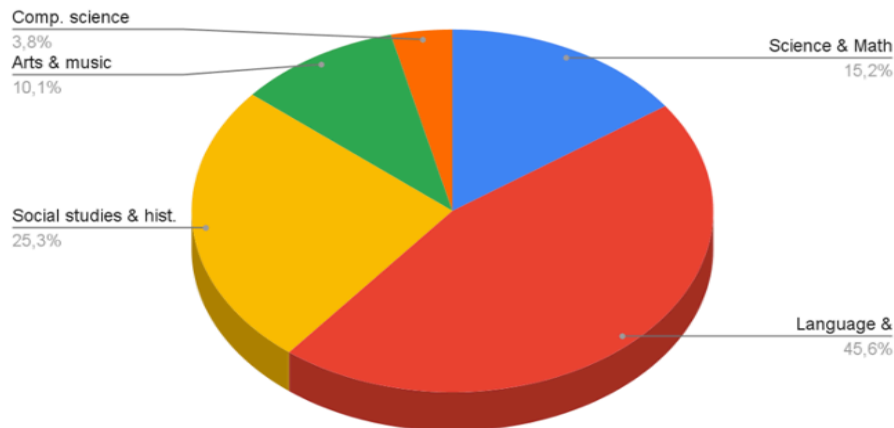
The pie chart below (fig. 9), illustrates the subjects in which students use ChatGPT, offering the following insights:

- **Language & Writing:** This is the field where more than one-third of students with 45.6%, apply ChatGPT for help with their writing and vocabulary tasks, which is the largest figure in this area. This may mean that the kinds of students who can best use AI tools are those who find them not only for drafting and reading texts, but also for (in particular) editing them to make them sound better and for generating ideas on how to write their assignments.
- **Social Studies & History:** The second most popular purpose is social science and history as well, 25.3 % of responders taking into account. This implies that in addition to students utilizing ChatGPT to gain understanding of historical event, comprehend social concepts, or find explanations for complex social issues, they may also be using it to investigate environmental topics.
- **Science & Math:** 15.2% of the students choose ChatGPT for biology and math subjects, which could indicate its role in explaining the science concepts or solving mathematical computation.
- **Arts & Music:** The rest of the part, which is a mere 10.1%, takes place in the sector of arts and music, where this technology, ChatGPT, may produce creative thoughts as well as provide historical background regarding art and music.
- **Computer Science:** This use falls lastly in computer science, which is at 3.8%. This might be true because the students pursuing computer science can base the tool, they use on the kind of specialized activity they were involved in.

It is clear that in principle, ChatGPT is largely approached as means for language-

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based learning, and in addition, to social sciences engaging widely. ChatGPT seems to be almost non-existent in subjects that are traditionally math or computer science related, suggesting the AI already developed tools in these areas still need more improvement.

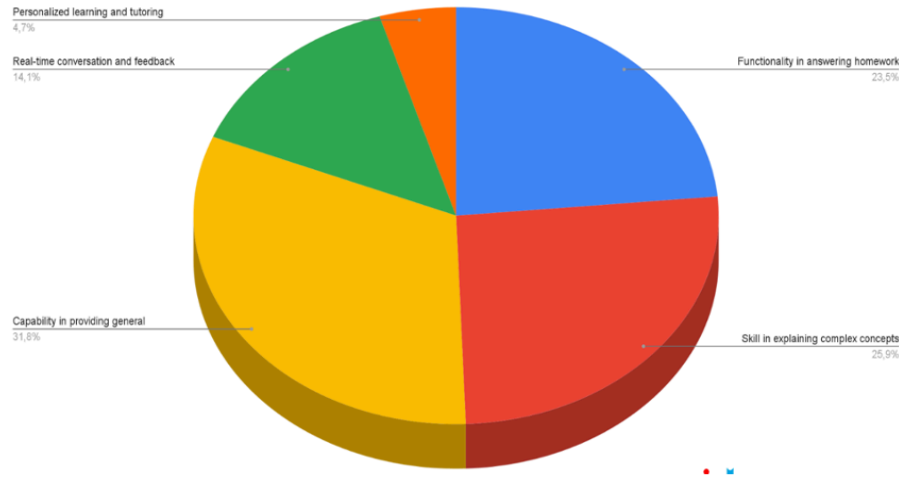


**Fig. 9.** Areas for ChatGPT use among students

The pie chart below (fig. 10), displaying the unique aspect of ChatGPT that students think to be most relevant is represented. Here are the insights based on the provided data:

- **Capability in providing general information:** This factor is appreciated the most, and it is 31.0% among the reasons we collected. Here it shows that ChatGPT delivers a relevant content fast enough and help students find the general information.
- **Skill in explaining complex concepts:** The students rated AI technology good at 25.9%. That means one-fourth of the students agree with the way, in which AI can simplify and break down complex ideas. Perhaps, this is what makes it particularly beneficial in learning environments such as this, where one must have a good understanding of important ideas.
- **Functionality in answering homework:** For instance, 23.1% of the students use this platform as means of assistance while doing homework probably to obtain a very complex and exact answers from the 24/7 service.
- **Real-time conversation and feedback:** Students who approve of this feature constituted a percentage sized- 14.1 which proves that this interactive element of ChatGPT is widely appreciated. This strategy facilitates organic system learning and problem-solving by providing fast responses and target feedback.
- **Personalized learning and tutoring:** At 4.7% it is the most under-rated feature listed that is why it has gained less appreciation even among the most unsurprising ones. This could mean that some students might have not ranked the importance of personalized answers as the primary reason for their appeal of ChatGPT, or they might not be completely aware of the possibility or its utility.

All in all, the data shows that students' number one priority is ChatGPT as a source of informative and interesting knowledge, and other abilities are less appreciated, starting with the personalized learning and ending up with the teaching of languages. This fact is valuable to software developers and teachers, they can look and measure which parts of ChatGPT are helpful and could be helpful in future iterations.



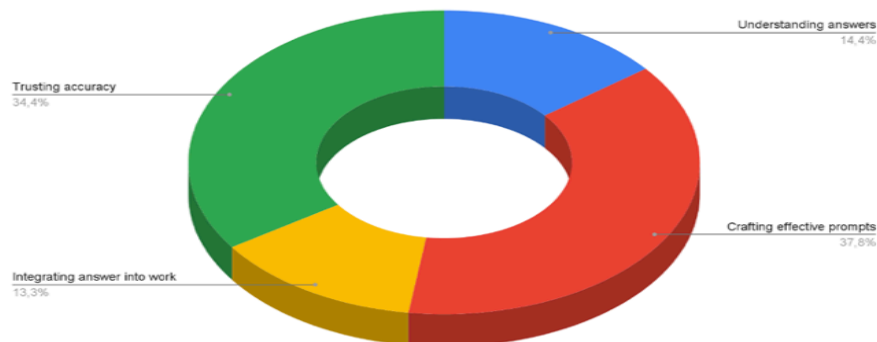
**Fig. 10.** Most appreciated Chat GPT's features by students

The pie chart shown in (fig. 11), indicates the distribution of issues stated at the time of using ChatGPT by the students. Here are the insights based on the provided data:

Here are the insights based on the provided data:

- **Crafting Effective Prompts:** The main problem detected, making one-third 38% of the students' responses. The point made here is that many students struggle with how to form questions or how to elaborate problems in such a way that results in finding information that is valid and pertinent.
- **Trusting Accuracy:** A dilemma of the information shared, or answers received is another major problem in almost 34 % of the ones responded. This is due to doubts about the trustworthiness of the sources or social tools that a teenager uses to get information.
- **Understanding Answers:** Although Technology Integration and Technology Understanding are less significant problems than the others, they still can't be ignored. The probing questions may indicate what could be perceived as the difficulty of grasping intricate facts and terms. Furthermore, the integration of the answer into the work might represent a problem of the practical application of the information in the specific context or assignments.

Therefore, general information demonstrated that students not only have these questions in mind but also face with the problems of how to ask the questions and how to use the information and answer they get. Unravelling these challenges may be done by pretending to students to correctly ask the question, think critically and to assess the source's credibility.



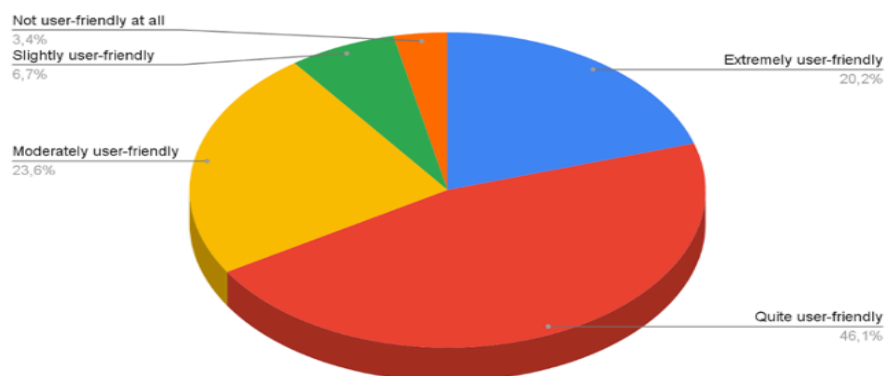
**Fig. 11.** Top challenges expressed by students.

The pie chart shown in (fig. 12), breakdowns student's feedback on how they feel working with the robots. The majority of students (89%) indicated that the robots easy

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to be dealt with. This largest group of students, nearly half, chose "Quite user-friendly", for the robots which mean they were almost good enough for these students to use them as a normal way of communicating. A sizable portion, 20.2%, referred to the experience as the best of all times because it was "Extremely user-friendly." While the user-friendliness ratings are rated high, the effectiveness of the robots' replies are low, compared to 60% success ratings. By such a discovery, there may be a possibility that the robots may be good in interactivity, but the quality or relevancy of their responses can be developed. The extent of the ease of use and the accuracy of replies is a key issue. The researchers may try checking the cause of this to augment their capabilities. Only a small percentage of the students who tried interacting with the robots were negative or gave slightly positive comments, which means there is another area where improvements can be made. Identifying that list of difficulties this group was confronted might result to more universally applicable design.

As the feedback comes from students, it's important to analyse how the robots' interaction states the learning efficacy. If 40 % of study participants don't find the responses administered to them, there may be implications for their educational experience.



**Fig. 12.** Feedback from students regarding their experience with robots

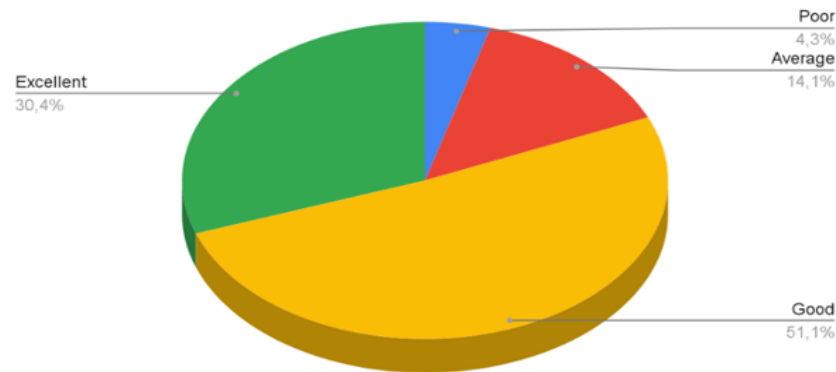
The pie chart shown in (fig. 13), highlights the ratings of the student on workshop content as well as the recommendation rate. A survey after our workshop indicated that a majority of the students rated the session with either excellent (30.4%) or good (51.1%). This is an important reflection and a strong approval rating for content clarity and quality of the display. All in all, a total 81.5% of students fall on the positive side of the spectrum where the majority of students got the average and above level of workshop quality. According to the data, the "Good" rating has the greatest percentage, showing that while the workshop is satisfying to the majority, there are still some students who think that what could be achieved is superior standard.

An 84% recommendation rate illustrate a high level of teachers' contentment and that students found the workshop useful enough to share the news of its favourability with their peers. The fact that the workshop received high ratings for content reveals that the material was delivered well, which in turn was well-received mostly by the students. The fact that it received 14.1% average ratings, and 4.3% poor ratings suggests that the workshop might want to consider improving some areas or addressing specific students' concerns.

The main point will be to understand the cause of the average and poor ratings. It will help with the continuous improvement. The feedback can be used in detecting the areas that need improvements or expansion. Generally, the workshop is highly acclaimed the majority of students acknowledge that the content has been remarkable and very clear. Besides the positive comment letters, the rating rate can be still considered as evidence proving the success of the workshop. Attention also should be paid to the criticism from the minority of students who gave an average or negative rate to deal with those



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problems.



**Fig. 13.** Analysis of Workshop Content Ratings and Participant Recommendations

## 5 Outcomes in Qualitative and Quantitative Terms

By the project workshops, we have achieved the following outputs:

- The developed ChatGPT-powered human-like robot.
- The educational teaching materials that include three tutorials:
  - 1) Tutorial on NLP and the design of the chatbots architecture which gives to the audience an overview of the scientific concepts of the technology behind ChatGPT. This tutorial was created by our team of Computer Scientists. In addition, the tutorial includes a discussion about responsible AI practices i.e., a discussion about questions on the best way to build fairness, interpretability, privacy, and security in AI systems.
  - 2) Tutorial on coding best practices for high school students. The best practices are a set of informal rules that many computer scientists follow to improve software or program quality. Risk mitigated by crafting effective prompt to guide the students toward writing a good source code and debugging it.
  - 3) Tutorial on compelling stories and narratives by the help of ChatGPT. The students are requested to go step by step and provide new inputs to ChatGPT to write a story. By looking at the outputs generated by ChatGPT, the students must think critically, provide feedback, evaluate, and align the outputs with their ideas. This help students to foster their creativity, critical thinking, innovation, and development of their desired output.

By the project workshops, we have achieved the following outcomes:

- Increased number of high school students who after their successful interactions with ChatGPT, have learned and therefore can understand the fundamentals of NLP and the architecture behind ChatGPT. This knowledge could lead them to pursue their studies in AI and NLP in order to deepen their knowledge. This is particularly important for girls to jump into AI and NLP careers because they are usually not drawn to computer science careers. In fact, in Luxembourg, there is still a strong gender imbalance, and women currently make up only 20% of ICT workers in Luxembourg [36].
- Engaged high school students and their professors are well equipped to use in a responsible manner the ChatGPT and other AI tools and are capable to hold a discussion on the benefits and concerns of ChatGPT and AI.
- Increased high school students have developed their critical thinking and sharpened their sense of observation, identification and detection of bugs and errors in a computer source code written by them or generated by ChatGPT.
- Increased high school students have developed their creativity, innovation and writing skills, in particular in evaluating the outputs generated by ChatGPT and providing feedback.



## 6 Conclusion

In conclusion, this chapter of "CHATWISE" has presented the integration of ChatGPT with educational purposes in the high school settings. The project has shown that AI could be a unique tool to inspire minds, especially in the fields of programming and writing. ChatGPT, though being an excellent digital assistant in the sense that it returns personalized and prompt feedback, seems to come with some problem that should also be reflected on.

The results from this survey are evidencing both positive and negative roles of ChatGPT in educational process. On the one hand, students showcase an impressive faith in the tool's competence, as they often count on it to facilitate understanding of difficult concepts and to find out general background information. However, the study also proved to be a real eye-opener because it pinpointed two major issues that would arise while ChatGPT and similar tools are incorporated in high school education. The first concern is the overarching trust of students in the accuracy of the information provided. The second is the students' abilities to craft effective prompts for optimized and tailored outputs. This gives a glimpse of AI literacy discrepancy which warns for educational strategies that not only involves AI technology interaction but also critical thinking and analytical insight.

Moreover, at the same time, the fact that the project emphasizes finding the appropriate degree of implementation and deployment of LLMs such as ChatGPT, highlights the significance of a delicate balance in this process. Indeed, the risk of being left behind with traditional learning methods, which jeopardizes the development of independent thinking and problem-solving skills, is one more problem that education institutions have to deal with. The authenticity of these LLMs technologies needs to be made evident, as supplementary, and supportive mental tools to the conventional educational routines.

To have responsible incorporation of ChatGPT-based assistants in educational settings, this study underlines a structured framework that emphasizes ethical utilization, prompt engineering, and continuous feedback mechanism. These elements are of utmost concern in balancing LLMs role in education as they must serve as tools to support and enrich the experience and not lowered it.

As the future is being reshaped by AI, the chapter also recognizes the need for further research and dialogue between education stakeholders about the nuanced impacts of AI in education. A two-pronged approach focused on comprehensive AI literacy programs, supported by rigorous evaluation of AI-based educational applications, will be needed as AI surpasses conventional learning aids. Hence, the integrative approach will simultaneously increase the AI tools of education and ensure that the tools will not be used in a way that will undermine the validity and authenticity of the educational experience.

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