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Education for environmental sustainability: policies and approaches in European Union Member States

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Education for environmental sustainability: policies and approaches in European Union Member States

Final Report

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1. Introduction

The European Green Deal[1] and UN Sustainable Development Goals (SDGs) highlight that education, including re-/up-skilling, is crucial in order to transition to environmental sustainability. Education has an essential role to play by supporting citizens in developing the competences needed to live responsibly, change consumption models, design solutions, transform society and shape a green economy. In the context of the EU's efforts to promote a sustainable and green Europe, the purpose of this study is to map EU Member States' national and institutional practices, processes, tools and strategies in education for environmental sustainability (EES) at various levels and in different forms of education. The study will help inform the actions of the European Commission with regard to education for environmental sustainability and policy for the implementation of the European Education Area[2] and the European 'Green Deal'.[3]

To date, no such comprehensive comparative analysis has yet been carried out on the delivery of education for environmental sustainability in the EU. The '*Evaluation report on the implementation of the UN's Economic Commission for Europe (UNECE) Strategy for Education for Sustainable Development from 2005 to 2015*'[4] and the '*Fourth evaluation report of the UNECE Strategy for Education for Sustainable Development*'[5] provide some information on Education for Sustainable Development (ESD) initiatives. These UNECE reports have a wider focus, however, and lack complete coverage of the Member States during different reporting periods. This study[6] contributes to closing this evidence gap by providing a more comprehensive overview of what is happening in the EU.

The specific purpose of this study is to provide a **comprehensive mapping** of the national and institutional **practices, processes, tools and strategies in education for environmental sustainability**. It covers multiple levels and types of education. More specifically, the study aims to look at:

- Existing competence frameworks and thematic dimensions of EES;
- Policies, curriculum developments and innovations around EES;
- Assessment, teacher training and multi-stakeholder partnerships;
- Enablers of and barriers to the mainstreaming of existing innovative approaches.

1 The Council of the European Union (2019).'Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social committee and the Committee of the Regions: The European Green Deal COM/2019/640 final'. 11.12.2019. Brussels.

2 The Council of the European Union (2019). Council Resolution on a strategic framework for European cooperation in education and training towards the European Education Area and beyond (2021-2030) (2021/C 66/01). 26.2.2021. Brussels.

3 The Council of the European Union (2019).'Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions: The European Green Deal COM/2019/640 final'. 11.12.2019. Brussels.

4 UNECE, 'Ten years of the UNECE Strategy for Education for Sustainable Development: Evaluation report on the implementation of the UNECE Strategy for Education for Sustainable Development from 2005 to 2015'. UN: Europe.

5 UNECE (2020). Information paper no. 2 Learning from each other: achievements, challenges and ways forward. Fourth evaluation report of the UNECE Strategy for ESD. Available at:
https://unece.org/fileadmin/DAM/env/esd/6thmeetsc/Informal%20Documents/phaseiiprogressreport_IP.8.pdf

6 This study was a joint effort by the Public Policy Management Institute (PPMI), www.ppmi.lt, and European Schoolnet (EUN), http://www.eun.org

1.1. Understanding key terms and concepts

Education for environmental sustainability can be understood as education that makes students aware of, sensitive to, and knowledgeable about the environment and its interconnectedness to social and economic systems, while encouraging them to develop attitudes of concern and motivation, as well as practical, complex systems and critical thinking skills to identify and solve environmental problems. Education for environmental sustainability is closely related to **environmental education, education for sustainability, sustainability education, ecological education, global citizenship education,** to the thematically narrower **climate change education**, and to the broader concept of **education for sustainable development (ESD)**. ESD has been integrated into most education systems in Europe and is understood as a tool to empower students to become thoughtful about and responsible for their actions and impact on the environment, economy and society. This involves considering not only the present consequences, but also those for future generations[7]. In this study, the concepts of education for environmental sustainability and ESD are used interchangeably, as the environment is central to all social and economic life.

While understandings of and practices concerning ESD may vary, most definitions rely on a common understanding and acceptance of the term 'sustainable development'. The most widely used definition of ***sustainable development*** *(SD) is the one developed in the Brundtland report* 'Our Common Future'*. According to this, SD is "development that meets the needs of the present without compromising the ability of future generations to meet their own needs". (*Our Common Future*, 1987, 43).*

Like ESD, education for environmental sustainability is strongly linked not only to the environmental, but also to the economic and social dimensions of sustainability. This study focuses to a greater extent on the environment, viewing it in the social and economic context, and considering the holistic competences necessary for sustainable development.

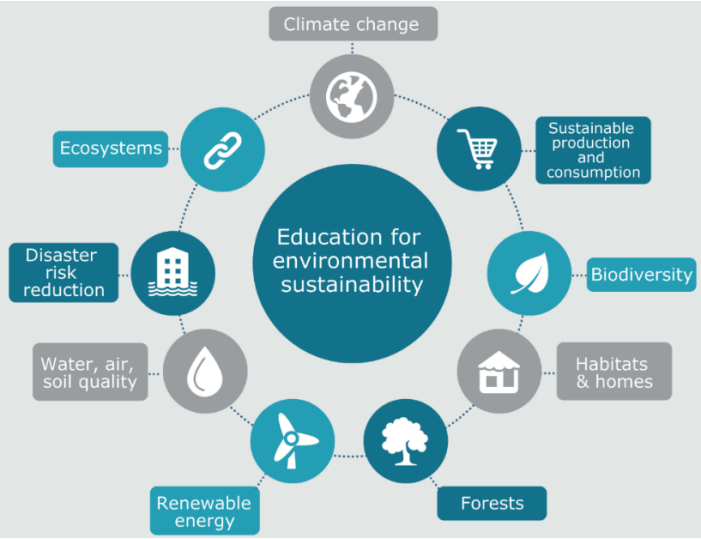
Thematically, education for environmental sustainability covers a broad range of topics and themes (which include environmental concepts, topics and issues). These range from **climate change; biodiversity; habitats and homes; ecosystems; water, air and soil quality; and forests,** to **sustainable consumption and production; renewable energy; disaster risk reduction; food** and other related themes.

From the themes indicated above, education on **climate change** and **biodiversity** is already well established as a research object in academic works. Climate change education aims to explain the consequences, causes of and solutions to global warming. It promotes attitudes and behaviours that help people to adapt and be resilient, using various adaptation and mitigation approaches.[8] Climate change education focuses on improving climate literacy among young people through innovative teaching approaches to changes in average climatic conditions both locally and globally through formal, non-formal and media education. **Biological diversity** or 'biodiversity' is another key topic in education

7 UNESCO Education Sector, 'Education for Sustainable Development Goals – Learning Objectives'.

8 Mochizuki Y, Bryan A. (2015). Climate Change Education in the Context of Education for Sustainable Development: Rationale and Principles. Journal of Education for Sustainable Development, 9(1):4-26. doi:10.1177/0973408215569109

for environmental sustainability. It is defined as the diversity of all living forms at different levels of complexity: genes, species, ecosystems, landscapes and seascapes[9].



Other noteworthy thematic areas within education for environmental sustainability are issues such as **sustainable production and consumption; renewable energy; clean water and sanitation,** and **sustainable cities and lifestyles.** The first of these aligns closely with the concept of sustainability, but focuses on the circular economy, the consumer society and global value chains. This is essential to ensure that young people become responsible citizens and consumers. The last of these thematic areas also focuses on the inseparable components of environmental sustainability, but from the perspective of urban planning and energy.

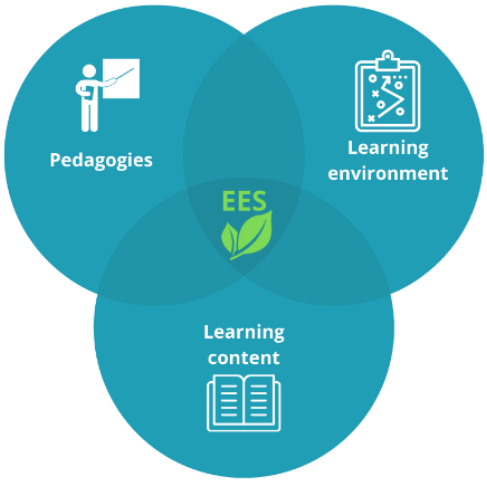
While these are some of the prominent topics with education for environmental sustainability, the concept goes beyond the specific thematic areas with which it may be identified. Research suggests that sustainability **should not be viewed as a topical subject exclusively, but an inter-disciplinary issue.** As such, it should be less defined by the themes it addresses than by the styles of thinking, knowledge, values and attitudes it embraces[10]. This study, therefore, recognises that all topics and sustainability goals are important and interconnected. It emphasises that they should be approached holistically, not simply as individual environmental concepts and sustainability goals, but by regarding sustainable development as an overarching and holistic concept.

Given its intersecting and inter-disciplinary nature, education for environmental sustainability relates to all SDGs. Just like the SDGs, EES is linked to environmental, economic and social sustainability dimensions. While it has natural links with the SDGs that focus on environmental aspects of sustainability (SDG 12, 'Responsible consumption and production'; SDG 13, 'Climate action'; SDG 14, 'Life below water'; and SDG 15, 'Life on land') education for environmental sustainability is just as closely related to other goals – for example, SDG 6, 'Clean water and sanitation'; SDG 7, 'Affordable and clean energy'; and SDG 11,

9 European Commission. Mapping and Assessment of Ecosystems and their Services in the European Union (MAES). 2014, Publication Office of the European Union. doi:10.2779/77667.

10 Redman, E., Wiek, A. & Redman, A. (2018). Continuing Professional Development in Sustainability Education for K-12 Educators: Principles, Programme, Applications, Outlook. Journal of Education for Sustainable Development 12(1), 59–80. Doi:10.1177/2455133318777182

'Sustainable cities and communities'. In addition, EES is connected with the SDGs that focus on economic or social sustainability, such as SDG 2, 'No hunger'; SDG 3, 'Good health and well-being'; and SDG 8, 'Decent work and economic growth'. Of particular importance is the link between EES and SDG 4, 'Quality education' – particularly target 4.7: "Ensuring that all learners acquire the knowledge and skills needed to promote sustainable development".



Recognising the importance of intersecting and interconnected issues and holistic approaches, this study highlights that education for environmental sustainability should be a comprehensive education that closely follows learners through all phases and stages of education and takes place in a supportive environment and culture for learning. This is particularly important, as education for environmental sustainability should build a critical way of thinking in which knowledge is only one of the components, and comes together with the attitudes, values and skills needed for sustainable change, as well as promoting sustainability competences. **School/institution culture** is just as important to successful education for environmental sustainability as comprehensive and contextualised **learning content**.

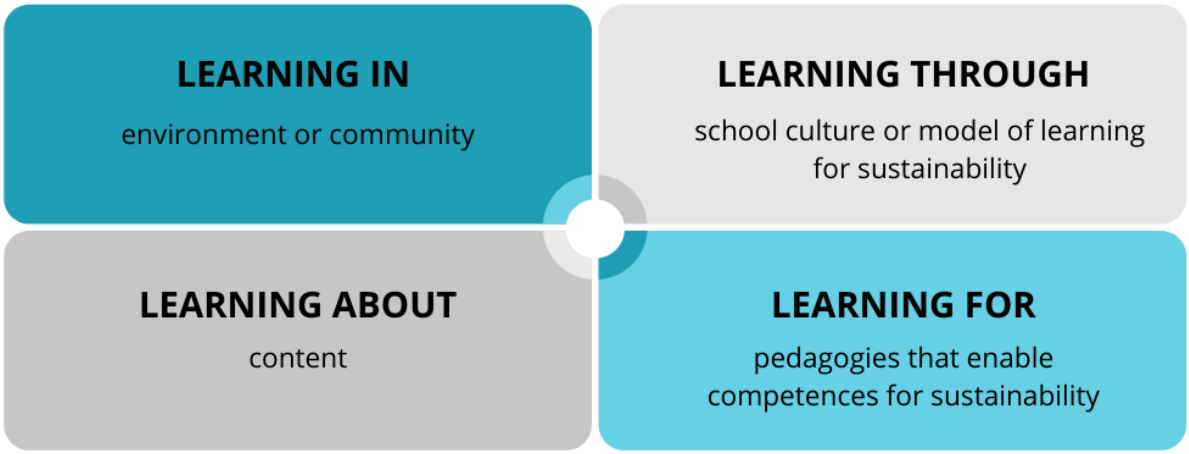
Lastly, **pedagogy** (designing teaching in a way that it enables exploratory, action-oriented and transformative learning) and **learning environments** (designing lessons physically or online that inspire learners to be committed to, and act for, sustainability) matter too. In addition to content (learning 'about'), learning should occur 'in' the environment studied, 'through' a supportive culture, and should foster behaviours 'for' environmental sustainability[11]. This requires learning to occur along **three dimensions**: cognitive (relating to knowledge, understanding and critical thinking); socio-emotional (relating to a sense of common humanity, values and responsibilities, empathy, solidarity and respect); and behavioural (relating to skills development). This should occur in **a supportive institutional environment and culture**, in which students learn what they live.

To achieve these aims, education for sustainability involves **various actors and cross-curricular approaches** rather than traditional discipline-based education, to encourage collaboration and creative real-world problem-solving. Successful education for environmental sustainability entails the involvement and leadership of institution staff. It requires the quality professional training of educators and school leaders, as well as opportunities for continuous professional development. Infrastructure plays an important role: sustainable campus management, green spaces, as well as the incorporation of innovative practices and teaching facilities, are all part of education for sustainability. Lastly, education for sustainability promotes the collaboration of early childhood education and care (ECEC), schools and higher education institutions (HEIs) with communities and

11 UNESCO. (2020). Education for Sustainable Development. A Roadmap. #ESD for 2030. Paris, UNESCO. (Available at https://unesdoc.unesco.org/ark:/48223/pf0000374802)

businesses. Taken together, these components create **a whole-institution approach** that is vital to the comprehensive delivery of education for environmental sustainability.

Figure 1. The four dimensions of learning in education for environmental sustainability.



Source: PPMI, Inspired by Delors, J (1996). Learning, the Treasure Within: Report to UNESCO of the International Commission on Education for the Twenty-First Century. Paris: UNESCO

Education for environmental sustainability from a lifelong learning perspective

All educational institutions – **from early childhood education to tertiary and adult education** – have a role in fostering the development of sustainability competences. Formal education can play a particularly strong role in mitigating climate change, as well as responding to its impact. Schools, training institutions and universities are well placed to engage with pupils, parents and the wider community with regard to the changes needed for a successful transition[12].

Evidence suggests that promoting sustainability competences and behaviour should start from a child's very early years. The benefit of starting early is confirmed by research that shows how the foundations for knowledge construction, as well as for attitudes and values, are established in the early years[13]. Childhood nature experiences and exposure to pro-environmental social norms from an early age have been proven to be related to the adulthood development of a connectedness with nature, ultimately influencing sustainable choices in future[14]. Preschool offers a wealth of opportunities to actively engage children and parents in a process of wonder, paying close attention to the living world around us, and developing the capacity to care for it[15]. To ensure the continuity of education, and to strengthen the learning foundations acquired at ECEC level, students should continue to develop sustainability competences in schools and VET. At primary and secondary school, the formation of children's values and habits can still be positively influenced for life. For example, research finds that in schools in which learning around sustainability

12 The European Green Deal.

13 Pramling Samuelsson, I. (2011). Why We Should Begin Early with ESD: The Role of Early Childhood Education. International Journal of Early Childhood, 43(2), 103–118. doi:10.1007/s13158-011-0034-x

14 Molinario, E. et al. (2020). From childhood nature experiences to adult pro-environmental behaviors: An explanatory model of sustainable food consumption. Environmental Education Research, 26(8), 1137–1163. doi:10.1080/13504622.2020.1784851

15 Sobel, D. (2020). Foreword. In: Meier, D.R. and Sisk-Hilton, S. (Eds.), Nature Education with Young children integrating inquiry and practice (pp. xiii-xvi; 2nd edn). New York: Routledge

competences is prioritised and integrated into the way of life at the school (e.g. through the environment being used actively for learning), children develop both applied knowledge and intrinsic motivation to protect the environment[16]. VET can take on the role of developing these skills, leading to students choosing work in the green economy, or simply teaching them a preference for using materials in construction and life that are more natural and sustainable. School and VET can also teach students practical skills in relation to sustainability – be it forest preservation, making sustainable life choices, or approaching policymakers. These are crucial to developing the action competences that sit at the heart of sustainability. In group work, students have further chances to develop skills that are strongly linked to sustainability competences, such as collaboration, problem-solving and critical thinking, especially if these are approached inclusively by the teacher and school.

Higher education plays an essential role in conducting research to find solutions to complex problems. It can also support and engage with local communities, create initiatives that make campuses more sustainable and, importantly, offer pre-service teacher training[17]. HEIs are thus well positioned to drive education for environmental sustainability and create societal impact through their education, research and operational functions. By advancing research and producing evidence as to what works, as well as acting as knowledge brokers in sharing and disseminating research within their network, HEIs can become crucial hubs for innovations that bring together different disciplines and stakeholders across the formal and non-formal education divide. This last point is of particular importance, as education for environmental sustainability **should not be limited to formal education**, and calls for close cooperation among different stakeholders[18].

A recent study published by the JRC on sustainability competences, identified significant gaps in research on EES in terms of different levels of education, stating that "*there is limited research on sustainability education beyond higher education, including early childhood, primary and secondary school, vocational education, adult education, and so forth. Equally, research should address how to convey sustainability competences through online education."*[19] In addition, research[20] shows that when providing education for environmental sustainability, there is insufficient integration of learning dimensions: for instance, primary education tends to focus on social and emotional skills, while higher levels of education tend to focus on cognitive learning and knowledge. Such fragmentation does not always result in a holistic and continuous learning approach to education for environmental sustainability.

16 Boeve-de Pauw, J. and Van Petegem, P. (2017): Eco-school evaluation beyond labels: the impact of environmental policy, didactics and nature at school on student outcomes, Environmental Education Research, doi: 10.1080/13504622.2017.1307327

17 International Association of Universities, 'IAU 2nd Global Survey Report on Higher Education and Research for Sustainable Development'. Available at: https://www.iau-aiu.net/IMG/pdf/iau_hesd_survey_report_final_jan2020.pdf

18 Mehling, S. and Kolleck, N. (2019). Cross-Sector Collaboration in Higher Education Institutions (HEIs): A Critical Analysis of an Urban Sustainability Development Program. Sustainability, 11, 4982. https://doi.org/10.3390/su11184982

19 Bianchi, G. (2020). Sustainability competences, EUR 30555 EN, Publications Office of the European Union, Luxembourg, ISBN 978-92-76-28408-6, doi:10.2760/200956, JRC123624.

20 UNESCO Education Sector, 'Educational content up close – Examining the learning dimensions of Education for Sustainable Development and Global Citizenship'.

1.2. Methodological approach

The study employed **a mixed-methods approach**, featuring different methods of data collection and analysis, and ensuring **data triangulation** throughout the implementation of the project. Below, we present the main elements of our methodology, data collection methods, and their objectives. Following this, we will proceed with presenting the analytical framework and research questions that guided our analysis of the information gathered, as well as the preparations made for data collection in order to achieve the research objectives.

- **Literature review**: PPMI conducted a general literature review to feed, as well as complement, the national-level research and data collection. This step aimed to help systematically analyse the existing evidence on competences relating to environmental sustainability, the key conditions for the successful implementation of education for environmental sustainability at policy and institutional levels, and the challenges associated with this.
- **National and policy research mapping**: National experts reviewed the national policies and strategies in their respective countries. The mapping task focused on mapping the current state of the art in the provision and mainstreaming of education for environmental sustainability in the 27 Member States. This task also aimed to identify the key barriers to and enablers of comprehensive education for environmental sustainability, as documented by existing research evidence. In addition, each national expert identified up to five transformative policy and/or institutional approaches to education for environmental sustainability, which fed into an inventory of good policy and/or institutional approaches.
- **Review of school curricula**: EUN carried out a thorough review of general school education curricula from each of the 27 EU Member States, together with insights from representatives of each country's ministry of education. This step aimed to gather more specific insights into the integration into school education plans of education for environmental sustainability-related topics across the Member States. It also aimed to identify key trends in EES teaching in schools, such as whether it takes place in a cross-curricular/transversal way or is associated with specific subjects/disciplines.
- **Survey of educators**: EUN surveyed the practices of schools and educators on education for environmental sustainability through an online survey targeting their teacher network. The findings complemented the list of initiatives suggested by national experts and fed into the inventory of good practice examples, providing information on educators' approaches to, and experiences with, teaching education for environmental sustainability. The survey received 140 responses from across the EU.
- **Case study programme**: The core research team and DG EAC selected five initiatives from the inventory as case studies to explore transformative practices and processes and to demonstrate the effectiveness of the approaches selected, as ways of overcoming the obstacles to the implementation of EES. The draft case study fiches are annexed to the main study report. The purpose of the case study programme was to provide illustrative examples of effective EES initiatives

that serve as important foundations for mainstreaming on a national scale, and to learn lessons as to how it can be achieved in different contexts.

— **Expert focus group meeting**: The expert focus group meeting aimed to validate the preliminary study results and to gain additional insights on the key barriers to and enablers of the upscaling of EES in national and cross-border contexts. The expert focus group discussed and analysed specific conditions relating to EES, covering examples such as time span, planning, the nature and process of change (including challenges), effective tools, and the evaluation of measures and outcomes.

1.1.1. Analytical framework

The 2030 Agenda for Sustainable Development and the European Green Deal reflects the urgency of embedding the principles of environmental sustainability into all levels of education. EES aims to develop competences that empower individuals to reflect on their own actions, taking into account their current and future social, cultural, economic and environmental impacts from both a local and a global perspective. As members of society, individuals should be empowered to act in a sustainable manner in complex situations. This may require them to strike out in new directions and participate in socio-political processes that require every member of society to acquire a **'sustainability mindset'** and **environmental literacy**.

For such transformations to take place holistically and comprehensively, **action is needed both vertically (from individual** to **institutional and systemic changes) and horizontally**, with all stakeholders acting in synergy to promote environmental sustainability. **This study considers both system-level and institutional-level approaches, and practices and interlinkages between them.** The system-level approach includes developing a long-term vision and coherent policy for the integration of EES into education at national, regional and local levels, including the development of adequate delivery systems – including comprehensive curricula, educator education, assessment and quality assurance among other elements. Because students spend a significant amount of time in the classroom, schools and universities are increasingly being called upon to act as role models and to engage with teaching content and methodology, and with campus and facilities management, as well as cooperating with partners and with broader communities.[21] Such institution-level practices are therefore also an important dimension of the effective delivery of EES.[22]

A critical outcome of EES, in addition to specific behavioural changes, is an ongoing capacity among citizens to effectively respond to future challenges. Successful sustainability education depends heavily on the learning and reflection that comes from active involvement in processes for change. Definitions often, therefore, include an

21 Farnell, T. (2020). 'Community engagement in higher education: trends, practices and policies', NESET report, Luxembourg: Publications Office of the European Union. doi: 10.2766/64207.

22 Affolter, C. and Varga, A. (2018). Environment and school initiatives lessons from the ENSI Network – Past, present and future. Vienna, Austria/Budapest, Hungary: ENSI/Eszterhazy Karoly University. Retrieved October 18, 2018, from http://ofi.hu/sites/default/files/attachments/lessons_from_the_ensi_network-book_web_0905.pdf

objective or pre-condition of "opportunities for every citizen to become involved" or "must involve active participation"[23].

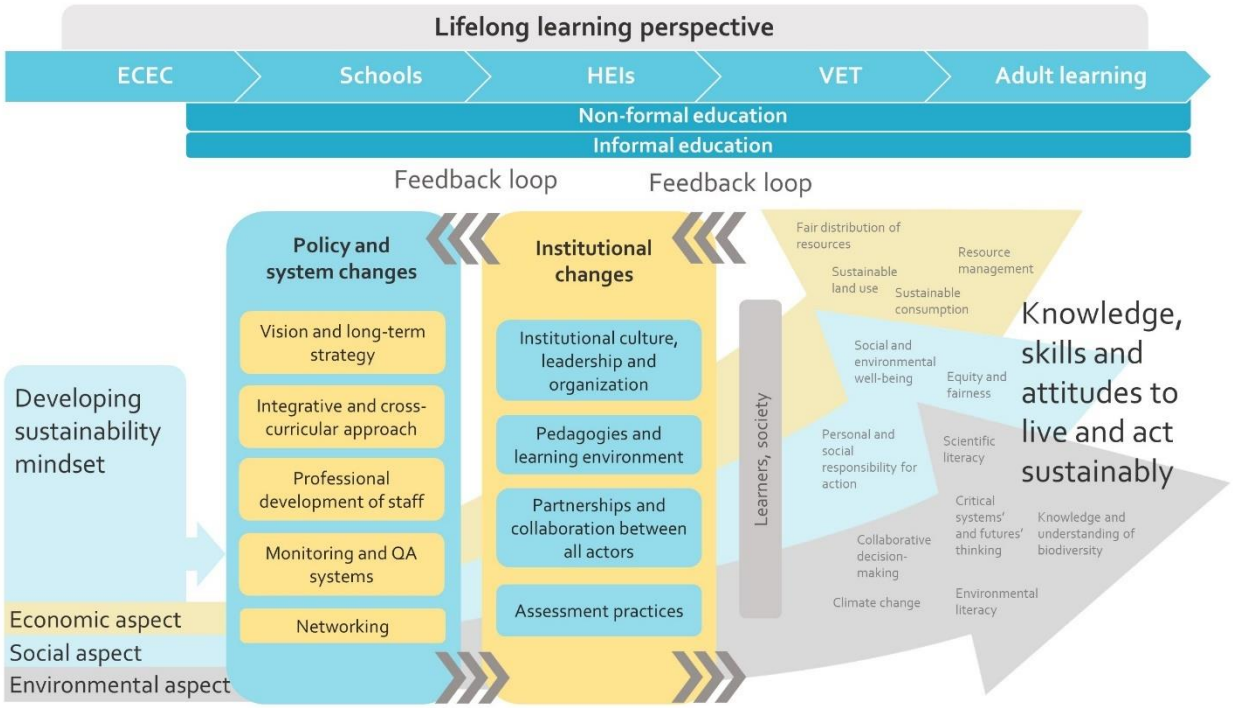
In such a context, education for environmental sustainability must be understood as an integral part of quality education and lifelong learning. **EES is therefore seen as a form of holistic and transformational education**. This implies:

- *Policy and vision for sustainability* – integrating visions for sustainability into key long-term educational strategies that shape the education delivery system: training and capacity building among educators and educators; quality assurance and monitoring frameworks; platforms for collaboration and synergies between different actors, etc.
- *Learning content and outcomes* – integrating critical issues such as climate change, biodiversity, disaster risk reduction and sustainable consumption into the curriculum and stimulating the promotion of core competences, skills and behaviours such as critical and systems thinking, a responsibility mindset, collaborative decision-making, future orientation, etc.
- *Pedagogy and the learning environment* – creating interactive, learner-centred teaching and learning settings and designing an action-oriented, transformative pedagogy that supports self-directed learning, participation and collaboration, problem-orientation, inter- and trans-disciplinary, and the linking of formal and informal learning to the development of key sustainability competences. It also requires adequate assessment tools and monitoring processes to document the impacts of new policies and programmes relating to EES, as well as the rethinking of learning environments – physical as well as virtual – that can inspire learners to act for environmental sustainability.

This understanding is depicted in our analytical framework, presented below, which guided and informed the study's data collection and analysis.

23 Hocking, C., Ray, S. and Day, T. (2006). What does professional development and learning for environmental sustainability facilitators look like? Available at: http://www.regional.org.au/au/apen/2006/refereed/6/2936_hockingcg.htm

Figure 2. Analytical framework



Source: compiled by PPMI.

1.1.2. Challenges and limitations of the study

Due to the scope and short timeframe of the study, several limitations of the proposed methodology and collected data must be acknowledged and taken into account when reading the findings presented in this report.

This study is largely qualitative in nature. While it provides a comprehensive mapping of national-level policies on education for environmental sustainability, its mapping of institutional approaches is exploratory and therefore **cannot be considered representative of all localities in all EU Member States**. The survey of teachers conducted by the research team aimed to collect examples of the different practices employed by teachers, as well as the challenges they face in implementing EES, with the aim of bringing the voices of teachers directly into the study. The sampling approach (purposeful, non-random and snowballing) is a non-representative approach, which means that while the survey serves the purpose of retrieving experiences that can shed light on the situation of certain teachers in Europe, its findings cannot generalised across the entire teacher population.

While the national mapping demonstrates many promising and innovative local and regional initiatives and approaches to EES, many of these are still at the pilot stage or have not yet been evaluated, which limits the ability of the study to draw comprehensive conclusions with regard to the effectiveness of existing and emerging policies and their real vs intended impact on the long-term development of a sustainability mindset. In such cases, some of the analysis relies on the perceptions of stakeholders and beneficiaries of these initiatives. This is also the case with the curricula review. This was developed on the basis of self-reporting by the ministries of education, and hence paints a more positive

picture of the state of play in terms of curriculum development than was reported by the national experts.

The core research team realised that caution needs to be taken in analysing good practices as being transferrable and scalable across socio-economical and national contexts, since environmental practices need to be grounded in the local environment. It is a challenge to highlight practices that are inspiring for other contexts, while also avoiding the counter-productive adoption of foreign initiatives in contexts to which they are not well suited. The research team has therefore done its best to solve this challenge by selecting case studies that make use of local adaptations, and to clearly emphasise in the case study reports the limitations and opportunities for transferring such initiatives.

2. The need for a transformative vision for education with a focus on sustainability

Much of the modern discourse about formal education focuses on the mechanics of it – that is, finding solutions to improve teaching and learning – without questioning what we are educating 'for'. The vision of education's purpose as being to prepare for a *sustainable* future is not yet common across national education policies, though it has been an important focus of expert debate over recent years[24]. The demand for sustainability as a new purpose of education requires intensified efforts to address the socio-emotional and affective dimensions of learning, beyond the mere cognitive focus. From such a perspective, education is not solely limited to acting as an instrument to achieve specific, formal individual needs and levels, but to serve as the integrated process and operating mode for a sustainable path of life.

What knowledge, skills, values and attitudes will be necessary for young people to play an active role in this sustainable life path? What role should ECEC, schools and HEIs play in developing these? How should – and how can – education and learning be rethought and reconfigured to make a significant and central contribution to achieving a more sustainable and just world? These are some of the questions that this chapter attempts to answer.

2.1. Rationale for education *for* environmental sustainability

The severe decline in biodiversity, environmental degradation and risks posed by climate change in the EU's Member States, requires urgent and systemic action from policy makers and citizens alike. Education for environmental sustainability is necessary to ensure that citizens develop the knowledge, skills and attitudes needed to be a part of a positive solution, and to drive more transformative change.

In 2015, countries around the world signed the **2030 Agenda for Sustainable Development**, which include the 17 **Sustainable Development Goals** (SDGs). At the core of this agenda is the development of societies and economies that meets the needs of present generations without compromising the ability of future generations to meet their

24 Hopkins, C.A., Michelsen, G., Salite, I., Sigmund, A., Wagner, D.A., Yokoi, A., Fischer, D., Kohl, K., Abdul Razak, D. and Tillezec, K. (2020). Sustainability as a Purpose on the New Path of Learning for the Future. In: UNESCO (Ed.), Humanistic Futures of Learning. Perspectives from UNESCO Chairs and Unitwin Networks. Paris: UNESCO Education Sector; Cook, J.W. (Ed.). (2019). Sustainability, Human Well-Being, and the Future of Education. Helsinki: Palgrave Macmillan.

own needs. A life within the planet's limits, and reconciling **economic efficiency**, **social inclusion** and **environmental responsibility,** is the essence of sustainable development.

The 17 SDGs cover global challenges that are crucial for the survival of humanity. They set environmental limits and critical thresholds for the use of natural resources. The goals recognise that ending poverty must go hand-in-hand with strategies to build economic and environmental development. They address a range of social needs including education, health, social protection and job opportunities, while tackling climate change and ensuring environmental protection.

The EU's commitment to the implementation of the SDGs places sustainable development at the very heart of its political agenda. Having ratified the **Paris Agreement** in 2016, and under its wider 2030 climate and energy framework, the European Union is committed to achieving a cut of at least 40% in greenhouse gas emissions. In addition, as part of the **European Green Deal**, Europe aims to be a climate-neutral continent by 2050. This is also in the process of being made a legally binding obligation under the **European Climate Law**, which is currently in preparation. Recent proposals by the European Commission and European Parliament have called for a more ambitious target of cutting greenhouse gas emissions by 55-60% by 2030, instead of 40%. These are in line with the notion of a 'green recovery' from the COVID-19 crisis.

Achieving the sustainable development goals will require a profound transformation in the way we think. To create a more sustainable world, and to engage with sustainability-related issues as described in the Sustainable Development Goals (SDGs), individuals must become sustainability change-makers[25]. In such a context, education should enable people to understand the causes and consequences of climate change, to make informed decisions, and to take appropriate actions to address it. To do this, they require the knowledge, skills, values and attitudes necessary to empower them to contribute to sustainable development. Learning about environmental sustainability from an early age is particularly helpful in the development of healthy and sustainable habits in adult life[26].

Education is therefore important in increasing people's knowledge about the influence their lifestyles have on the Earth's ecosystems and climate, and what they can do to achieve more sustainable development. However, the key question is how should – and how can – education and learning be re-thought and reconfigured to make a central and significant contribution to achieving a more sustainable and just world? A great deal of learning, both everyday and through formal education, makes no positive difference to a more sustainable future. Overall, the net effect of such education is likely to exacerbate unsustainable systemic conditions[27].

25 UNESCO, 'Education for Sustainable Development Goals: Learning Objectives', 2017. Available at: https://unesdoc.unesco.org/ark:/48223/pf0000247444.

26 Spiteri, J. (2020). Early Childhood Education for Sustainability. In: Leal Filho, W., Azul, A., Brandli, L., Özuyar, P. and Wall, T. (Eds.) Quality Education. Encyclopedia of the UN Sustainable Development Goals. Springer, Cham. https://doi.org/10.1007/978-3-319-69902-8_114-1. Also, Molinario, E., et al. (2020). From childhood nature experiences to adult pro-environmental behaviors: An explanatory model of sustainable food consumption. Environmental Education Research, 26(8), p. 1137–1163. doi:10.1080/13504622.2020.1784851

27 Sterling, S. (2019), 'Becoming 'learner drivers' for the future: re-thinking learning and education in a troubled world', Routledge Sustainable Development Pages, May 2019.

This is in line with scarce data from international assessments of awareness about global issues such as climate change. For instance, the PISA 2018 Global competence assessment revealed a high level of awareness among 15-year-olds in OECD countries regarding climate change and the need for action to address it (79%). In addition, the challenges facing the environment are seen by young people as not just urgent, but as personal and inspiring. However, when students were asked whether they could do something about global problems such as climate change, this figure dropped to an average of 57%. In Germany, the Slovak Republic, Romania, Hungary, Latvia, Moldova, Russia, Austria, Switzerland, Malaysia, Slovenia, Serbia, Belarus and Estonia, the percentage fell to less than half. When asked whether they thought their behaviour could impact people in other countries, the average dropped still further, to 44%[28]. So, while students show a high level of awareness and interest in the future of the planet and take responsibility for this in their daily lives, they do not currently feel a sense of empowerment and agency to make a real difference. Education for a sustainable future should help young people to develop a sense of agency and responsibility.

Education for environmental sustainability, has by now become familiar as a concept within many education institutions[29]. The promotion of EES at international and European levels has, for example, resulted in the increasing integration of sustainability goals into curricula and learning outcomes at educational institutions ranging from ECEC to universities[30]. Alongside the ESD/EES approach, there are also other concepts that emphasise the role of education as a key lever for sustainable transformation, such as transformative education. Transformative education places the focus on a shift in consciousness and an altered state of being in the world[31], enabling an "understanding of different options for action and solution approaches", and describing individuals as "change agents" who play a pivotal role in launching and shaping change processes[32].

EES is not without its critics, however. The concept has been questioned for frequently adopting a top-down approach to implementation that does not allow for the challenging of existing economic models[33]. As a result, most of the solutions implemented have been found to be more "symptomatic than causal", with insufficient attention given to growth-critical and postcolonial perspectives.[34] The concept of transformative education raises the issue of whether education can and should be learning for societal change or Bildung (self-cultivation)[35]. One potentially problematic aspect here is that strong doctrinal opinions –

28 Schleicher, A. (2021), 'Green at fifteen – what schools can do to support the climate', OECD Education and Skills Today.

29 Singer-Brodowski, M. (2016). Transformative Bildung durch transformatives Lernen. Zur Notwendigkeit der erziehungswissenschaftlichen Fundierung einer neuen Idee. ZEP: Zeitschrift Für Internationale Bildungsforschung Und Entwicklungspädagogik, 39(1), 13–17.

30 Brock, A., de Haan, G., Etzkorn, N., & Singer-Brodowski, M. (2018). Wegmarken zur Transformation: Nationales Monitoring von Bildung für Nachhaltige Entwicklung in Deutschland. Verlag Barbara Budrich.

31 O'Sullivan, E., Morrell, A. (eds) 2002. Expanding the Boundaries of Transformative Learning: Essays on Theory and Praxis. New York: Palgrave Press, p. 18.

32 WBGU - German Advisory Council on Global Change. (2011). World in Transition – A Social Contract for Sustainability. WBGU.

33 Getzin, S. and Singer-Brodowski, M. (2016). Transformatives Lernen in einer Degrowth-Gesellschaft. Socience: Journal of Science-Society Interfaces, 1(1), 33–46. https://doi.org/10.5167/UZH-135963

34 Selby, D. and Kagawa, F. (2018). Teetering on the brink: Subversive and restorative learning in times of climate turmoil and disaster. Journal of Transformative Education, 16(4), 302–322.

35 de Haan, G. (2019). Transformative Methoden einer zukunftsorientierten Bildung / BNE. Reallabore, Citizen Science, Service Learning & Co. – Transformative Bildung für eine Nachhaltige Entwicklung, Berlin. https://www.transformative-innovation-lab.de/wp-content/uploads/2019/02/3_de-Haan_zukunftsorientierte_Bildung.pdf

in the area of sustainability, as elsewhere – can constitute indoctrination and subjectively overwhelm students' ability to form their own political and social judgements[36].

The alternative concept of transformative learning is well-established in education science, and is operationalised both educationally and methodologically. It encompasses two broad directions: "the approaches of transformative learning as a change in individual perspectives of meaning and the concepts of transformative learning as collective processes of awareness development and emancipation"[37]. In the transformative learning process, experiences of failure result in the questioning of basic understandings and the creation of new realities, and therefore lead beyond the mere acquisition of knowledge and abilities to trigger changes in basic behaviour, feelings and thoughts.

Transformative learning should focus on the process of building awareness of, questioning and further developing the individual's own perspectives. This can take place through innovative approaches to learning such as project-oriented formats, collective practices that can be incorporated into everyday life, and through critical discussion. Other methods that can be used to foster these processes include the use of diaries, role-playing, perspective exercises, social simulation, 'living statistics' or systemic constellations to gain a better understanding of the complexity of interrelationships. The conceptual approach taken by transformative learning – in contrast to transformative education – includes the discussion of growth-critical and ideology-critical perspectives. In addition, the approach helps to identify structural possibilities for transformation towards sustainability that go beyond what people can do at the individual level (Ibid).

Schneidewind emphasises that transformative learning can be regarded as an "interplay of knowledge, mindsets and skills"[38]. These mindsets must be underpinned by a guiding sustainable vision and desire for change. Changing individual or collective behaviour requires abilities, a perceived sense of potency or ability to act, and certain key competencies. The key competences that enable students to contribute to sustainable development as change agents are the subject of discussion in the upcoming sections.

2.2. Competences associated with a sustainability mindset

Numerous efforts have been made to define specific competences for sustainability[39] in academia. Vare et. al[40] presented the first initiatives and early developments to define and categorise competences for sustainability and sustainable development. In 2020, the JRC published a comprehensive literature review of existing research on sustainability

36 Singer-Brodowski, M. (2016). Transformative Bildung durch transformatives Lernen. Zur Notwendigkeit der erziehungswissenschaftlichen Fundierung einer neuen Idee. ZEP: Zeitschrift Für Internationale Bildungsforschung Und Entwicklungspädagogik, 39(1), 13–17

37 Singer-Brodowski, M. (2016). Transformative Bildung durch transformatives Lernen. Zur Notwendigkeit der erziehungswissenschaftlichen Fundierung einer neuen Idee. ZEP: Zeitschrift Für Internationale Bildungsforschung Und Entwicklungspädagogik, 39(1), 13–17. Quotation Pg. 15

38 Schneidewind, U. (2018). Die große Transformation: eine Einführung in die Kunst gesellschaftlichen Wandels (Originalausgabe). Fischer Taschenbuch.

39 Waltner, E., Rieß, W. and Mischo, C. (2019). "Development and Validation of an Instrument for Measuring Student Sustainability Competencies", Sustainability, 11(6), 1717. Available at: <https://doi.org/10.3390/su11061717.

40 Vare, P. et al. (2019). Devising a Competence-Based Training Programme for Educators of Sustainable Development: Lessons Learned. Sustainability, 11(7), 18-90. doi:10.3390/su11071890

education, including competences for sustainability[41]. The report highlighted the need to develop a more comprehensive system to identify and update the necessary sustainability competences, linking them to the performance of sustainability-related jobs and other jobs to be performed in a sustainable manner.

However, the discussion concerning a sustainability mindset is intertwined with reflection on worldviews, and how these impact values, attitudes and (educational) approaches[42]. It thus needs to go beyond merely linking competences to sustainability-related jobs. Sustainability competences are relevant to all learners and citizens. Exploring worldviews is therefore an important step in developing sustainability competences and can be seen as part of a transformative learning process, as it allows an awareness of personal values and beliefs and of all the potential situations, future job-related or personal, in which sustainability skills will be fruitful.

Through their different nuances in the terminology used, most existing frameworks emphasise the related knowledge and skills required to grasp, analyse and act upon sustainability issues. Bearing in mind the complexity of environmental issues spread across various domains, people need to be enabled to think in a systemic way. They also require good analytical skills and critical thinking to be able to assess the current state, past developments and future trajectories of the environment, as well as to identify false information. To visualise a sustainable future and be able to adjust that image over time, an anticipatory or future-thinking competence is also required. Clearly, a sustainability mindset based on normative values, which fosters individual as well as community action in an ecological and fair manner, is inseparable from this approach.

Lastly, people need competences to initiate action; to take leadership in promoting sustainability; to engage, cooperate and effectively communicate with others; as well as to enable others to act. All of these call for strong interpersonal competences. To allow students to acquire such competences, education should focus on the cognitive and affective (emotional) dimensions of learning, which are interconnected, in order to assure a whole-person learning that can be seen as a pre-requisite for transformative education.[43]

Importantly, it is necessary to highlight that many of the competences discussed so far and defined as EES competences (see Table 2) are transversal skills that need to be seen as integral to EES, but not necessarily foundational. Transversal skills such as critical and future thinking, as well as thinking about values, need to be acquired *after* the learner has acquired basic, concrete knowledge and skills regarding the natural environment and the socio-economic world as it relates to environmental sustainability. One of the main weaknesses with existing literature and frameworks is a lack of clarity as to how transversal skills support environmental sustainability in practice.

41 Bianchi, G. (2020). Sustainability competences. EUR 30555 EN, Publications Office of the European Union: Luxembourg. ISBN 978-92-76-28408-6, doi:10.2760/200956, JRC123624.

42 de Vries, B.J.M. (2019). Engaging with the Sustainable Development Goals by Going Beyond Modernity: An Ethical Evaluation within a Worldview Framework. Global Sustainability, 2, e18. doi: 10.1017/sus.2019.15

43 Balsiger, J., Förster, R., Mader, C., Nagel, U., Sironi, H., Wilhelm, S. and Zimmermann, A.B. (2017). Transformative Learning and Education for Sustainable Development. GAIA - Ecological Perspectives for Science and Society, 26(4), 357-359. doi: 10.14512/gaia.26.4.15; Sterling, S. (2011). Transformative Learning and Sustainability: Sketching the Conceptual Ground. Learning and Teaching in Higher Education, 5, 17-33.

Table 1. Competences for sustainable development

SOURCE	COMPETENCES FOR SUSTAINABLE DEVELOPMENT
UNESCO, 'Education for Sustainable Development Goals Learning Objectives', 2017.	Eight competences: systems thinking, anticipatory, normative, strategic, collaboration, critical thinking, self-awareness and integrated problem-solving
UNECE, 'Learning for the Future: Competences in Education for Sustainable Development', 2012.	Three clusters of competences: holistic approach (integrative thinking, inclusivity, dealing with complexities); envisioning change (learning from the past, inspiring engagement in the present, exploring alternative futures); and achieving transformation (transformation of what it means to be an educator, transformation of pedagogy, transformation of the education system as a whole).
Wiek, A., Withycombe, L., Redman, C.L. (2011). Key competencies in sustainability: A reference framework for academic program development, *Sustainability Science*6, 203–218.	Five groups of competences: systems-thinking, anticipatory, normative, strategic and interpersonal competences
Brundiers, K., Barth, M., Cebrián, G., Cohen, M., Diaz, L., Doucette-Remington, S., … Zint, M. (2020). Key competencies in sustainability in higher education—toward an agreed-upon reference framework, *Sustainability Science* doi:10.1007/s11625-020-00838-2	Eight competencies: integrated problem-solving, interpersonal, intrapersonal, strategic thinking, values thinking, future thinking, systems thinking, and implementation
Rieckmann, M. (2012). Future-oriented higher education: Which key competencies should be fostered through university teaching and learning? *Futures* 44, 127–135.	Twelve competences: systemic thinking and handling of complexity, anticipatory thinking, critical thinking, acting fairly and ecologically, cooperation in (heterogeneous) groups, participation, empathy and change of perspective, interdisciplinary work, communication and use of media, planning and realising innovative projects, evaluation, and ambiguity and frustration tolerance
Lambrechts, W., Mulà, I., Ceulemans, K., Molderez, I. and Gaeremynck, V. (2013). The integration of competences for sustainable development in higher education: An analysis of bachelor programs in management, *J. Clean. Prod.*48, 65–73.	Six competences: responsibility, emotional intelligence, system orientation, future orientation, personal involvement, and the ability to take action
Lozano, R.; Merrill, M.M.Y., Sammalisto, K., Ceulemans, K. and Lozano, F.J. (2017). Connecting Competences and Pedagogical Approaches for Sustainable Development in Higher Education: A Literature Review and Framework Proposal, *Sustainability* 9, 1889.	Twelve competences: systems thinking; interdisciplinary work; anticipatory thinking; justice, responsibility, and ethics; critical thinking and analysis; interpersonal relations and collaboration; empathy and change of perspective; communication and use of media; strategic action; personal involvement; assessment and evaluation; and tolerance for ambiguity and uncertainty.

3. Source: compiled by PPMI.

Some more concrete attempts have nevertheless been made. In the most recent attempt to update Wiek's framework of competences for sustainability, Brundiers et al (2020) added integrated problem-solving (also emphasised by UNESCO) and **implementation**

competences[44]. The **integrated problem-solving competence** refers to successfully integrating two or more of the key competences in sustainability problem-solving endeavours and, ultimately, integrating all key competences to create viable and equitable solutions for sustainability[45]. The implementation competence is defined by the authors as the collective ability to realise a planned solution towards a sustainability-informed vision, to monitor and evaluate the realisation process, and to address emerging challenges (adjustments), recognising that sustainability problem-solving is a long-term, iterative process involving planning, realisation and evaluation – essentially, an action competence[46].

Researchers sometimes differentiate between competences for sustainability in schools and HEIs[47], as well as sustainability competences for educators[48]. While these do target different groups, the suggested competences share much common ground with general ESD competences. For example, teachers' competences focus more on the various aspects of interpersonal competences (participation, attentiveness, empathy, engagement[49]). Recent years have shown an increasing focus on the evaluation of sustainability competences[50].

In its attempt to map whether a certain set of sustainability-related competences highlighted by academia are part of EU school curricula, the research team conducted a review of curricula at primary and secondary education levels. The list of competences used for curriculum analysis was compiled on the basis of a review of the existing frameworks presented above, and is presented in the table below.

Complex systems thinking is not yet easily understood by the educators or officials of education ministries who provided insights to the curriculum analysis, and was therefore not included in the list. A more complex understanding of systems thinking as an understanding of thematic areas being interlinked and interconnected (e.g. the human and natural worlds, consumption and production, etc.) was perceived as being covered under the heading of problem-solving frameworks, since these can deepen students' understanding of various interlinked subjects.

44 Brundiers, K., et al. (2020). Key competencies in sustainability in higher education—toward an agreed-upon reference framework. Sustainability Science, doi:10.1007/s11625-020-00838-2

45 Brundiers et al.

46 Brundiers et al.

47 Lozano, R. et al. (2019). "Teaching Sustainability in European Higher Education Institutions: Assessing the Connections between Competences and Pedagogical Approaches", Sustainability 11(6), 1602. Available at: <https://doi.org/10.3390/su11061602>

48 Bürgener, L., and Barth, M. (2018). Sustainability competencies in teacher education: Making teacher education count in everyday school practice. Journal of Cleaner Production, 174, p. 821–826. doi:10.1016/j.jclepro.2017.10.263. Also, Vare, P. et al. (2019). Devising a Competence-Based Training Programme for Educators of Sustainable Development: Lessons Learned. Sustainability 11(7), p. 18-90. doi:10.3390/su11071890

49 Vare, P. et al. (2019). Devising a Competence-Based Training Programme for Educators of Sustainable Development: Lessons Learned. Sustainability 11(7), p. 18-90. doi:10.3390/su11071890

50 Cebrián, G., Junyent, M. and Mulà, I. (2020). "Competencies in education for sustainable development: Emerging teaching and research developments." Sustainability 12 (2), 579. https://doi.org/10.3390/su12020579.

Table 2. Key competences used in the curriculum analysis

Personal	Values thinking	To be able to differentiate between intrinsic and extrinsic values in the social and natural world; to recognise normalised oppressive structures; to identify and clarify one's own values; to explain how values are contextually, culturally, and historically reinforced; to critically evaluate how particular stated values align with agreed-upon sustainability values; and to differentiate between espoused values and practised values.
	Well-being	To be able to understand potential risks to well-being, and to adopt a sustainable lifestyle that protects the environment.
Social	Strategic thinking	To be able to recognise the historical roots and embedded resilience of deliberate and unintended unsustainability and the barriers to change; to creatively plan innovative experiments to test strategies.
	Future thinking competence	To be able to iterate and continuously refine one's own future thinking (visions, scenarios, etc.) in productive and explicit tension to the status quo; recognising the implicitly held (and largely unrecognised) assumptions about how society works and how they influence the status quo, as well as critically reflecting on how they might influence future thinking.
	Implementation	To be able to realise a planned solution toward a sustainability-informed vision, to monitor and evaluate the realisation process, and to address emerging challenges (adjustments), recognising that sustainability problem-solving is a long-term, iterative process involving planning, realisation and evaluation
	Communication	To be able to listen to others and engage in conversations with confidence, assertiveness, respect and clarity in both personal and social contexts.
	Collaboration	To be able to engage in group activity and teamwork, acknowledging and respecting others.
Learning to Learn	Problem solving	To be able to combine and integrate steps of the sustainability problem-solving process or competences, while drawing on pertinent disciplinary, interdisciplinary, transdisciplinary and other ways of knowing.
	Critical thinking	To be able to assess information and arguments to support reasoned conclusions and develop innovative solutions.

4. Source: compiled by EUN.

In Table 3, an overview of EES-oriented competences can be found for each EU Member State. Competences are not divided according to educational level, as they are understood to be competences that students should have continuous opportunities to practice up to the end of compulsory education. Thus, it is relevant to know that they are part of the curriculum while focusing less on when they are introduced, as long as students acquire them. These competences reflect the shared vision of EU countries regarding future European citizens, equipping students with the skills needed to become active in civic life by working on their readiness to **understand**, **critically analyse** and eventually **act and find solutions** to common contemporary socio-environmental challenges.

It is also worth mentioning that, despite their direct connection to EES, in most countries these competences are not presented in a way that directly connects them with EES. Denmark, Finland, and Sweden are the exceptions to this, as they offer specific goals and

clearly mention EES, while countries such as Belgium, the Netherlands and Slovakia briefly connect EES with the specific competences.

Table 3. Overview of EES competences per EU Member State

	Basic compulsory education (5-16 years old)								
Country / Competences	**Values thinking**	**Well-being**	**Strategic thinking**	**Future thinking**	**Implementation**	**Communication**	**Collaboration**	**Problem solving**	**Critical thinking**
Austria	x	x	x	x	x	x	x	x	x
Belgium	x	-	-	x	-	x	x	x	x
Bulgaria	x	x		x	x	x	x	x	x
Croatia	x	x	x	x	x	x	x	x	x
Cyprus	-	-	-	-	-	-	-	-	-
Czech Republic	x	x	x	x	x	x	x	x	x
Denmark	x	x	x	x	x	x	x	x	x
Estonia	x	-	-	-	-	x	-	-	x
France	x	x	x	x	x	x	x	x	x
Germany	x	x	x	x	x	x	x	x	x
Greece	-	-	-	-	-	-	-	-	-
Hungary	-	-	-	-	-	-	-	-	-
Ireland	x		x	x		x	x	x	x
Italy	x	-	x	x	x	-	-	x	-
Latvia	x	x	-	x	x	x	x	x	x
Lithuania	-	-	-	-	-	x	x	x	x
Luxembourg	x		x	x	x	x	x	-	x
Malta	x	x	x	x	x	x	x	x	x
Netherlands	x	-	-	-	-	x	x	x	x
Poland	-	x	x	-	-	x	x	-	x
Portugal	x	x	x	x	x	x	x	x	x
Romania	-	x	-	-	x	x	x	-	-
Slovakia	x	x	x	x	x	x	x	x	X
Slovenia	-	-	-	-	x	x	x	x	x
Spain	x	-	x	x	x	-	x	x	-
Sweden	x	x	x	x	x	x	x	x	x

5. Source: Curricula analysis by EUN.

As the table shows, curricular documents in most countries present most of the EES competences. Indeed, all countries except for Greece and Hungary refer to at least three EES competences. However, most curricula include four or more, and Austria, Croatia, the Czech Republic, Denmark, Finland, Germany, Portugal, Slovakia and Sweden contain all nine. In Portugal and Spain, however, competences are mainly developed during the

secondary years, despite the existence of many opportunities in primary education. Although every competence is referenced in at least 14 countries – demonstrating their widespread presence overall – the competence mentioned most often is **communication**. This is followed by **collaboration**, **critical** and **values thinking**.

Environmental sustainability is usually linked to pedagogical practices that promote more learner-centred and participatory approaches. These include art-based inquiry experiences, outdoor education, project and problem-based learning, and game-based learning. However, in many countries the transmissive pedagogical approach dominates, under which teachers play the role of deliverers of knowledge that the learners need to understand and reproduce during exams or tests.[51] As indicated earlier in this report, the implementation of EES requires more than the mere introduction of information and knowledge. To develop a learner's knowledge, skills, and values relevant to creating sustainable behaviour, pedagogies must be adjusted towards practising and instilling such behaviour.[52] Furthermore, environmental sustainability is also very much linked to inquiry-based scientific approaches, and to the development of natural science literacy.

The examples of Denmark and Belgium described in the curriculum analysis demonstrate how the use of integrated teaching and learning offers favourable conditions for the deeper integration of EES themes. Two Royal Decrees published in Belgium in 2014 and 2015 incorporated institutional reforms into primary and secondary education, under which the development of STEM skills must be promoted by means of integrated learning. In accordance with this, the teaching of STEM competences must be approached from all areas of knowledge. This provides a great advantage when it comes to the selection of EES topics and themes that can be taught across various non-STEM subjects. In Denmark, the incorporation of interdisciplinary classes into the current curriculum allows students to tackle contemporary issues often connected with EES using the tools provided by different subjects. In addition, the use of integrated teaching and learning not only provides an abundance of opportunities to include EES themes, but it also contributes to the development of EES key competences. Inspiring, open-ended, creative exploration serves as a form of productive play and inquiry. The lack of rigidly defined rules encourages students of all ages to demonstrate adaptive critical thinking, to think around a given problem, and to consider the effects produced by changing different variables. Collaboration and effective communication are also critical to the success of this pedagogical approach.

When considering the various approaches to ESD, it is also important to consider the growing importance of digital tools in learning and teaching. As mentioned above, digital tools can be used to implement a game-based learning approach that is interactive and engaging, and can help students to gain not just knowledge, but also relevant skills.[53] It

51 Bourn, D; Hunt, F; Bamber, P; (2017) A review of education for sustainable development and global citizenship education in teacher education. (UNESCO GEM Background Paper). UNESCO: Paris, France.

52 UNESCO Education Sector, 'Educational content up close – Examining the learning dimensions of Education for Sustainable Development and Global Citizenship'. Available at: https://unesdoc.unesco.org/ark:/48223/pf0000372327

53 Emblen-Perry, K. (2018). Promoting education for sustainability through Game-Based learning: using the sustainable strategies game to improve students' knowledge and skills of sustainable business practices. In: Handbook of Sustainability Science and Research (pp. 849-866). Springer, Cham.

also has a potential to produce the desired attitude change.[54] Digital tools can help teachers ensure that the learning environment is more closely tailored to the individual needs of each student and that it provides them with the stimulation of experiences that they may not encounter in their normal environments. Consequently, this can potentially help them to widen their worldviews and to develop the skills for which a different environment would be required. The effectiveness of digital technologies should not be overstated, however. Its use should be carefully considered, as its effect on children's empathy is positive when its content, use and interactions are prosocial, and if the amount of time spent in front of screens does not reduce face-to-face interactions[55].

While the curriculum content and learning objectives for ESD are generally set out in EU Member States, teachers are often free to choose their teaching methods. Unless the learning objectives or pedagogies set out in the curriculum are of a behavioural or socio-emotional nature, there is no guarantee that teachers will adopt learner-centred and participatory approaches[56]. In fact, Boeve-de Pauw and Petegem (2017) suggest that many teachers prefer a transmissive understanding of behavioural change that works through knowledge rather than behavioural and socio-emotional understanding[57]. It is thus crucial that learning objectives should cover action competences – or, alternatively, should guide teachers as to the pedagogical approaches used. This also applies to higher education.

The EU already has an influential tool in place to support educational practitioners and policy makers in their efforts to develop the entire spectrum of competences across all citizens – from literacy and maths, to cultural and entrepreneurial. The general European Framework of Key Competences[58] is already used by EU Member States to promote the development of the whole person from a lifelong learning perspective. This framework describes the knowledge, skills and attitudes required by people to become responsible citizens in a modern democracy, as well as to understand and act towards building a more sustainable society. However, while these key competences can be helpful in developing a sustainability mindset – in particular, mathematical competence and basic competences in science and technology (STEM), learning to learn and citizenship – explanations as to how they contribute to a sustainability mindset are not clearly elaborated.

While the UNECE reports consider it a strength of EES implementation that countries implement the key competences for lifelong learning, Ayers (2020) finds that competences that are not contextualised in relation to sustainability provide no guarantee that they will achieve their desired learning outcomes.[59] In fact, recent research suggests that the best way to crystallise the link between 21st-century skills and competences for environmental

54 Janakiraman, S., Watson, S.L. and Watson, W.R. (2018). 'Using Game-based Learning to Facilitate Attitude Change for Environmental Sustainability', Journal of Education for Sustainable Development, vol. 12(2), pages 176-185, September.

55 Flecha, R., Pulido, C., Villarejo, B., Racionero, S., Redondo, G. and Torras, E. (2020). 'The effects of technology use on children's empathy and attention capacity', NESET report, Luxembourg: Publications Office of the European Union. doi:10.2766/947826.

56 UNECE (2020). Information paper no. 2 'Learning from each other: achievements, challenges and ways forward. Fourth evaluation report of the UNECE Strategy for Education for Sustainable Development'. Available at: https://unece.org/fileadmin/DAM/env/esd/6thmeetsc/Informal%20Documents/phaseiiprogressreport_IP.8.pdf

57 Boeve-de Pauw, J. and Van Petegem, P. (2017): Eco-school evaluation beyond labels: the impact of environmental policy, didactics and nature at school on student outcomes, Environmental Education Research, DOI: 10.1080/13504622.2017.1307327

58 See https://ec.europa.eu/education/education-in-the-eu/council-recommendation-on-key-competences-for-lifelong-learning_en

59 Ayers, J. (2020). Competence Literate but Context Lacking? Investigating the Potential of Study Abroad Programs to Promote Sustainability Competence Acquisition in Students. Sustainability, 12(13), 5389. MDPI AG. Retrieved from http://dx.doi.org/10.3390/su12135389

sustainability may be through a separate competence for sustainability.[60] In the context of curriculum frameworks, there needs to be *explicit* mentioning of sustainability competences, learning objectives, and how to achieve and assess them – yet very few countries currently do this.

3. Supporting education for environmental sustainability across systems

This chapter presents the findings from the study's mapping exercise, and discusses various system-level practices across Europe in the light of the literature and earlier comparative reports by the UNECE (2016 and 2020) on how to successfully mainstream education for environmental sustainability across the system. The study's analytical framework recognises that transformative and sustainable change needs to occur at both policy and institutional level, with purposeful and holistic approaches and supportive synergies between these levels. At system level, policy needs to support education for environmental sustainability across all of the core pillars that uphold an efficient education system: policy vision and strategy; curriculum frameworks and the approach to the development of competences; training and capacity building for educators; assessment, monitoring and evaluation; and cross-sectoral partnerships.[61] Accordingly, this chapter provides an overview of how education for environmental sustainability is understood and defined in national and regional education policy documents across the EU, and discusses the current obstacles to and policy solutions for the promotion of EES across institutions.

3.1. Policy vision and strategy for sustainability

Visionary thinking can play an important role in the development of policy regarding sustainability. Globally, good examples of influential and visionary policy documents include the 1987 Brundtland report 'Our Common Future', and the education-specific Tbilisi Declaration on Environmental Education[62]. The Decade for Education for Sustainable Development (DESD) put in motion several national policy strategies and evaluation processes to ensure that countries sign up for and monitor their progress towards better and more effective education for environmental sustainability (creating a national strategy was an obligatory requirement for taking part).[63] Yet, as the data from this study and previous UNECE reports suggest, EU Member States vary greatly in their ability to make their education systems play a transformative role. This section therefore investigates what types of policy and strategies are being implemented across Europe, and which strategies are more successful at rallying change on the ground.

First, national policy mapping shows that almost all Member States have some kind of strategic policy documents or action plans in place with regard to education for environmental sustainability (see Table 4). The exception is Denmark, where some

60 [to be published] Mulvik, I. B., Pribuišis, K., Gras-Velázquez, À., Dumčius, R. & Coles, N. (2020) Nature-Based Solutions in education – A Pilot Study, European Commission, December 2020.

61 Adopted for the study on the inspiration of Loreman, T. (2007). 'Seven pillars of support for inclusive education: moving from 'why?' to 'how?'.' International Journal of Whole institutioning, vol. 3, no. 2, p. 22+. Accessed 19 Apr. 2021.

62 UNESCO. (1978). 'Final report, Intergovernmental Conference on Environmental Education', organised by UNESCO in cooperation with UNEP, Tbilisi, USSR. Paris: UNESCO.

63 Benavot, A. (2014). Education for Sustainable Development in Primary and Secondary Education. Available at: https://www.researchgate.net/publication/282342116_Education_for_Sustainable_Development_in_Primary_and_Secondary_Education

pedagogical or general guidelines exist, but no overarching national policy strategy or action plan. In general, the existence of policy documents that explicitly and exclusively discuss mainstreaming education for sustainable development is positive, since it implies that national policymakers are prioritising the issue. It also provides non-governmental actors with a document they can use to hold policymakers accountable for their (in)action.[64]

Table 4. Key national strategies and policy documents on Education for Environmental Sustainability, outlined by National experts

National Policy Documents/Strategies			
AT	Austrian Strategy for Education for Sustainable Development	Decree for Environmental Education for Sustainable Development	
BE	Federal Plan for Sustainable Development Flemish Implementation Plan for Education for Sustainable Development	Flemish Strategy for Sustainable Development	Federal Plan for Sustainable Development
BG	National Strategy for Lifelong Learning for the period 2014-2020	The National Strategy and Action Plan for Adaptation to Climate Change	
CY	National Action Plan for Environmental Education and Education for Sustainable Development	Curriculum for Environmental Education/Education for Sustainable Development	Schools Sustainable Environmental Education Policy (SEEP)
CZ	Framework Education Programmes, The National Programme of Environmental Education, Communication, and Counselling for the Years 2016-2025	The Goals and Indicators of Environmental Education [Cíle a indikátory pro environmentální vzdělávání, výchovu a osvětu v České republice]	The Strategy for Educational Policy 2030+ [Strategie vzdělávací politiky České republiky do roku 2030+]
DE	National Action Plan on Education for Sustainable Development (NAP ESD)		
DK	-		
EE	The Law on Sustainable Development General Education System Development Plan 2014-2020 [Eesti teadus- ja arendustegevuse ning innovatsiooni strateegia 2014–2020]	National Strategy on Sustainable Development 'Sustainable Estonia 21' [Eesti säästva arengu riiklik strateegia „Säästev Eesti 21"]	The Law on Sustainable Development
EL	Ministry of Education, Article 36: Establishment of the Directorate for the Support of Educational Programs and Education for Sustainable Development	Circular of the Directorate of Programmes and Sustainability Education Support	National Strategy for Biodiversity 2014-2029
ES	Environmental Education Action Plan for Sustainability [Plan de Acción de Educación Ambiental para la Sostenibilidad]		
FI	UN Sustainable Development Goals Agenda 2030 [Agenda 2030 – kestävän kehityksen tavoitteet]	The Finland We Want by 2050	
FR	This New Education for Sustainable Development Circular (the 5th in 15 years) [Cette nouvelle circulaire EDD (la 5e en 15 ans)]		
HR	Strategy of Education, Science and Technology [Strategija obrazovanja, znanosti i tehnologije]	Strategy and Action Plan for the Nature Protection in Croatia from 2017-2025 [Strategija i akcijski plan zaštite prirode Republike Hrvatske za razdoblje od 2017. do 2025. godine]	Strategy for Sustainable Development [Strategija održivog razvitka]
HU	The National Framework Strategy on Sustainable Development [Nemzeti Fenntartható Fejlődési Stratégia]	The Act on National Public Education [Törvény a nemzeti köznevelésről]	National Core Curriculum [Nemzeti alaptanterv]
IE	The National Strategy on Education for Sustainable Development in Ireland, 2014-2020		

64 Taylor, N., Quinn, F., Jenkins, K., Miller-Brown, H., Rizk, N., Prodromou, T., Serow, P. and Taylor, S. (2019). Education for Sustainability in the Secondary Sector – A Review. Journal of Education for Sustainable Development, 13(1), 102–122. https://doi.org/10.1177/0973408219846675

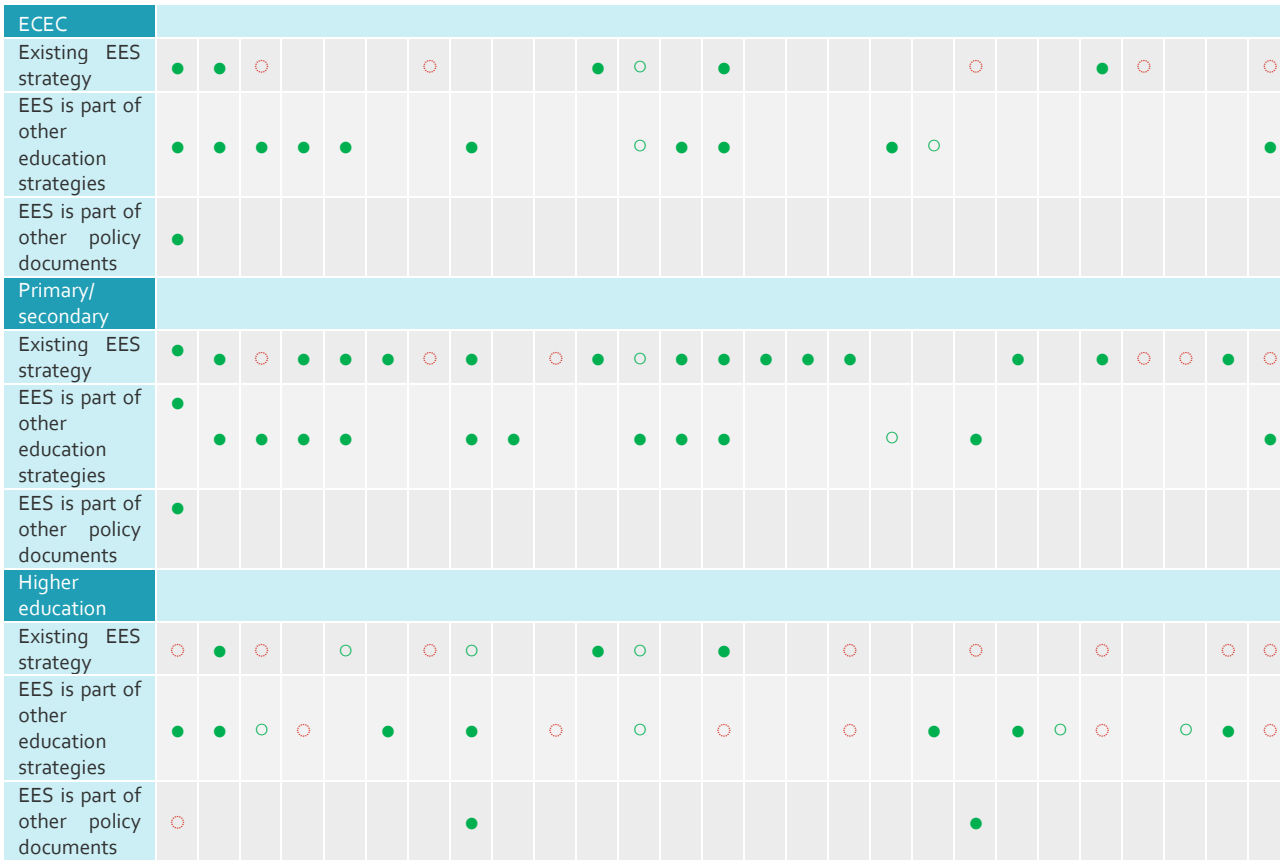
IT	National Plan of Education for Sustainability [Strategia Nazionale per lo Sviluppo Sostenibile]	Memorandum of Understanding on Education for Sustainable Development [Protocollo d'intesa tra Ministero dell'Istruzione, dell'Università e della Ricerca (di seguito denominato MIUR) e Ministero dell'Ambiente, della Tutela del Territorio e del Mare (di seguito denominato MATTM)]	
LT	The National Sustainable Development Education Programme 2007-2015 [Dėl Nacionalinės darnaus vystymosi švietimo 2007–2015 metų programos patvirtinimo]	The National Sustainable Development Approval and Implementation Strategy [Dėl Nacionalinės darnaus vystymosi strategijos patvirtinimo ir įgyvendinimo]	
LU	Luxembourg's Agenda 2030. Plan national du développement national (PNDD). [Luxembourg 2030, 3ième Plan National Pour Un Développement Durable]	National Reference Framework 'Non-formal Education of Children and Young People'. [Règlement grand-ducal du 28 juillet 2017 portant établissement du cadre de référence national « Éducation non formelle des enfants et des jeunes]	
LV	Basic Guidelines for Sustainable Development of Latvia [Par Latvijas ilgtspējīgas attīstības pamatnostādnēm]	Concept for Sustainable Development of Latvia [Ilgtspējīgas attīstības koncepcija]	Environmental Protection Law [Vides aizsardzības likums]
MT	National Curriculum Framework (NCF)		
NL	National Strategy on Sustainable Development [Nationale Strategie Duurzame Ontwikkeling]		
PL	The National Environmental Policy 2030 (NEP2030) [Polityka Ekologiczna Państwa 2030]		
PT	National Environmental Education Strategy [Estratégia Nacional de Educação Ambiental] Environmental Education for Sustainability [Referencial de Educação Ambiental para a Sustentabilidade]	National Strategy for Development Education [Estratégia Nacional de Educação para o Desenvolvimento]	National Environmental Education Strategy [Estratégia Nacional de Educação Ambiental]
RO	Education for Sustainable Development [Educație pentru Dezvoltare Durabilă]	National Strategy for Sustainable Development in 2030 [Strategia-nationala-pentru-dezvoltarea-durabila-a-României-2030]	
SE	Action Plan for Agenda 2030 [Handlingsplan Agenda 2030]		
SI	Slovenian Development Strategy 2030 [Strategija razvoja Slovenije 2030]	National Environmental Protection Programme for 2020–2030 [Resolucija o Nacionalnem programu varstva okolja za obdobje 2020–2030]	
SK	Concept for the Development of Environmental Education, Training and Awareness in SEA until 2030 [Rezortná koncepcia environmentálnej výchovy, vzdelávania a osvety do roku 2025]	Greener Slovakia: Strategy of the Environmental Policy of the Slovak Republic until 2030 [Zelenšie Slovensko: Stratégia environmentálnej politiky Slovenskej republiky do roku 2030]	National Strategy for Sustainable Development of the Slovak Republic [Národná stratégia trvalo udržateľného rozvoja]

Source: Authors. *Note*: The national policy documents and strategies on EES have been outlined by respective national experts. Some national policy documents and strategies might be missing.

Table 5 provides a simple overview of the spread and reach of EES at different education levels under the various strategies and policy documents. Several things can be noted. First, EES is well represented in education strategies and policy documents across the EU-27. Second, EES strategies appear most frequently at primary and secondary level.

Table 5. Overview of strategies and policies on education for sustainability, EU-27

EDUCATION POLICIES	Member States																											
General	AT	BE	BG	CY	CZ	DE	DK	EE	EL	ES	FI	FR	HR	HU	IE	IT	LT	LU	LV	MT	NL	PL	PT	RO	SE	SI	SK
Existing EES strategy	●	●	○	●	●	●	○	●		○	●	○	●	●	●	●	●				●		●			●	●
EES is part of other education strategies	●		●	●	●	●		●	●	●		●	●	●		●			●	●			●	●		●	●
EES is part of other policy documents	●	●	●	●				●	●		●		●	●			●	●	●	●		●		●	●	●	●



Source: Authors. *Note*: ● – Present in the country ○ – only partially present ○ - not present. Blank cell indicates N/A. The abundance of empty cells can be explained by the fact that the respective national expert could not find data on the matter, and as such no definitive answer could be provided.

Table 6 below suggests that the inclusion of EES in the form of non-formal education (hereafter referred to as NFE) is not well represented in national strategies and/or policy documents. The finding of the national mapping provide further context for this – EES in NFE tends to materialise via initiatives and cross-sector collaborations, rather than in a systematic manner.

Table 6. Education for environmental sustainability in non-formal education, EU-27

NON-FORMAL EDUCATION	Member States																											
General	AT	BE	BG	CY	CZ	DE	DK	EE	EL	ES	FI	FR	HR	HU	IE	IT	LT	LU	LV	MT	NL	PL	PT	RO	SE	SI	SK
EES is part of the national strategy	●	○		●	●				●								○	●		●			●			○	●

Source: Authors. *Note*: ● – Present in the country ○ – only partially present ○ - not present. Blank cell indicates N/A.

The Global Action Programme (2015-2019)[65] and the ESD for 2030 roadmap[66] recommend explicitly integrating education elements into all policy documents relating to sustainable development, as this is considered more impactful. Mentioning education in the context of

65 Glavic, P. (2020). Identifying Key Issues of Education for Sustainable Development. Sustainability 2020, 12, 6500; doi:10.3390/su12166500

66 UNESCO. (2020). Education for Sustainable Development. A Roadmap. #ESD for 2030. Paris, UNESCO. (Available at https://unesdoc.unesco.org/ark:/48223/pf0000374802

the economy and other sustainability strategies, for example, can impact the implementation of EES in schools and VET. National concepts of the green economy have influenced jurisdictions such as **Denmark**, where work on EES is being aligned with green growth planning[67]. While almost all countries possess specific documents relating to education for environmental sustainability, very few focus on education for environmental sustainability across multiple policy documents. Three good examples of countries that do so are provided in the comment box.

Examples of countries that include education for environmental sustainability across multiple policy documents

Poland: ESD appears across several national strategies, e.g. the Strategy for Energy Security and Environment and Strategy for Innovation and Efficiency of the Economy, as well as the Perspective for Lifelong Learning, which all form a blueprint for the country's development.

Estonia: Aside from an ESD-specific policy document in the context of strategic planning, ESD appears in the Estonian Lifelong Learning Strategy (ELLS) and the long-term strategy 'Estonia 2035', which creates a strong basis for a more systematic and robust reflection of sustainable development goals in sectoral strategies. The strategy 'Estonia 2035' sets strategic goals for the Estonian state and its people for the next 15 years, and determines the changes necessary to achieve them.

Greece: The National Strategy for Biodiversity 2014-2029 and its accompanying 5-year Action Plan sets out, among other things, a general target (target 11) to "integrate biodiversity conservation in the society's value system". To achieve this, it refers to the promotion of formal and non-formal education on biodiversity, the environment and sustainable development, targeting students of all ages, and training and life-long learning programmes aimed at the education of educators.

Conceptually, the majority of Member States have moved away from the term 'environmental education' towards 'education for sustainable development', and have thus widened their thematic focus to also factor in social and economic issues. Data from the national reports suggest that in **Slovakia** and **Hungary**, this move has encountered more significant resistance. Researchers, and the Slovakian and Hungarian education community, have been concerned with this move for two reasons: 1) confusion due to the existence of several terms; and 2) fear that widening the scope will turn the focus away from the environment and towards economic development and growth. Concerning the first of these, the majority of the national reports show that the switch has resulted in confusion, as most national reports describe ESD as a complementary, positive or even an "insignificant" addition to the rhetorical landscape. By "insignificant", it is meant that the *content* of the policy strategies matters more than the use of these particular terms. An example of its positive value, described in the **Latvian** national report, is that it is easier to work in a cross-disciplinary manner using ESD than environmental education, due to its more pronounced links to social, economic and political challenges. This is an interesting finding, since research suggests that cross-disciplinary implementation can be effective in shaping the divergent thinking needed for transdisciplinary and lifelong learning skills development around sustainability[68]. Regarding the second concern, although the policy documents are not necessarily explicitly critical of economic growth, the national reports suggest that this broadening has not turned the focus away from the environment. Most policy documents described in the national reports retain a deep understanding of the interlinkages between environmental, social and economic challenges, and the urgent need for a green economy. Furthermore, several

67 UNECE. (2016). Ten years of the UNECE strategy for education for sustainable development. UN Distr. GENERAL ECE/CEP/179/2016 23 May 2016, pp. iii.

68 Sund, P. and Gericke, N. (2020). Teaching contributions from secondary school subject areas to education for sustainable development – a comparative study of science, social science and language teachers. Environmental Education Research 1–23. doi:10.1080/13504622.2020.1754341

reports highlight that the environmental dimension has recently increased in importance, due to the increased interest in climate change education.

Effective policies on education for environmental sustainability are purposeful, reflective and work across all the pillars that support the education system (curriculum, pedagogy, funding and support for institutional innovation, teacher training, etc.)[6970]. The Danish case reveals how supporting the main pillars of education (pedagogy, curriculum, funding and support for institutional innovation etc.) is crucial to the successful implementation of education for environmental sustainability, and can make up for the lack of a specific strategy document. It confirms the theory on the importance of the *constructive alignment* of policy planning between the goals of curricula, resources, assessment and teaching, and the need for *collaboration* between civil society, private companies and academia to create policy and strategies that are embedded in practice and consensus-based, to ensure their wider influence and upscaling.[7172] In **Denmark**, institutions and NGOs are well supported in delivering ESD, and there appears to be societal and political consensus concerning the terms and their importance. This has been explained by the Danish tradition of participatory action research with regard to education for environmental sustainability.[73]

Furthermore, cross-sectoral collaboration in policymaking is highlighted as powerful when it comes to transformative action on education for environmental sustainability. Half of all national experts, and several of the case studies, have outlined that cross-sector cooperation and the exchange of good practices between the state, businesses and academia serves as an important enabler for the implementation of education for environmental sustainability. The policy mapping reveals that the Member States vary greatly in the extent to which policy visions for education are synergised with those in other policy areas. In **Bulgaria**, for instance, a 2004 memorandum facilitates collaborate on education for environmental sustainability between the country's education and environmental departments. In **Greece** and **Germany**, such collaboration is evident through the mentioning of education in several key sustainability strategy documents produced by various ministries. In **Belgium**, however, the ministries of education and environment hesitate to collaborate closely, while **Ireland**'s action plan for a carbon-neutral society does not emphasise education but focuses exclusively on transport, energy, business and trade. The case of Ireland is somewhat ironic since – according to the country's National Economic and Social Council (2012) – the vision of Ireland becoming a carbon-neutral society by 2050 will only be realised if it is, "combined with action and

69 Loreman, T.(2007). 'Seven pillars of support for inclusive education: moving from 'why?' to 'how?'.' International Journal of Whole institutioning, vol. 3, no. 2, , p. 22+. Accessed 19 Apr. 2021.

70 UNESCO. (2020). Education for Sustainable Development. A Roadmap. #ESD for 2030. Paris, UNESCO. Available at: https://unesdoc.unesco.org/ark:/48223/pf0000374802

71 Biggs, J. (2003). Aligning teaching for constructing learning. The Higher Education Academy. Retrieved from https://www.heacademy.ac.uk/system/files/resources/id477_aligning_teaching_for_constructing_learning.pdf

72 UNECE (2020). Information paper no. 2: 'Learning from each other: achievements, challenges and ways forward. Fourth evaluation report of the UNECE Strategy for Education for Sustainable Development'. Available at: https://unece.org/fileadmin/DAM/env/esd/6thMeetSC/Informal%20Documents/PhaseIIProgressReport_IP.8.pdf

73 Breiting, S. and Wickenberg, P. (2010). The progressive development of environmental education in Sweden and Denmark, Environmental Education Research 16:1, 9-37,DOI: 10.1080/13504620903533221

learning" (2012, p. 4), yet it does not recognise education as being a crucial force in this regard.

An exemplary national document on sustainability, which recognises the importance of education in achieving a sustainable society, is the **Italian** National Strategy for Sustainable Development (SNSvS): "*The 'education, awareness, communication' vector represents one of the key dimensions for the effective achievement of the objectives of the SNSvS. The 'culture of sustainability', to be promoted at all levels (business, civil society, institutions, research) and in all educational institutions, formal and non-formal, from a lifelong learning perspective, is the main vector for triggering the transformation of the current development model, as well as for the dissemination of knowledge, competences, lifestyles and virtuous models of sustainable production and consumption*".[74]

Few Member States possess strategic documents on education for environmental sustainability that specifically target early childhood education and care. In several cases, this is because regulations and documents are the same for pre-primary and primary/secondary education or only provide universal recommendations (e.g. **Cyprus, the Flemish part of Belgium, Lithuania, Spain**). In other countries (e.g. **Bulgaria**, **Italy**), specific laws or strategy papers exist covering pre-primary education, but these are broad and do not target ecological or environmental topics – or, in the case of **Croatia**, this specificity does not fall within the national-level jurisdiction. The Croatian national Law on Preschool Education from 1997 obliges all kindergartens to introduce ecological education. However, its implementation relies on the enthusiasm of teachers since the management of preschool institutions is the responsibility of local communities and laws. The **Italian** national report describes a similar issue, which can be further contextualised by the fact that ECEC is not compulsory: "*ECEC schools are often funded and managed by local administrations or by private Institutions. Their number and distribution depend on local authorities and local working situations, and so does their quality*."

While this situation also used to be the case in **Germany, Hungary, Ireland and Slovenia**, the national policy mapping suggests that the enabling policies that brought about transformative change in these countries were efforts to provide higher-quality qualifications for educational professionals; guidebooks or ESD-oriented training for educators; and the promotion of a whole-institution approach at kindergarten level through a Green Kindergarten Network. [75][76] In **Germany**, the introduction of the legal entitlement to a childcare place also contributed to a call for improved educational standards in ECEC. To anchor education for environmental sustainability into ECEC in a manner that considers the national context and thereby increases the likelihood that the policy will be effective, it would be advisable to set up an ECEC Forum, as was done in Germany. The ECEC forum developed goals and measures for the fields of action, focusing on the essential structural areas of the pre-primary sector in the country.

74 Italian Ministry of Education (2020). Draft for the National Strategy for Sustainable Development (SNSvS). Available at: https://www.minambiente.it/sites/default/files/archivio_immagini/Galletti/Comunicati/snsvs_ottobre2017.pdf [Accessed 27 February 2021]

75 UNECE (2020). Information paper no. 2: 'Learning from each other: achievements, challenges and ways forward. Fourth evaluation report of the UNECE Strategy for Education for Sustainable Development'.

76 Singer-Brodowski, M. (2019). 'Bildung für nachhaltige Entwicklung in der frühkindlichen Bildung.' Pfade der Transformation. Leverkusen: Verlag Barbara Budrich, pp. 65–99.

It is evident from Table 5 that few Member States possess national strategy documents targeting higher education. However, around half have higher education acts that address EES.[77] This is because universities are often autonomous and do not fall under the jurisdiction of the state. However, due to the increasing adoption of national policy frameworks at this level, the main challenge is the adoption of national implementation and action plans.[78]

A study in **Portugal** that attempted to conceptualise sustainable development within higher education suggests that a focus on sustainability from a government perspective can greatly influence universities towards taking the first steps towards sustainability.[79] Conversely, insufficient legal incentives lead to ambiguity and complexity regarding the concept of sustainability itself, which is seen as an "abstract and complex topic". Another piece of research on the barriers to innovation and sustainability in 172 universities also confirms that the field of environmental and sustainability research suffers from not being an area of priority.[80] This results in sustainable initiatives having to operate on low budgets and being delivered primarily by volunteers. HEIs must find the resources themselves, but this is not easily achievable due to a **lack of willingness among leaders, policy makers and decision makers to envisage a sustainable future within universities**. Without the support of senior management within a university, bottom-up sustainability initiatives seem destined to fail in the long term due to a lack of investment and administrative support from governments. As a result, staff and student entrepreneurs often fail to progress with such initiatives. Even a university's autonomy may become a barrier to developing EES initiatives if the university does not consider them a strategic priority, as there then would be a lack of incentives within the institutions to drive the change.

Conversely, the literature suggests that a lack of autonomy on the part of universities can also be a major obstacle that stalls the potential progress of innovations that can support EES. This is particularly applicable to EES, which has at its core an interdisciplinary and innovative approach. The most important restriction on institutional autonomy is the central government control over academic programmes and, to some extent, over curricula. Although universities can implement self-regulated programmes, these are not recognised as 'national' diplomas programmes, which means they do not have a legal status as 'official' programmes. Moreover, the creation of new 'official' programmes is a lengthy process that involves many committees, which are controlled by academics. This means that the result may be somewhat different from the initial aim, and that new

77 University Educators for Sustainable Development (UE4SD) (2014). 'State of the art report on mapping opportunities for developing education for sustainable development competences in the UE4SD partner countries'.

78 UNECE (2019). 'Preliminary results on progress achieved and challenges encountered in the fourth phase of implementation of the UNECE ESD strategy', https://unece.org/fileadmin/DAM/env/esd/14thMeet_SC/Doc/Presentations/revised_Inf_paper_1_-_Prelminary_findings.pdf

79 Aleixo, A. M., Leal, S., & Azeiteiro, U. M. (2018). Conceptualization of sustainable higher education institutions, roles, barriers, and challenges for sustainability: An exploratory study in Portugal. Journal of Cleaner Production, 172, 1664–1673. doi:10.1016/j.jclepro.2016.11.010

80 Ávila, L.V., Filho, W.L., Brandli, L., Macgregor, C.J., Molthan-Hill, P., Gökçin Özuyar, P., Martins Moreira, R. (2017). Barriers to innovation and sustainability at universities around the world, Journal of Cleaner Production, Volume 164, pp. 1268-1278, https://doi.org/10.1016/j.jclepro.2017.07.025

curricula may be oriented more towards satisfying the individual interests of academics rather than the real needs of students and society.[81]

Furthermore, bureaucracy is an important factor mentioned by several authors. Anna Lašáková (2017)[82] considers the power structures and states in which it is undisputable that the tone that comes from the top – whether the politicians that create the regulatory frameworks, the management of HEIs – sets the direction in which the higher education sector will move. In this respect, financial limitations and rigid regulatory mechanisms act as barriers to innovation in higher education. Major barriers arise from inflexible administration that promotes bureaucracy. HEIs need to combat various **legislative obstacles in order to receive additional financial funding** for their innovative activities, as well as to somehow ridding themselves of the tight regulatory frameworks that disempower HEIs in their quest for innovation. Moreover, instituting time-consuming administrative processes and systems, together with **unresponsive accreditation procedures that do not measure the innovation potential of HEIs,** is seen as one of the major problems within the current legislative environment. Regulatory practices at system level that are too restrictive, and which impose rigid regulations and lengthy decision processes, significantly limit the implementation of innovations in education.

Another piece of research, carried out by Dirk Schneckenberg[83], focuses on innovation capacity within European universities. Schneckenberg points out that universities are weighed down by many goals that are often contradictory. In addition, they still lack real organisational autonomy, and are deeply institutionalised and possess a conservative administrative culture. As a consequence of these unique organisational characteristics, European public universities tend to be bottom-heavy institutions with comparably low potential for collective action and strong organisational leadership.

Government entities at national, sub-national, or local levels can mobilise resources and create the enabling environments needed to guide and support HEIs.[84] In addition to following up ESD strategies with implementation plans, other reported success factors include ensuring targeted funding, including ESD as a criterion for universities' performance evaluations, and passing regulations or laws to 'nudge' towards or support universities in acting. **Latvia**'s national legislation (the Environmental Protection Law) states that EES must be included in the mandatory curriculum of the subject or course standard per the specific character of each subject, by coordinating and ensuring succession in different fields of study. In **Austria**, the inclusion of ESD is a central topic in the performance agreements between the Federal Ministry of Education, Science and

81 Mora ,J.-G. and Villarreal, E. (2001). Breaking Down Structural Barriers to Innovation in Traditional Universities, Higher Education Management Vol. 13, No. 2. Available at: http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.450.9953&rep=rep1&type=pdf#page=55 [Accessed 8 July 2021]

82 Lašáková, A., Bajzíková, L. and Dedze, I. (2017). Barriers and drivers of innovation in higher education: Case study-based evidence across ten European universities, International Journal of Educational Development, Volume 55, Pages 69-79, ISSN 0738-0593, https://doi.org/10.1016/j.ijedudev.2017.06.002

83 Schneckenberg, D. (2009). Understanding the real barriers to technology-enhanced innovation in higher education, Educational Research, 51:4, p. 411-424. DOI: 10.1080/00131880903354741

84 University Educators for Sustainable Development (UE4SD) (2014). 'State of the art report on mapping opportunities for developing education for sustainable development competences in the UE4SD partner countries'.

Research and the universities. This has had a transformative effect by increasing the importance universities place on EES.

A common barrier indicated by well over two-thirds of the national reports is insufficient government/political support for EES. This barrier is also highlighted in the literature[85,86] where it is argued that insufficient legislative and financial support by the government is responsible for the stunted growth of EES in the realm of education. Limited government support is also regarded as tending to result in a lack of harmonisation in national approaches to EES. According to data from the national reports, insufficient government support can be categorised as occurring on three different levels.

The Overall Austrian University Development Plan (GUEP) is a technical and strategic planning instrument of the Federal Ministry of Education, Science and Research. It is the basis for the development plans and performance agreements of public universities. Austria's 22 public universities are also members of the Austrian University Conference (Uniko). Uniko's manifesto highlights the responsibility and role of universities in contributing to sustainable development:

1. Universities fulfil their legal mandate to contribute responsibly to solving human problems and to the prosperous development of society and the natural environment.
2. Universities see themselves as spaces for the creation of new knowledge that contributes to social change.
3. Universities take responsibility for sustainable action in teaching, research, knowledge exchange and university management by considering the ecological, economic and social dimensions of sustainability in order to help shape the path to a sustainable and liveable society.
4. Universities understand sustainability as a holistic and long-term concept of transformation that is anchored in (interdisciplinary and project-led) research and teaching.
5. Universities make an active contribution to the responsible use of resources and shape the development and operation of their campuses (e.g. energy and resource requirements, investments and construction, procurement, waste, mobility).
6. Universities support the goals of the Fridays For Future movement, supporting the implementation of the Paris Climate Agreement and global climate justice, and welcome their contribution to strengthening public awareness of complex social, ecological and economic challenges.

On the first level, there may be a **lack of political consensus over EES**. Such a situation exists in **Austria, Hungary, Italy, Lithuania and Poland**, where governments either fail to agree on the importance of EES, or the extent to which it should be implemented. The reasons for this are manifold – short-term economic interests, partisanship, lack of stable governments that have enough time to undertake a transformative role *vis-à-vis* EES and other issues. Panth (2005) argues that in addition to the more common barriers created by limited government support for EES, another potential barrier is limited education regarding EES within the ranks of government. The author argues that in order for EES to become the paradigm for present and future development, it is vital to first educate those who are in command, as they often fail to comprehend EES in a nuanced manner. This is reflected in their capability to implement EES in an adequate manner at national level. The second level is characterised by an existing consensus as to the need for EES, but a **lack of systematic political support or action**. At this level, support from the governmental chain of command is often limited and is characterised by uncertainty. This is manifested in several ways. In some Member States, support is mostly limited to talk. In **Luxembourg**, the government actively acknowledges the need for EES, but environmental issues and EES in general are hardly mentioned in policy documents of a binding nature such as school laws. In others, support

85 Panth, P. (2005). The Scope and Target of Education for Sustainable Development. 1-9. Retrieved June 02, 2021, from https://www.researchgate.net/publication/239538125_The_Scope_and_Target_of_Education_for_Sustainable_Development.

86 Nomura, K. and Abe, O. (2009). The education for sustainable development movement in Japan: A political perspective. Environmental Education Research, 15(4), 483-496. doi:10.1080/13504620903056355

is more tangible but is afflicted by an undefined division of power. With no strategy in place to define responsibilities, there is an evident overlap between government branches in terms of their responsibilities towards EES. In **Latvia**, no formalised inter-ministerial cooperation takes place with regard to the localisation and implementation of urgent global interdisciplinary issues such as EES. In **Lithuania**, state institutions and bodies implementing education measures for sustainable development have also not properly allocated powers and responsibilities. Lastly, limited support may be demonstrated through solitary initiatives and individual government reports. For instance, in **Denmark** there is governmental support for standalone initiatives, but no framework in place that would support the nationwide implementation of EES initiatives. In **Latvia**, there is government support for sequestered EES initiatives but no national vision or strategy for life-long learning among the wider society. In **Slovakia**, separate government branches have published reports on the importance of EES, but no systematised national support framework exists. The common denominator at this level is thus an EES implementation framework – or lack thereof – so that institutions have access to guidelines as to how to proceed with EES implementation into everyday routines or teaching.

The third level comprises Member States that have more extensive EES national frameworks in place, but which tend to face issues of a **lack of quality and comprehensiveness**. The national report for **Croatia** suggests that the presence of the legal framework for EES at national level does not yet guarantee its successful implementation on the ground, if there are no effective delivery mechanisms to encourage or incentivise the target audiences to actually proceed with the implementation of EES. At the same time, there is also a lack of mechanisms for regulation and control over EES and its outputs. Teachers and other target audiences already lack basic resources such as time and funding, thus it is not enough to simply urge them to implement a new concept. In **Slovenia**, progress has been made towards the nationwide implementation of EES, but there is a lack of enforcement – to achieve progress, teachers depend on motivation and stimulus from the government's side. It is evident that this motivation and stimulus on the part of the government varies, leading to implementation of varying quality. A similar situation can be seen in the **Czech Republic**, where regional differences are apparent in the scope of support, and a certain level of 'unpredictability' exists with regard to the amount of the support in the long term. The national report for **Hungary** highlights an interesting solution to levelling out the scope of support – institutions can seek aid from international programmes targeted at EES, as well as from local donors.

The obstacle at ECEC level most frequently outlined in the national reports is the lack at national level of an existing childcare system targeted at EES. In **Austria, Belgium, Croatia, Cyprus, Denmark, Finland, Hungary, Lithuania and Poland**, EES is not well defined by any national policy documents, strategies or programmes intended explicitly for ECEC. While general EES strategy documents exist that target all levels of education, these tend to prove insufficient information to implement EES in a comprehensive manner at ECEC level. The national report for **Romania** suggests a lack of political culture behind ECEC. As such, it tends to receive lower funding.

Over half of all national experts noted the existence of national implementation roadmaps, strategies and other policy documents as key enablers for the better implementation of EES. Having a well-defined national action plan that identifies the specific targets and actions to be taken helps EES implementation at both institutional and personal level. This

must be combined with strict deadlines, and responsibilities must be clearly assigned to specific agencies and organisations responsible for the implementation of EES at national level. A good example of this is **Estonia**, where a clear competence framework for EES has existed within the general education curriculum since 1996. Moreover, the key themes of EES are addressed explicitly at various levels of education, both within the curriculum and in national policy documents targeted at EES. The national expert for Estonia suggests that this has been a key factor in the success that can be observed in Estonia at national level.

The findings of our national mapping suggest that Member States with well-established networks for disseminating programmes, as well as entities that sponsor and finance EES initiatives, enjoy a significant advantage in the implementation of EES. As enablers, these factors are also suggested as positively influencing the existing institutional/organisational culture within the country in favour of EES. Lack of awareness in terms of appropriate funding mechanisms was outlined as a common barrier in certain Member States. A positive example is that of Estonian schools, which can apply for financial support through their Environmental Investment Centre to visit environmental and nature centres in order to learn about EES. These study visits are therefore free for the schools.

3.2. Comprehensive curriculum frameworks

Across Europe, the coverage, scope and depth of education for environmental sustainability in curricula have increased, as the curriculum is an important tool for mainstreaming education for environmental sustainability in schools[87]. Despite this, variation exists in the way environmental sustainability topics and pedagogies are included in national curricula, and cannot be considered comprehensive in all Member States. This section reflects on the extent to which comprehensive curricula frameworks exist in each EU Member State, as well as the extent to which inter-disciplinary approaches are used – and how transformative and successful these approaches are. In discussing the *effectiveness* of implementation, this chapter distinguishes between the intended curriculum (the official guidance), the implemented curriculum (what teachers and learners actually do), and the attained curriculum (what students actually learn).

It must be noted that while curriculum content and learning objectives are generally set out in EU Member States, teachers enjoy wide freedom of choice over their teaching methods. Unless the learning objectives or pedagogies set out in the curriculum are of a behavioural or socio-emotional nature, there is no guarantee that teachers will use learner-centred and participatory approaches[88]. For this reason, we discuss pedagogies at institutional level rather than system level, although we recognise that education policy and curricula may do a lot to encourage positive pedagogical practices within institutions.

Based on the findings of our literature review, we consider curriculum frameworks to be *comprehensive* when they explicitly carve out space within curricula for education for environmental sustainability, as well as providing an in-depth understanding of the topic from multiple perspectives at both local and global levels, and emphasising learning along all learning dimensions – cognitive, socio-emotional and behavioural – to develop action

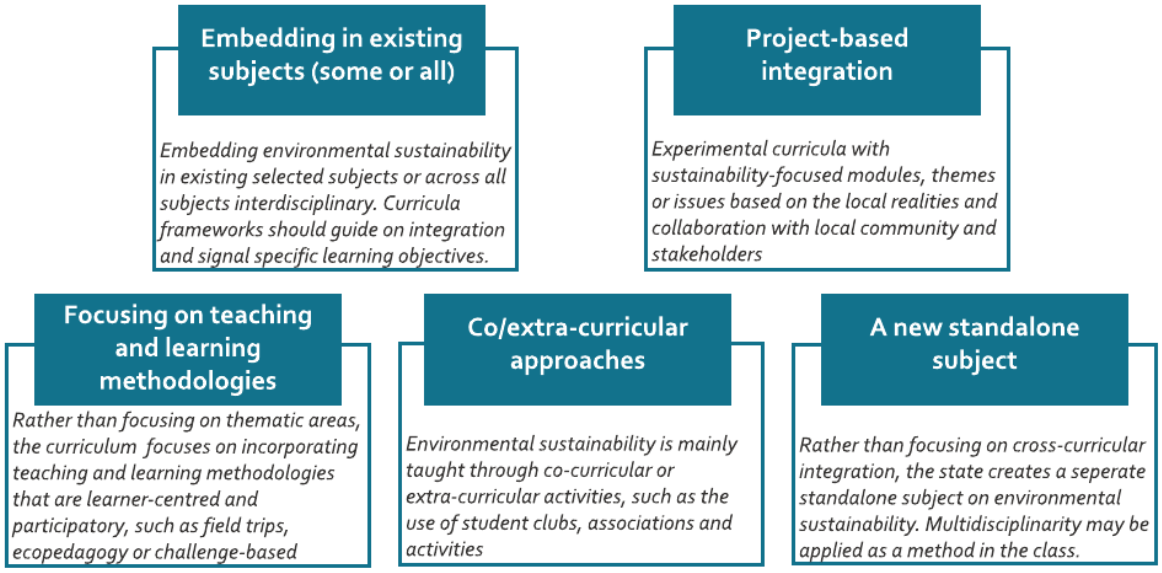
87 Benavot, A. (2014). Education for Sustainable Development in Primary and Secondary Education. Available at: https://www.researchgate.net/publication/282342116_Education_for_Sustainable_Development_in_Primary_and_Secondary_Education

88 UNECE (2020). Information paper no. 2: 'Learning from each other: achievements, challenges and ways forward. Fourth evaluation report of the UNECE Strategy for Education for Sustainable Development'. Available at: https://unece.org/fileadmin/DAM/env/esd/6thmeetsc/Informal%20Documents/phaseiiprogressreport_IP.8.pdf

competences. Education for sustainability entails much more than simply including ESD topics in the curricula. It must focus primarily on transformative teaching and learning approaches and transdisciplinarity[89], as specialised disciplines have been found insufficiently capable of addressing the complexity of socio-ecological systems[90]. Thus, instruction on suitable pedagogies or pedagogical guidelines to foster action competences is crucial, as are interdisciplinary approaches to building the necessary synergies between disciplines. The main benefit of interdisciplinary teaching is its impact on students' ability to connect issues and become effective real-world problem-solvers[91][92].

A cross-disciplinary approach links subjects together under the premise of one subject retains dominance. Interdisciplinary approaches are defined by Newell and Green (1982) as "inquiries which critically draw upon two or more disciplines and lead to an integration of disciplinary insights"[93]. Interdisciplinary teaching is therefore slightly more sophisticated, and requires the rearrangement of courses to extend beyond traditional single subjects. Yet, both approaches call for the integration of EES topics into all subjects horizontally or simultaneously within a lesson. The figure below provides an overview of possible ways in which education for environmental sustainability can be integrated into the curriculum.

Figure 3. Ways to mainstream EES into school curricula



Source: Authors

According to the curriculum analysis, one-third of Member States encourage interdisciplinary approaches in their curricula, and these are primarily linked to natural

89 Biberhofer, P. and Rammel, C. (2017). Transdisciplinary learning and teaching as answers to urban sustainability challenges. International Journal of Sustainability in Higher Education, 18(1), p. 63–83. doi:10.1108/ijshe-04-2015-0078

90 Nölting, B., Molitor, H., Reimann, J., Skroblin, J.-H. and Dembski, N. (2020). Transfer for Sustainable Development at Higher Education Institutions—Untapped Potential for Education for Sustainable Development and for Societal Transformation. Sustainability, 12(7), 2925. doi:10.3390/su12072925

91 Wright, J. (2018). Critically analyse and evaluate interdisciplinary approaches to teaching and learning, Journal of Middlesex Education Students (Vol.1). Available at: https://mdxcers.files.wordpress.com/2018/03/jwright-pp4-9.pdf

92 Pickford, T., Garner, W. and Jackson, E. (2013). Primary humanities: Learning through enquiry. SAGE Publications Limited.

93 Newell, W.H. and Green, W.J. (1982). Defining and teaching interdisciplinary studies. Improving College and University Teaching 30(1), pp.23-30.

science courses. In some cases, the cross-cutting themes of the environment and sustainable development are integrated into various subjects; in others, they are separate subjects, each with plenty of scope for suitable classroom and field projects. This can be done with or without accompanying guidelines for integration (e.g., included in **Germany**); structures and links to environmental sustainability through 'mandatory cross-cutting themes' (e.g., included in **Estonia, Slovakia, Sweden**); and by describing learning objectives for knowledge, skills, attitudes and competences. Some countries refer to specific teaching methods in their curricula, the majority of which promote learner-centred learning (e.g. **Finland, Netherlands, Hungary, Latvia, Romania, Estonia and Slovenia**). Austria takes a particularly comprehensive approach to interdisciplinarity in its curriculum frameworks: the requirement to include interdisciplinary is included in the *'Decree for Environmental Education for Sustainable Development'*[94], and the National Education Report defines the implementation of interdisciplinary competences at various levels of education as a quality criterion for the **Austrian** education system.

Furthermore, while EES is usually linked to natural science courses, our curriculum review notes that that an environmental dimension is increasingly integrated also into civil education subjects (also appearing as 'ethics', 'citizenship', or 'citizen science') in a growing number of countries. These subjects are included in secondary education, but also at primary level in 16 out of the 27 countries analysed. The diversity with regard to the content of these subjects provides educators and policy makers with a great opportunity to introduce interdisciplinary aspects of EES and to capitalise on both national and European dimensions that relate directly to EES themes.

Building a 'sustainability mindset' requires not only knowledge about environmental issues, but also a positive and caring attitude towards the environment. Research has shown that most attitudes are formed very early in life, and it is therefore very important for environmental education to begin in early childhood[95]. Promoting a sustainability mindset during a child's early years requires the development of environmental literacy in the age-appropriate way. Environmental education in early childhood encompasses knowledge of the natural world, as well as emotions, dispositions and skills. Compared with school-aged children, the approach to environmental education for early childhood learners is less about achievements and more about free discovery on each child's own terms. Young children explore the world through play and experiences, thus the **experiential** aspect of delivering environmental education in the early years is often highlighted in the literature. **Play** is often discussed in research as a constitutive part of learning during the early childhood years, since playing can contribute to the development of cognitive functions, as well as to the communicative and social skills[96] necessary for a child's future sustainability mindset. Particularly among very young children, EES should incorporate exploring woodlands, getting wet feet, climbing rocks, building with sticks, running on grass, turning over rocks,

94 See Austrian Federal Ministry for Education and Women´s Affairs (2014). 'Decree for Environmental Education for Sustainable Development',. Available at: https://www.bmbwf.gv.at/dam/jcr:e470c99b-52cb-44fd-959b-24b2af87d7f1/2014_20_ge_umwelt_en.pdf

95 Siraj-Blatchford, J., Smith, K.C. and Samuelsson, I.P. (2010). Education for sustainable development in the early years. OMEP, World Organization for Early Childhood Education.

96 Bascopé, M., Perasso, P. and Reiss, K. (2019). Systematic Review of Education for Sustainable Development at an Early Stage: Cornerstones and Pedagogical Approaches for Teacher Professional Development. Sustainability, 11(3), 719. doi:10.3390/su11030719.

following insects, and connecting with nature[97]. Consequently, outdoor learning and experiences are important characteristics of environmental education in ECEC.

Given the young age of pupils and their limited capacity to comprehend complicated information, research advises that education for environmental sustainability in ECEC should focus more on skills, attitudes and values than on specific content knowledge. It should be organised around three main criteria: 1. It should be action-integrative; 2. It should be community-based; and 3. It should be value-oriented, with a large enough scope to develop ethical and aesthetic attitudes with regard to humans and non-humans[98]. In general, experts agree that the thematic focus of environmental issues in ECEC should be on concrete objects and questions within their surroundings, such as exploring plants and trees (and the issue of deforestation), the cycle of nature, facts about animals, or the importance of saving water.

However, evidence is fragmented as to the extent to which EES is consistently integrated into ECEC curricula across the Member States. **Finland** proves to be an exceptional case, in where the approach advised by research is used. According to the Finnish national core curriculum for ECEC, the goal of early childhood education is to develop the child's co-operation and interaction skills, promote peer activities and guide ethically responsible and sustainable activities, respect for other people, and membership of society. Early childhood education is based on respect for life, sustainable living and human rights, as well as on the inviolability of human dignity.[99] The 2018 national core curriculum for early childhood education and care states that all activities should consider the need for an ecologically, socially, culturally, and economically sustainable lifestyle. Everyday choices and actions should reflect a responsible attitude towards nature and the environment, and early childhood education should promote sharing, reasonableness, sustainability, and the repair and re-use of resources.[100] In **Germany**, ESD and related concepts are present in almost half of ECEC education courses, and the universities that prepare educators include ESD in the training of educators, as well as preparatory professions (e.g. nursery teachers)[101].

Table 7 provides a comprehensive overview of EES competences and curricula. This reveals that the presence of EES is limited at curriculum and competence level. Even so, more than half of Member States possess full or at least partial EES competence frameworks. EES is most frequently part of the national curriculum at primary and secondary level. Lastly, three Member States – **Austria, Cyprus and Czech Republic** – appear to have national EES curricula. In Austria, a new curriculum for primary and lower secondary schools is currently being developed. EES is anchored into the general part of this, with its own competence goals, and is made compulsory in certain subject curricula. In **Cyprus**,

97 Siraj-Blatchford, J., Smith, K.C. and Samuelsson, I.P. (2010). Education for sustainable development in the early years. OMEP, World Organization for Early Childhood Education.

98 Bascopé, M., Perasso, P. and Reiss, K. (2019). Systematic Review of Education for Sustainable Development at an Early Stage: Cornerstones and Pedagogical Approaches for Teacher Professional Development. Sustainability, 11(3), 719. doi:10.3390/su11030719.

99 Finnish National Agency for education 2021. National core curriculum for early childhood education and care 2018. Available in Finnish at: https://www.oph.fi/sites/default/files/documents/varhaiskasvatussuunnitelman_perusteet.pdf. [8 February 2021].

100 Finnish National Agency for education 2021. National core curriculum for early childhood education and care 2018. Available in Finnish at: https://www.oph.fi/sites/default/files/documents/varhaiskasvatussuunnitelman_perusteet.pdf. [8 February 2021].

101 Singer-Brodowski, M., Brock, A., Etzkorn, N. and Otte, I. (2018). Monitoring of education for sustainable development in Germany – insights from early childhood education, school and higher education. Environmental Education Research, 1–16. doi:10.1080/13504622.2018.1440380

the EES curriculum in pre-primary and primary education is developed through 12 thematic units of international, regional and national interest. Each thematic unit includes: a) the basic notions and vocabulary relating to the particular issue; b) indicators; and c) learning outcomes, which are differentiated according to the age of the students. In **Czech Republic**, the curriculum goals for EES have been defined in the document 'The Goals and Indicators of Environmental Education'[102].

Table 7. Education for environmental sustainability competences and curricula, EU-27

COMPETENCES AND CURRICULA	Member States																										
General	AT	BE	BG	CY	CZ	DE	DK	EE	EL	ES	FI	FR	HR	HU	IE	IT	LT	LU	LV	MT	NL	PL	PT	RO	SE	SI	SK
National EES curriculum	●				●	○	○			○	○	○	○			○		○	○				○		○	○	○
EES is part of the national curriculum					●	○						○															○
EES competence framework	○	○	●	●	○	○	○	●	●	○	○	○	○	○	○	○	○	○	○	●		○	●	○	○	○	○
ECEC																											
National EES curriculum	○			●	●	○	○					○												○	○		○
EES is part of the national curriculum				●	●	○						○		●													○
EES competence framework	○				○	○				○	○	○		○			○						○				○
Primary/secondary																											
National EES curriculum	○			●	●	○	○					○						○									○
EES is part of the national curriculum	●	●	●	●								○									●	●	●		●	●	●
EES competence framework	○				○	○	○	○		○		○	○	○		○		○	○	○							○
Higher education																											
National EES curriculum	○					○	○					○															○
EES is part of the national curriculum	○					○						○															○
EES competence framework	○	○		○	○	○		○		○	○	○		○	○	○	○		○	○			○				○

Source: Authors. *Note*: ● – Present in the country ○ – only partially present ○ - not present. Blank cell indicates N/A.

One of the key barriers to the effective implementation of a curriculum that embraces EES in practice is a lack of supportive leadership,[103] as well as a lack of up-to-date relevant educational content. In general, environmental sustainability is a challenging topic to teach, as teachers report uncertainties over teaching it.[104] For some, it is a controversial topic, and this further complicates teaching it.[105] Another challenge is that curriculum guidelines and content has to compete with false information about climate change, spread

102 Ministry of the Environment of the Czech Republic (2011). 'Cíle a indikátory pro environmentální vzdělávání, výchovu a osvětu v České republice'. Available at: https://www.mzp.cz/C1257458002F0DC7/cz/environmentalni_vzdelavani_poradenstvi/$FILE/OEDN-Cile_a_indikatory_EVVO-20200717.pdf

103 Kadji-Beltran, C., Zachariou, A. and Stevenson, R. (2013). Leading sustainable schools: exploring the role of primary school principals, Environmental Education Research, 19:3, 303-323, DOI: 10.1080/13504622.2012.692770

104 Oversby, J. (2015). Teachers' learning about climate change education. Procedia-Social and Behavioral Sciences, 167, 23-27.

105 Oversby, J. (2015). Teachers' learning about climate change education. Procedia-Social and Behavioral Sciences, 167, 23-27.

through online disinformation campaigns.[106] Providing comprehensive curriculum guidelines, as well as educational content that is up-to-date and correct is therefore crucial – but this is one of the weakest areas of curriculum frameworks on ESD, due to teachers' lack of access to such material[107].

Overall, the lack of priority given to EES in curricula, along with the insufficient resources available and the thematic dismissal of EES, play a major role in limiting the effective implementation of EES. This reasoning is supported by data provided within the national reports. The national report for **Malta** suggests that "although EES is gaining momentum in Malta, other priorities compete with EES for scarce human and financial resources, and consequently EES is always put on the back burner". Similarly, curriculum overload is evident in Member States including **Poland, Slovenia** and others. While existing strategic and teaching material might be available that could help schools and teachers alike to integrate EES to a desirable degree, rigid curriculum frameworks are often too overloaded, thus relegating EES to being either an extra-curricular matter or one that is limited to superficial coverage. Policymakers often appear to make new additions to the curricula on top of existing programmes, instead of rethinking the order and importance of the programmes as a whole.

The data from the national reports suggest that the existence of **education silos** may be one of the key reasons why the interdisciplinarity of EES is sometimes seen as a barrier. For the sake of clarity, it should be stated that the fact that EES is interdisciplinary is not, in itself, a barrier. Rather, the barrier in this context is the structuring of schools around single subjects. It should also be noted that this is a barrier common to many Member States. Two country-level examples provide good insights into this issue. The national report on **Austria** argues that the silo structure makes it more difficult to deal with the overarching issues that EES is trying to address. Similar reasoning can be found within the national report on **Estonia**, which states that in order to address the issue of education silos and to better incorporate EES, an educational paradigm shift is required towards whole-system thinking. Data from the national reports overall suggest that EES materialises most often in natural science subjects such as biology (See Annex).[108] In other subjects, EES tends to be presented as a supplement – EES elements are placed in textbooks and workbooks, but in the form of appendices or minor sub-chapters.

Considerable progress has also been made to incorporate sustainable development into the curricula of HEIs – an area in which European HEIs have led the way[109]. However, there remains a lack of more learner-centred and collaborative pedagogies that align with EES. In addition, sustainability often finds itself positioned into discipline-based sustainable development courses in higher education. These are typically not multidisciplinary or

106 Rosenzweig, A. (2017). Understanding and Undermining Fake News From the Classroom. In: Berkeley Review of Education 7. Available at: https://escholarship.org/uc/item/7rk9w7tm

107 UNECE (2020). Information paper no. 2: 'Learning from each other: achievements, challenges and ways forward. Fourth evaluation report of the UNECE Strategy for Education for Sustainable Development'. Available at: https://unece.org/fileadmin/DAM/env/esd/6thMeetSC/Informal%20Documents/PhaseIIProgressReport_IP.8.pdf

108 In terms of content, the natural sciences in primary and secondary education are a combination of two central branches: the life sciences and the physical sciences. The life sciences revolve around biological studies, and the physical sciences contain astronomy, chemistry, Earth science, and physics.

109 Lozano, Rodrigo, et al. (2019). 'Teaching sustainability in European higher education institutions: Assessing the connections between competences and pedagogical approaches'. Sustainability 11.6: 1602.

transdisciplinary, and thus reflect only one component of education for environmental sustainability – content for learning, leaving behind the whole-institution approach vital to EES implementation. **Nature-based solutions** (NBS) also occur more frequently in higher education in the context of formal education[110]. There are entire degrees[111], university courses[112], micro-credentials provided by universities outside of their regular syllabuses[113], as well as learning platforms[114] aimed at teaching about NBS in HE. However, education for sustainability entails much more than including ESD topics into curricula, and must focus primarily on transformative teaching and learning approaches and trans-disciplinarity[115], as specialised disciplines cannot sufficiently address the complexity of socio-ecological systems[116].

The key enabling structural factors necessary for effective curriculum integration that fosters learners' skills are: specialised environmental education centres, local embedding and collaboration, as well as school plans and voluntary schemes for schools. For example, Estonia set up specialised environmental education centres to help teachers design lessons and access materials that are in line with the policy and curriculum. The VET system in Romania introduced the Local Development Curriculum (LDC) as a part of the curriculum adapted to local development needs. This is developed by the school in partnership with companies, taking into account local labour market trends and needs. Lastly, throughout Europe, school plans are becoming increasingly popular that focus on enhancing sustainable development in the curriculum and classroom through projects and/or the promotion of voluntary schemes for individual schools to seek ESD recognition and certification.[117] To varying degrees, these solutions require collaboration and the potential outsourcing to experts of teachers' tasks in implementing the curriculum. While this goes some way towards solving the aforementioned challenges, and has the potential to diversify methods and pedagogies, it is also criticised for being a short-term solution compared with developing teachers' knowledge, skills and values[118].

110 [to be published] Mulvik, I.B., Pribuišis, K., Gras-Velázquez, À., Dumčius, R. and Coles, N. (2020) Nature-Based Solutions in education – A Pilot Study, European Commission, December 2020.

111 University of Antwerp, 'Advanced Master in Water Sustainability: Integrating Technology and Nature-Based Solutions (Think Water)', Master's studies. Accessed 13.12.2020 from https://www.masterstudies.com/Advanced-Master-in-Water-Sustainability-Integrating-Technology-and-Nature-Based-Solutions-(Think-Water)-(M.Sc.)/Belgium/uantwerp/

112 Paterson, J. and Penman, H. 'Postgraduate Course: Nature-based Solutions (PGGE11265)', University of Edinburgh. Accessed 13.12.2020 from http://www.drps.ed.ac.uk/20-21/dpt/cxpgge11265.htm

113 Cranfield University, 'Nature Based Solutions for Water and Land Management'. Accessed 13.12.2020 from https://www.cranfield.ac.uk/courses/short/water/nature-based-solutions-for-water-and-land-management

114 Lund University, 'Urban Nature: Connecting Cities, Nature and Innovation. Course: Climate Change and Nature-Based Solutions', Coursera. Accessed 13.12.2020 from https://www.coursera.org/lecture/urban-nature/climate-change-and-nature-based-solutions-h4t0l

115 Biberhofer, P. and Rammel, C. (2017). Transdisciplinary learning and teaching as answers to urban sustainability challenges. International Journal of Sustainability in Higher Education, 18(1), p. 63–83. doi:10.1108/ijshe-04-2015-0078

116 Nölting, B., Molitor, H., Reimann, J., Skroblin, J.-H. and Dembski, N. (2020). Transfer for Sustainable Development at Higher Education Institutions—Untapped Potential for Education for Sustainable Development and for Societal Transformation. Sustainability, 12(7), 2925. doi:10.3390/su12072925

117 UNECE (2016). Ten years of the UNECE strategy for education for sustainable development. UN Distr. GENERAL ECE/CEP/179/2016, 23 May 2016, pp. iii.

118 Keddie, A. and Holloway, J. (2019). School autonomy, school accountability and social justice: stories from two Australian school principals, School Leadership & Management, doi: 10.1080/13632434.2019.1643309

3.3. Training and capacity building among education personnel

Building the competences of teachers and educators is crucial to ensuring that they are capable of successfully integrating education for environmental sustainability into their daily lessons and activities. Hence, the inclusion of EES topics into initial and in-service training for educators and teachers is very important and can contribute significantly to the better implementation of EES in education systems. According to UNECE, 26 member states (81% of UNECE members) reported that ESD is part of initial teacher training in their countries, while 28 member states (87.5%) stated that these topics are covered by in-service teacher training. ESD-related competences are also addressed during training programmes for education leaders and administrators in 22 member states (68%).[119] While the integration of EES into teaching practices is important and some guidance on how this can be achieved is available at national levels across the EU, in practice the situation varies greatly between Member States and some challenges persist.

While this section focuses primarily on teachers and educators, the literature suggests that the training of school leaders is an increasingly important factor in the mainstreaming of EES – but has been overlooked significantly in practice. Training the principals and leaders of institutions matters, because they can help to further support teachers and generate a positive school culture in relation to EES. Certain key areas have been highlighted as crucial for the professional development for principals. These include empowering staff, encouraging critiques of current approaches, and exploring alternative possibilities for curricula, pedagogies and policy.[120]

In 2014, the **Austrian Federal Ministry for Education and Women´s Affairs** passed the Decree for Environmental Education for Sustainable Development[1], which outlines **clear objectives for environmental education and the competences it should focus on holistically**. They should be implemented in teacher education institutions for both the initial and continuous training of teachers.

In **Latvia, environmental education often highlights local and global perspectives,** and focuses on both the local community and the interconnectedness of communities around the globe. It also raises awareness of past and future generations, and highlights the dimensions of responsibility and care.[1]

Teacher training on EES may also include a variety of perspectives. These can focus on globally important topics, connecting them with the local reality and challenges. In some countries, education for environmental sustainability has been integrated into initial and in-service teacher training through clear guiding frameworks. These frameworks aim to integrate EES perspective holistically.

Unfortunately, while EES has received a sizeable increase in attention from a variety of stakeholders in education, this is a relatively recent development, and knowledge is still lacking with regard to EES topics and, especially, pedagogy. Consequently, there remains a lack of research and engagement from educational communities with regard to EES. For example, in the **Czech Republic**, even though the EES academic community has grown over recent years, it remains relatively small. Consequently, EES is insufficiently represented in in-service teacher programmes and graduates are inadequately prepared to implement EES in their schools.

119 UNECE (2020). Information paper no. 2: 'Learning from each other: achievements, challenges and ways forward. Fourth evaluation report of the UNECE Strategy for Education for Sustainable Development'. Available at: https://unece.org/fileadmin/DAM/env/esd/15th_Meeting_SC/Doc/Informal_documents/Information_paper_No.2_-_4th_revised_evaluation_report_after_Oct_2020_meeting_revised_5Nov2020.pdf

120 Kadji, C., Zachariou, A. and Stevenson, R. (2012). Leading sustainable schools: Exploring the role of primary school principals. Environmental Education Research, Environ Educ Res. 19. 1-21. 10.1080/13504622.2012.692770.

Another overarching challenge to the integration of EES into both initial and in-service teacher training may be the lack of a homogeneous strategy and approach to teacher training at national level. For example, in **Germany**, wide variations exist between federal states with regard to the inclusion of EES in teacher training. There is no common thread, and no national policy providing direction as to how to implement EES within the education sector. While EES topics are integrated from a cross-sectoral perspective into various legislative documents in federal states such as Rhineland-Pfalz, these are barely referenced, or not at all, in education policy documents in other federal states.[121] The integration of EES into programmes for continuous professional development similarly depends on national or regional priorities. In Germany, EES is implicitly or explicitly part of subject-related or interdisciplinary teacher training and qualification measures for head teachers and school counsellors.[122] In **Sweden**, responsibility for the professional development of teachers is decentralised, with school owners being fully responsible for it, which results in large discrepancies between teachers in terms of knowledge and skills on various topics including EES. In response to this, the government in Sweden has proposed a national framework for the professional development of teachers and school leaders, which has not yet been implemented.[123]

Initial teacher training

Existing studies show that future teachers should acquire sustainability competences to promote meaningful changes towards the more sustainable behaviour of students.[124] Hence, holistic approaches are needed to ensure that future teachers acquire these competences. Before building the necessary competences in students, teachers must recognise their agency in relation to the teaching of sustainability, and find their role as agents of societal change towards sustainability.[125]

The ways in which EES topics are integrated into initial teacher training differ between EU Member States. EES topics can be fruitfully included into initial teacher training in various ways. These include:[126]

— Part of the core curriculum, alongside literacy and numeracy in early childhood and primary teacher education programmes;

121 Holst, J., Brock, A., Singer-Brodowski, M. and de Haan, G. (2020). 'Monitoring Progress of Change: Implementation of Education for Sustainable Development (ESD) within Documents of the German Education System'. Sustainability, 12(10), 4306; https://doi.org/10.3390/su12104306

122 Kultusminister Konferenz (2017). ‚Zur Situation und zu Perspektiven der Bildung für nachhaltige Entwicklung'. Available at: https://www.kmk.org/fileadmin/Dateien/veroeffentlichungen_beschluesse/2017/2017_03_17-Bericht-BNE-2017.pdf

123 SOU2018:17 (2018). Med undervisningsskicklighet i centrum – ett ramverk för lärares och rektorers professionella utveckling. Slutbetänkande av Utredningen om en bättre skola genom mer attraktiva skolprofessioner. Stockholm: Statens offentliga utredningar. https://www.regeringen.se/rattsliga-dokument/statens-offentliga-utredningar/2018/03/sou-201817/?TSPD_101_R0=08054bd396ab200076399e51cfe347d54888c85014972fa813831ea1b3071438b0e4aa914b80336708e158796014300085474f5fac33a6fa67ef774f6be52a6c947e1f37d65d6adc0b91394ebb1db4971834b6f2144c4956c55ffd233bcb9488

124 Vare, P. et al. (2019). Devising a Competence-Based Training Programme for Educators of Sustainable Development: Lessons Learned. Sustainability, 11(7), p.18-90. doi:10.3390/su11071890.

125 Weinberg, A.E., Trott, C.D., Wakefield, W. et al. (2020). Looking inward, outward, and forward: Exploring the process of transformative learning in teacher education for a sustainable future. Sustain Sci. 15, 1767–1787.

126 Gough, A. (2016). Teacher Education for Sustainable Development: Past, Present and Future. Available at: https://www.researchgate.net/publication/303704647_Teacher_Education_for_Sustainable_Development_Past_Present_and_Future

- Being offered as an elective. This results in a few teachers specialising in EES, rather than all teachers developing the necessary skills;
- Being mainstreamed across the teacher education programme through a focus on helpful pedagogies (e.g. problem-based, project-based) and didactics (e.g. eco-justice), so that a genuine 'whole-system' approach to EES can be developed;
- A combination of the above.[127]

In some Member States, EES topics are integrated as part of the core curriculum, but in the majority they are offered as electives. In other countries, even though there is no explicit emphasis on sustainability in the main subjects such as languages or mathematics, sustainability is included as a learning objective. Including EES topics as part of the obligatory subjects or including sustainability as a learning objective can ensure that teachers are aware of their importance and are capable of implementing EES approaches in their teaching practices. However, the inclusion of EES topics only in certain subjects or as electives may result in some teachers lacking expertise in such topics, and struggling to implement EES approaches in their daily practices.

In countries where there is no clear compulsory teaching on EES topics, guidelines may be available on the integration EES into teacher training. This is helpful for future teachers and teacher training; however, as guidelines are often not binding, they are often not properly followed due to time constraints or a lack of clarity as to how they should be implemented.

A European survey shows that a lack of expertise or training was the most common reason (66%) why teachers might not include climate education in their lessons, followed by a lack of climate education resources (51%)[128]. The results of a study during which 18 in-depth interviews were conducted with teachers shows that the absence of environmental education and sustainable consumption in teaching practices is often a consequence of a lack of knowledge by the educators.[129] Even though courses on EES topics exist, they are often not obligatory, which means that most educators and teachers do not possess basic knowledge on how to incorporate EES into their teaching practices. For example, in **Luxembourg**, courses relating to EES are available, but as they are not obligatory, many current and future teachers do not choose them, and are thus not prepared to implement EES in their daily teaching. This is especially challenging in countries where EES is an obligatory part of school education. For example, in **Slovenia**, environmental education is a mandatory part of school education, and every teacher is obliged to include it in their teaching. However, many teachers lack the necessary knowledge and skills, as environmental sustainability is rarely part of their main training. Consequently, numerous EU Member States, including **Cyprus, the Czech Republic and Malta**, have noted the lack of knowledge of EES principles among teachers as an ongoing challenge[130].

127 Ferreira, J., Ryan, L. and Tilbury, D. (2006). A review of models for professional development in pre-service teacher education. Available at: http://aries.mq.edu.au/projects/preservice/files/TeacherEduDec06.pdf

128 School Education Gateway, 'Survey on climate education – results', School Education Gateway, 31.07.2020. Available at: https://www.schooleducationgateway.eu/en/pub/viewpoints/surveys/survey-on-climate-education.htm [Accessed 20.01.2021]

129 Melo, H.M.S., de Carvalho, D.B. and Sampaio, D.B. (2020). Environmental Education and Sustainable Consumption. U. Porto Journal of Engineering, 6(1), 52-65.

130 UNECE. (2016). Ten years of the UNECE strategy for education for sustainable development. UN Distr. GENERAL ECE/CEP/179/2016 23 May 2016.

Several studies comment on the difficulties associated with interdisciplinary teaching (including teacher training approaches) and subject-specific timetables[131][132]. Introducing environmental sustainability through interdisciplinary perspectives or as a cross-curricular topic requires negotiation and cooperation between discipline-based teachers, which may be hard to manage in practice[133]. Besides, confusion exists between interdisciplinary, multidisciplinary and cross-curricular methods, which adds a layer of complexity for the teachers and school leaders trying to implement them.[134] In **Italy**, for example, initial teacher education focuses primarily on disciplinary knowledge and not on the competences that teachers and students need to develop for more sustainable behaviour. Teachers are also rarely prepared for an interdisciplinary approach to education, which is necessary for EES. This presents challenges for teachers later, when they try to implement EES.

The way in which EES is integrated into the teacher training curriculum can also depend on the education level and subject for which trainee teachers are preparing. For example, in **Croatia**, some courses for future teachers in early childhood education and care take an integrated pedagogical approach to EES, and provide future teachers with the basics of EES necessary for preschools in a holistic way.[135] At the same time, education for primary school teachers tends to include obligatory subjects with a focus on EES, such as Natural Science.[136] For future secondary education teachers, EES topics tend to be taught only to those teachers who choose subjects that are related to, for example, Natural Science. In **Sweden**, while the training of primary and higher-level teachers usually does not explicitly include sustainable development, EES-related topics and competences are included in pre-school teacher training. These tend to emphasise learner-centred and participatory pedagogical approaches.[137] Having different approaches to EES at different education levels can be beneficial, as children of different ages may understand sustainability issues in different ways, and may respond better to certain pedagogical approaches. However, the trend that can be observed is that while EES topics are better integrated into teacher training for future ECEC teachers, they tend to be fragmented and included only in some subjects at higher education levels. This could result in EES teaching being fragmented and limited at those levels of education.

The importance of a 'whole-institution' approach towards EES has been emphasised in recent years, and is gaining popularity in Europe across different levels of education[138]. Consequently, more and more countries are focusing on introducing a whole-institution

131 Bolscho, D. and K. Hauenschild. (2006). 'From Environmental Education to Education for Sustainable Development in Germany', Environmental Education Research 12 (1): 7–18. doi:10.1080/13504620500526297.

132 Gayford, C.G. and Dillin, P.J. (1995). 'Policy and the Practice of Environmental Education in England: A Dilemma for Teachers', Environmental Education Research 1 (2): 173–183. doi:10.1080/1350462950010204.

133 Stevenson, B. (2007) Schooling and environmental/sustainability education: from discourses of policy and practice to discourses of professional learning, Environmental Education Research, 13:2, 265-285, doi: 10.1080/13504620701295650

134 Wright, J. (2018). Critically analyse and evaluate interdisciplinary approaches to teaching and learning. In: Journal of Middlesex Education Students (Vol.1). Available at: https://mdxcers.files.wordpress.com/2018/03/jwright-pp4-9.pdf

135 University of Rijeka (2017). 'Studijski program Diplomski sveučilišni studij Rani i predškolski odgoj i obrazovanje'. Available at: https://www.ufri.uniri.hr/files/studiji/280417_Studijski_program_Rd_proieni_tekst.pdf [Accessed 4 March 2021].

136 University of Zagreb (2021) 'Studijski program Učiteljski fakultet'. Available at: https://www.ufzg.unizg.hr/wp-content/uploads/2020/03/US903_CORE.pdf [Accessed 4 March 2021].

137 https://www.gu.se/studera/hitta-utbildning/hallbar-utveckling-och-globala-perspektiv-1-for-forskollarare-lofa61

138 UNECE (2020). Information paper no. 2: 'Learning from each other: achievements, challenges and ways forward'. Fourth evaluation report of the UNECE Strategy for Education for Sustainable Development.

approach towards EES in initial teacher training. For example, in **Estonia**, educators and teachers at all educational levels are trained to use cross-curriculum, integrated and whole-institution approaches. A more integrated and whole-institutional approach is also often introduced in teacher education by focusing on the competences necessary for change towards sustainability and behavioural changes, instead of focusing on theoretical knowledge about sustainability. In **Spain**, under Order ECI/3854/2007[139], pre-service teachers in early childhood education and care should acquire competences relating to environmental sustainability, such as the ability to analyse the most relevant issues in today's society and the ability to develop didactic proposals concerning the interactions between science, technology, society and sustainable development. Similar competences are required from pre-service primary teachers as well. Under Order ECI/3857/2007[140], during their education future teachers should acquire competences relating to multiculturalism, social inclusion and sustainable development. According to Order ECI/3858/2007[141], future secondary school teachers should be able to develop learning areas with a special focus on emotional education, equity, equal rights and opportunities for men and women, and respect for human rights, that can facilitate life in society and the construction of a sustainable future. A focus on a whole-institution and cross-curricular approach tends to benefit teachers and students, and is one of the most effective approaches to promoting behavioural change towards sustainability. However, the transfer of these competences into individual degrees in education and their effectiveness often depends largely on individual universities and other teaching institutions.

Another important issue is that even though EES focuses more on the development of competences than on theory, teacher training still often prioritises theoretical knowledge. For example, in **Lithuania**, initial teacher training for ECEC and primary education in practice often pushes trainee teachers more towards theoretical knowledge rather than problem-solving and other important skills, despite its proclaimed focus on competence development.[142] A similar issue hinders the successful implementation of the whole-institutional approach, as EES topics – and especially their interdisciplinarity – are often missing from training for school administrators and leaders. For example, in **Portugal**, EES topics and competences are not emphasised during training for school leaders and non-teaching staff, which means they may lack the knowledge necessary for a whole-institutional approach to EES.

In the Netherlands, **the teacher programme titled *De Duurzame docent*** (sustainable teacher) aims to ensure that teachers focus not only on teaching children the necessary knowledge in subjects as English or mathematics, but also help them to develop important competences to ensure that children are flexible, agile, and are able to adapt to new situations quickly. See more: https://duurzamedocent.nl

While EES knowledge and skills are often included in initial teacher training, it is also crucial to ensure that teachers actually acquire them. For this reason, some countries have also developed various initiatives to help trainee teachers to assess their newly acquired

139 Ministry of Education and Science, 'Order ECI/3854/2007, of 27 December, which establishes the requirements for the verification of official university degrees that enable the exercise of the profession of Early Childhood Education Teacher', 29 December 2007 (312).

140 Ministry of Education and Science, 'Order ECI/3857/2007, of 27 December, which establishes the requirements for the verification of official university degrees that enable the exercise of the profession of Primary Education Teacher.', 29 December 2007 (312).

141 Ministry of Education and Science, 'Order ECI/3858/2007, of 27 December, which establishes the requirements for the verification of official university degrees that enable the exercise of the professions of Teacher of Compulsory Secondary Education and Baccalaureate, Vocational Training and Language Teaching.', 29 December 2007 (312).

142 Jucevičienė, P. (2010). Teacher Training in Lithuanian Higher Education Institutions in the Context of Education for Sustainable Development. Retrieved from: https://www.smm.lt/uploads/documents/darnus-vystymas/pedagogu_rengimas_DVS_kontekste.pdf

knowledge on environmental sustainability. One example is **Austria**'s 'competency compass'[143]. This builds upon the basic decree for environmental education for sustainable development, and can be used as a framework for teacher training on EES. Teachers can use it to assess their newly acquired skills and knowledge on the environment and sustainability, as well as their methodological-didactic approaches to EES.[144] Such assessment frameworks can significantly improve EES teaching in teacher training. Unfortunately, in most countries, assessment mechanisms for EES topics and competences for future teachers remain weak.

In-service teacher training

While it is important to ensure EES topics are introduced in initial teacher training, it is also crucial to offer in-service teacher training on these topics, especially given that environmental education and its focus is constantly changing and evolving.[145] Key competences that are often the focus of continuous professional development programmes for teachers are presented in the figure below. However, while in-service teacher training on EES topics is very important, it tends to vary significantly between EU Member States in terms of its importance, formats and the stakeholders involved.

Various institutions and organisations can be included in the provision of in-service teacher training on EES. For example, in **Germany**, classic in-service teacher training is supplemented by formats that are carried out in cooperation with other ministries in addition to the Ministry of Education or within the framework of topic-specific (school) programmes or campaigns, as well as, to a particular extent, through the involvement of non-school education providers representing various areas of ESD. Furthermore, some federal states appoint so-called 'ESD multipliers', who carry out further training courses within the framework of their respective areas of responsibility.[146] In **Spain**, in-service teacher training on EES is provided by the unit of the Ministry of Education responsible for the continuous training of non-university teachers[147]; the National Centre for Environmental Education; public administration institutions; and private entities. Such training tends to differ in focus, target group, length, and intensity. Universities, naturally, also play an important role in the provision of in-service teacher training on various topics, included EES. In **Slovenia**, for example, professional development courses on EES are often offered by tertiary education institutions or educational institutions in collaboration with ministries. In some countries, corporate and commercial partners play a very significant role in providing teacher education on EES topics.

143 Federal Ministry of Education, Science and Research (BMBWF) (2019). ‚Kompetenzen von Pädagoginnen und Pädagogen zur Umweltbildung für nachhaltige Entwicklung'. Available at: https://www.oekolog.at/static/fileadmin/oekolog/dokumente/Publikationen/Broschuere_Kompetenzenkompass.pdf.

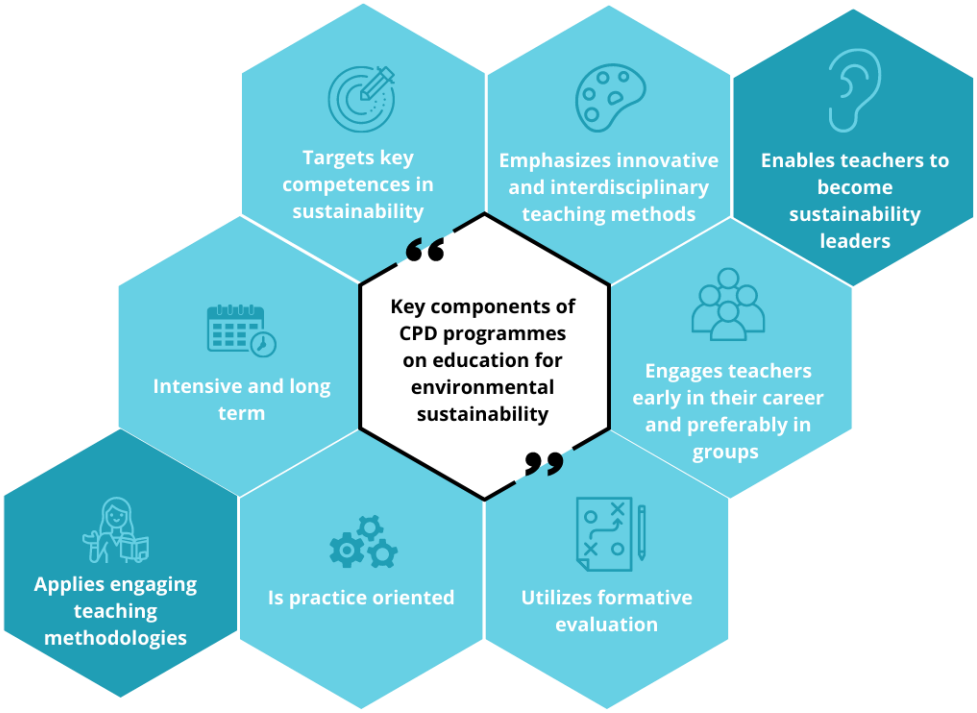
144 ÖKOLOG (n.d.). Kompetenzen-Kompass. Available at: https://www.oekolog.at/fileadmin/oekolog/dokumente/Publikationen/Kompetenzen-Kompass_Vers_4April2019___1_.xlsm.

145 Stevenson, R.B. (2007). Schooling and environmental/sustainability education: From discourses of policy and practice to discourses of professional learning. Environmental Education Research, 13(2), 265-285.

146 Kultusminister Konferenz (2017). ‚Zur Situation und zu Perspektiven der Bildung für nachhaltige Entwicklung'. Available at: https://www.kmk.org/fileadmin/Dateien/veroeffentlichungen_beschluesse/2017/2017_03_17-Bericht-BNE-2017.pdf

147 https://intef.es/

Figure 4. Key components of CPD programmes on education for environmental sustainability



Source: Authors

The Centre for Environment Studies at the University of **Latvia** University cooperates with various NGOs to organise professional development courses on EES, which are often included in other activities such as environmental school network support or environmental camps. Such activities are popular, as they introduce a new perspective on natural sciences and offer an integrated exploratory and action-oriented approach to environmental education, as well as introducing aspects such as the evaluation of personal lifestyle and citizenship.[1]

Several EU Member States emphasise the role of NGOs in training teachers, particularly on topics relating to the environment. For example, the NGO Djago in **Belgium** provides material on various EES topics on its website, and teachers can ask for guidance or advice from the NGO's employees.[148] An NGO in **Sweden**, Keep Sweden Tidy, also offers in-service teacher training on environmental education, as well as producing teacher training textbooks and other materials on EES topics for schools and teachers.[149] In **Croatia**, civic society organisations organise various activities relating to EES outside the formal education structure. For example, the civic society organisation Odraz, which supports behavioural change towards sustainability, organises the Academy of Sustainable Development for Teachers, where teachers can acquire knowledge and skills on sustainable development, cooperation and partnership, community organisation and similar topics. [150] The NGO Zelena Istra organised the project Knowledge for Sustainable Action 2019-2021, which aimed to introduce sustainable development in formal education in its partner

148 https://djapo.be/lesmateriaal-kleuteronderwijs/

149 Miljöundervisning NaturligtVis! 1992. Metoder och skolexempel. Stockholm, Sweden: Stiftelsen Håll Sverige Rent.

150 NGO Odraz (2019). 'Akademija održivog razvoja za nastavnike 2019.-2020.'. Available at: https://www.odraz.hr/edukacija/odrazova-skola-primjeri/akademija-odrzivog-razvoja-za-nastavnike-2020/ [Accessed 4 March 2021].

schools.[151] In **Malta**, NGOs, such as Nature Trust – FEE Malta, and KOPIN, offer voluntary training programmes for teachers on sustainable development and related topics.

In-service teacher training can either focus on EES topics in an individual manner, or integrate them on a systematic basis. In **Germany**, some federal states have put efforts into integrating EES in a structured way into the existing teacher training rather than offering it additionally.[152] In **Cyprus**, professional development courses for teachers on EES were revised to focus more on a competence-based approach. All of the courses are based on UNECE ESD competences[153] and the RSP Competences model[154]. All professional courses for teachers on EES are developed around the competences for systems thinking, future, participation, attentiveness, empathy, engagement, interdisciplinarity, action, criticality[155]. However, in several countries, teacher training on EES is still often implemented only in the context of natural sciences, which prevents teachers and educators from understanding EES as a holistic topic.[156]

In most Member States, in-service professional training is obligatory, and often involves EES topics at least as optional choices. For example, in **Cyprus**, compulsory education and training courses for primary teachers on the implementation of the National Curriculum for Environmental Education are implemented centrally each year. In these courses, teachers are introduced to planning their school's EES School Plan (SEEP), developing EES lessons using an interdisciplinary approach, and using various EES pedagogical techniques such as concept maps, moral dilemmas and simulations.[157] In Malta, the Ministry of Education offers voluntary in-service training opportunities relating to ESD and Global Education. An increased focus on EES as part of in-service teacher training, and the availability of programmes focusing on EES, are highly beneficial. However, certain challenges remain. For instance, it remains a challenge to attract teachers to attend (e.g. in **Latvia, Malta**), as funding and time constraints are of significance. Moreover, within the variety of courses available, ESD is often only referred to implicitly, and could be more 'visible' or linked to innovative pedagogies, in order to attract the attention of teachers.[158]

While mandatory training can be seen as more effective, voluntary in-service teacher training can also bring a lot of benefits – especially if teachers recognise their importance or are encouraged to take part in them. For example, in **Croatia**, teachers are motivated

151 Zelena Istra (2019). 'Znanje za održivo djelovanje'. Available at: https://zzod.zelena-istra.hr/hr/o-projektu/ [Accessed 4 March 2021].

152 Kultusminister Konferenz (2017). 'Zur Situation und zu Perspektiven der Bildung für nachhaltige Entwicklung'. Available at: https://www.kmk.org/fileadmin/Dateien/veroeffentlichungen_beschluesse/2017/2017_03_17-Bericht-BNE-2017.pdf

153 United Nations Economic Commission for Europe (UNECE) (2012). 'Learning for the future: competences in education for sustainable development', [ECE/CEP/AC.13/2011/6]. Available at: https://www.unece.org/fileadmin/DAM/env/esd/ESD_Publications/Competences_Publication.pdf. [Accessed 10 January 2021].

154 A Rounder Sense of Purpose (n.d.). RSP EU project, Available at: https://aroundersenseofpurpose.eu/

155 Ministry of Education and Culture (MoEC). (2019). 'Cyprus National Report on implementation of the UNECE Strategy for Education for Sustainable Development 2017-2019', pp. 21-22. Available at: https://unece.org/DAM/env/esd/Implementation/NIR_2018/Final_Cyprus_3rd_evaluation_Cycle__2017-2019_.pdf. [Accessed 16 January 2021].

156 Kalniņa, D. (2012). Pētnieciskās prasmes attīstība dabaszinībās [Development of Research Skills in Natural Sciences]. Rīga: RaKa.

157 Zachariou, A. (2013). 'Teacher education for sustainable development: Cyprus example', Available at: http://www.unece.org/fileadmin/DAM/env/esd/8thMeetSC/Presentations/Cyprus_teacher_education.pdf [Accessed 31 January 2021].

158 UNECE (2020). Information paper no. 2: 'Learning from each other: achievements, challenges and ways forward. Fourth evaluation report of the UNECE Strategy for Education for Sustainable Development'. Available at: https://unece.org/fileadmin/DAM/env/esd/6thMeetSC/Informal%20Documents/PhaseIIProgressReport_IP.8.pdf

to participate in in-service teacher training on EES, as it earns them the points they need to gain promotion and a better employment status.[159] In **Hungary**, teachers and school heads are obliged to participate in in-service training for 120 hours over 7 years.[160] According to the new evaluation and teacher qualification system to regulate professional career opportunities for teachers, nine professional teacher competences are evaluated.[161] One of these, which has been added recently, is "proficiency in environmental education, authentic representation of the values of sustainability and the way of transferring attitudes related to environmental awareness". Since 2020, teachers' EES competences have been evaluated within this system, which determines career opportunities.[162] In Portugal, even though in-service teacher training, including training in EES-related pedagogical approaches,[163] is not compulsory, it counts as credit units towards career progression. Hence, teachers generally tend to be interested in in-service training on EES.

In-service teacher training on EES can also be included into other activities to attract greater attention. Teacher training as a part of network support meetings or camps can appear more engaging and interactive, and thus attract more teachers. However, the initial popularity of these initiatives tends to decrease due to the lack of available educational material and visible learning outcomes.[164]

Table 8 provides a comprehensive overview of teacher training on EES. It is evident that EES is present at both ITE and CPD levels. The most exemplary Member State is **Greece**, where EES is an obligatory part of both ITE and CPD. In other Member States, such as **Austria, Cyprus, Estonia, Hungary, Malta, Sweden and Slovakia**, the obligatory element is partial and highly contextual. For instance, in **Austria**, teachers are obliged to attend in-service professional development courses. However, EES is only an elective part of this obligatory in-service training. In other words, teachers must attend training, but they do not necessarily have to choose to train in EES.

Table 8. Teacher training on education for environmental sustainability, EU-27

TEACHER TRAINING	Member States																										
General	AT	BE	BG	CY	CZ	DE	DK	EE	EL	ES	FI	FR	HR	HU	IE	IT	LT	LU	LV	MT	NL	PL	PT	RO	SE	SI	SK
EES is obligatory in ITE/CPD	○	○	○	○	○	○	○	○	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
EES is part of ITE	●	○	○	○	○	○	○	○	●	○	○	○	●	●	○	○	○	○	●	●	○	○	○	○	○	○	○
EES is part of CPD	●		●	●	●	○	○	●	●	○	●	○	●	●		●	●	●	○	●		●	●	○		●	●

Source: Authors. *Note*: ● – Present in the country ○ – only partially present ○ - not present. Blank cell indicates N/A.

159 Government of the Republic of Croatia, 'Ordinance on the Advancement of Teachers, Teachers, Professional Associates and Principals in Primary and Secondary Schools and Student Homes', 8 July 2019, Official gazette NN 68/2019.

160 Eurydice (2020). 'Hungary - Management in general education'. Available at: https://eacea.ec.europa.eu/national-policies/eurydice/content/management-staff-early-childhood-and-school-education-29_ro [Accessed 20 February 2021]

161 Symeonidis, V. (2019). 'Teacher competence frameworks in Hungary: A case study on the continuum of teacher learning', European Journal of Education. Available at: https://onlinelibrary.wiley.com/doi/abs/10.1111/ejed.12347. [Accessed 20 February 2021]

162 Varga, A. and Könczey, R. (2019). 'Which ways of evaluation of education for sustainability is acceptable for Hungarian teachers?'. Available at: https://akjournals.com/view/journals/063/9/4/article-p654.xml. [Accessed 3 March 2021]

163 National Scientific and Pedagogical Council for Continuing Education: Available at: http://www.ccpfc.uminho.pt/ [Accessed 5 March 2021]

164 Grīnberga, M. and Ridūze, L. (2006). Rokasgrāmata vides izglītībā: Mācību līdzeklis skolotājiem vides izglītībā [Handbook on Environmental Education: A Teaching Tool for Teachers in Environmental Education]. Riga: Zaļā Josta. Available at: http://www.zalajosta.lv/sites/default/files/files/vides%20gramata_ABC%281%29.pdf [Accessed 10 March 2021].

A common barrier to EES raised by the literature is insufficient teacher training (Taylor, 2012)[165]. Similarly, the national reports highlight the lack of a focus on EES and transformative pedagogies during teacher training as a systemic barrier common to nearly every Member State. Few Member States require mandatory in-service teacher training on EES. Instead, most gravitate towards integrating individual aspects of EES and leaving more in-depth training as an optional choice. Some – such as **Luxembourg, Cyprus, Romania and Slovakia** – have been found not to provide any courses or materials relating to EES at all during initial teacher training.

Two issues stand out with respect to teacher training. First, in order to ensure sufficient teacher training on EES, there must be someone available to teach and elaborate on all matters pertaining to EES. Several national reports indicate that there are **too few EES professionals to train teachers** the basic principles of what competences they need to acquire in order to teach EES; what pedagogical practices should be employed when tackling different EES topics; and what innovative concepts and learning tools should be used to engage the classroom. Second, where there is **insufficient emphasis on EES during initial teacher training**, many teachers tend not to have sufficient motivation or time during continuous professional development (CPD) to learn new skills and teaching methods. This is well illustrated in the national report for **Lithuania**, which states that "teachers do not participate actively enough in the implementation of the principles of sustainable development, as they are often not familiar enough with the ideas of sustainable development and do not understand their importance." This unwillingness is often reinforced by the lack of any binding documents that would commit teachers to integrating EES into their subjects to some specified extent.

Scarce resources are also a commonly highlighted barrier to the implementation of EES. Mentions of insufficient resource allocation are found in more than half of all national reports conducted for this study. Taylor (2012)[166] outlines limited resource provision as one of the barriers most commonly emphasised by school management and administrators. The national reports suggest that insufficient allocation of resources and funding for EES tends to be the result of limited political and government support. This barrier can be divided into three areas – funding, time and materials.

Lack of funding for sustainable development and EES is often associated with EES not being perceived as a priority at governmental level. Data from the national reports suggest that this tends to manifest itself in limited institutional funding, where educational institutions fail to secure funding either due to a lack of national support or poor funding strategies. In Portugal and Italy, the national reports suggests that a lack of institutional funding is perceived as a transversal barrier. However, various forms of rationalisation exist. In **Austria**, funding is often used to support core tasks rather than to strengthen sustainability. If educational institutions are regulated by performance contracts, they tend to focus on aspects that yield better funding. Because sustainability-related tasks are often not assessed, there is little tangible value in pursuing them over well-established core

165 Taylor, S.K. (2012). Technical–Vocational Education for Sustainable Development in Manitoba. The International Institute for Sustainable Development, 1-35. Retrieved June 2, 2021, from https://www.iisd.org/system/files/publications/technical_vocational_education_sd_mb.pdf

166 Taylor, S.K. (2012). Technical–Vocational Education for Sustainable Development in Manitoba. The International Institute for Sustainable Development, 1-35. Retrieved June 2, 2021, from https://www.iisd.org/system/files/publications/technical_vocational_education_sd_mb.pdf

tasks. As indicated in the national report for **Denmark**, this leaves only highly engaged teachers or institutional leaders, who either find other sources of funding, or push EES as an extra-curricular activity without institutional funding.

Insufficient time is outlined as an obstacle not only in the national report data, but also in the teacher survey conducted for this study. Whether this is due to additional responsibilities and obstacles caused by the pandemic or to overloaded work schedules due to rigid curricula, overworked educators are unable to fit new concepts such as EES into their schedules. In this situation, only motivated, sustainability-oriented and creative teachers, supported by the school management, can use EES as a cross-sectional topic. Otherwise, EES goals tend to be met only formally and not in practice. The national report for **Slovakia** suggests that because developing and implementing a new topic is time-consuming, many teachers choose to do the minimum necessary. This in turn stunts the growth of EES. A similar scenario can be observed in the case of **Slovenia**. Due to being overloaded, teachers in Slovenia who try to implement new concepts such as EES usually have to do so at the expense of their own time and resources.

The last resource insufficiency revolves around **teaching materials**. This applies not only to classroom subject materials, but also to outdoor activity plans and cross-disciplinary integration. Insufficiency of teaching materials is characterised by three factors – lack of awareness, lack of access, and lack of categorisation. While teaching materials are not always available in the national language, plenty of guides, lesson plans and outdoor activity plans are available in English that can be appropriated to the local context. However, this often takes time. The national report for **Cyprus** explains that because "teachers are constantly faced with new duties, they find it hard to search for and organise lessons. So, they prefer to have ready-to-go materials and handbooks." A similar sentiment is expressed in the national report for **Lithuania**: while theoretical and knowledge-based materials might be plentiful, methodological handbooks specifying what competences to link to EES, or what teaching methods to apply within the classroom, are rarer. Lack of access occurs when schools or teachers are aware of available materials but cannot access them freely. This is especially troublesome when teachers are self-motivated to promote EES and do so on their own initiative, with limited financial resources. For instance, in **Bulgaria** "a lot of handbooks produced by the publishing houses are available, which are not accessible to teachers". Lastly, a lack of categorisation refers to the issue of teaching materials often being too broad. The national report for **Portugal** suggests that the government should invest in and address resource categorisation by classifying materials according to themes, education levels, target users and type of resource, thus saving time for teachers and making the search for materials more interactive.

With regard to enablers, data from the national reports suggests that teacher training is the third most commonly indicated enabler among the national experts. The national experts from **Cyprus** and **Sweden** suggest that there is a need to revise teachers' professional development programmes to include EES competences. Our literature review suggests that this can be achieved if the governments of Member States commission systematic reviews of every aspect of teacher education, including teacher training, continuing professional development and leadership education, as was done in Scotland in 2009 to incorporate sustainability in the teacher training cycle in a more comprehensive manner.

The Global School (*Swedish: Den globala skolan*). The Global School works with competence development for teachers, school leaders and student teachers in learning for sustainable development. They also provide support to municipalities and decision makers. Its purpose is to contribute to school development through insights into global issues, encounters with people and cultures, participatory working methods, as well as knowledge about and the application of success factors in the school's work. The project's goal is for children and students in Swedish preschools and schools to gain sufficient knowledge to participate in the democratic process, make conscious choices, develop an ethical approach to their environment, and work towards a sustainable world. Furthermore, it produces and disseminates pedagogical material on ESD/GCED. It arranges around 150 seminars nationally every year. It also collects material, mainly for pre-, primary and high schools, and some for adult education, from authorities, organisations and partners, which it distributes on its website. This is provided free of charge. The initiative is a part of the Swedish Council for Higher Education (UHR).

The reports also outline that in-service EES teacher training is insufficient as an enabler. National experts from **Luxembourg and Slovenia** suggest that it is vital that EES training spans both initial teacher training and in-service teacher training in a standardised and comprehensive manner. In some countries such as **Ireland**, teacher training is outlined as the key enabler, due to prevalent institutional conservatism and teachers being resistant to change as a result of its interdisciplinarity aspect. Data from the national reports suggest that the issue of interdisciplinarity could be addressed by making EES training more subject-specific, but at the same time emphasising its interdisciplinary nature, thus making teachers more comfortable with introducing EES as part of their subject. The literature review suggests that more often than not, sustainability finds itself positioned within discipline-based sustainable development courses. These are typically not multidisciplinary or transdisciplinary, and thus only reflect one component of education for environmental sustainability – the learning content – consequently leaving behind the whole-institution approach that is vital for EES implementation.

The national reports for **Austria, Czech Republic, Estonia, Luxembourg** and **Sweden** suggest that cooperation between experts, teachers and government on policymaking acts as an important enabler. Gathering together researchers and experienced teachers from different regions who are knowledgeable about EES can be of significant importance when constructing the policy framework for the implementation of EES at national level.

3.4. Assessment frameworks

The assessment of EES tends to vary between different levels of education, and is sometimes integrated into the general assessment system. However, while some Member States have strategies and frameworks in place for assessment practices, in a large number of Member States assessment frameworks do not exist at national level, and assessment practices largely depend on institutions.

Like most assessment, various approaches can be used to assess EES learning. These approaches can include diagnostic, formative, summative, norm references, ipsative,

criterion-referenced or benchmarked assessment. Common assessment tools used to examine students' sustainability are presented in the table below. It is recommended that a range of assessment techniques are used to measure students' learning outcomes on environmental sustainability. For example, in **Portugal**, because EES is part of 'Citizenship Education', its assessment procedure is established by the Portuguese National Strategy for Citizenship Education (ENEC, *Estratégia Nacional de Educação para a Cidadania*)[167], and thus encompasses diagnostic, formative and summative assessment tools.

Table 9. Common assessment tools for students' sustainability competences by frequency

Tool	Brief description
Scaled self-assessment	*Students rate their own competence development based on a pre-determined scale*
Reflective writing	*Students respond in writing to prompts reflecting on their competence development*
Scenario/case test	*Students are presented with a case and asked to respond to competence-requiring prompts*
Focus group/interview	*Students respond to prompts, verbally reflecting on their competence development*
Performance observation	*Students are evaluated while carrying out course activities in or out of the classroom*
Concept mapping	*Students are given a prompt and asked to create a two-dimensional image with nodes and connections (specific to systems-thinking competence)*
Conventional text	*Students take a test which may include multiple choices or short answers linked to competences*
Regular course work	*Students complete regular course work which is analysed for evidence of competences*

Source: Authors

Assessment of EES knowledge and skills is sometimes included within the general assessment framework. For example, in Estonia, external assessments take the form of standard-determining tests, state examinations, and harmonised final examinations in primary schools.[168] Students finishing basic or lower-secondary schools need to pass three compulsory exams, while students finishing upper secondary schools need to pass three state examinations, one school examination, and compile a student investigation assignment. These examinations often cover cross-curricular topics and topics related to EES.[169] In **Latvia**, the assessment of EES-related competences is integrated into the assessment of intended results, as described in the 'Regulations Regarding the State Guidelines for Pre-school Education and Model Pre-school Education Programmes'[170], in the 'Regulations Regarding the State Basic Education Standard and Model Basic Education Programmes'[171], and the 'Regulations Regarding the State General Secondary Education Standard and Model General Secondary Education Programmes'[172]. The inclusion of EES

167 Portuguese Republic, National Strategy for Citizenship Education (ENEC) (2017). Available at: https://cidadania.dge.mec.pt/sites/default/files/pdfs/national-strategy-citizenship-education.pdf [Accessed 22 February 2021]

168 Eurydice (2020). Estonia – Quality Assurance in Early Childhood and School Education. Available at: https://eacea.ec.europa.eu/national-policies/eurydice/content/quality-assurance-early-childhood-and-school-education-20_en

169 Henno, I. and Puusepp, L. (2019) UNECE National Implementation Report ESD 2018. Estonia. Implementation phase: 2017–2019. https://unece.org/DAM/env/esd/Implementation/NIR_2018/Estonian_ESD_NIR_final_2019.pdf

170 Cabinet of Ministers of the Republic of Latvia, 'Noteikumi par valsts pirmsskolas izglītības vadlīnijām un pirmsskolas izglītības programmu paraugiem' [Regulations Regarding the State Guidelines for Pre-school Education and the Model Pre-school Education Programmes], 21 November 2018 (716). Available at: https://likumi.lv/ta/id/303371 [Accessed 10 March 2021].

171 Cabinet of Ministers of the Republic of Latvia, 'Noteikumi par valsts pamatizglītības standartu un pamatizglītības programmu paraugiem' [Regulations Regarding the State Basic Education Standard and Model Basic Education Programmes], 27 November 2018 (747). Available at: https://likumi.lv/ta/id/303768-noteikumi-par-valsts-pamatizglitibas-standartu-un-pamatizglitibas-programmu-paraugiem [Accessed 10 March 2021].

172 Cabinet of Ministers of the Republic of Latvia, 'Noteikumi par valsts vispārējās vidējās izglītības standartu un vispārējās vidējās izglītības programmu paraugiem' [Regulations Regarding the State General Secondary Education Standard and Model General Secondary Education Programmes], 3 September 2019 (416). Available at: https://likumi.lv/ta/id/309597 [Accessed 10 March 2021].

topics in the general assessment framework ensures that the knowledge students acquire on these topics is evaluated, at least to some extent. However, the focus on subject content and written examinations may limit the ability to address environmental education issues that are often taught more practically and innovatively[173][174].

In **Romania**, the assessment of EES-related competences is often based on projects and practical tests in primary and secondary education institutions. In universities, it often takes the form of written or oral exams, or via projects or quizzes in extracurricular or optional classes.
In **Estonia**, while national examinations for school education cover cross-curricular topics and topics related to EES,[1] universities tend to use various assessment approaches, including testing, grading, projects, portfolios and others, to assess students' sustainability competences[1].

Assessment methods may take various forms, which largely depend on education level. For example, as universities tend to enjoy a large degree of autonomy, their EES knowledge and competence assessment frameworks tend to vary widely across institutions, and largely depend on how important EES is to the leadership of the specific university. Different assessment frameworks at different levels of education may be useful, due to the different teaching approaches used and different knowledge and skills being focused on. Moreover, this can be beneficial, as children and students of different ages tend to respond to different pedagogical and assessment frameworks in different ways. However, an excessive focus on written examinations and theoretical knowledge, which is observed throughout assessment techniques used at various levels of education, may lead to learning outcomes in the cognitive learning dimension being over-emphasised, compared with socio-emotional and behavioural skills.

One important challenge is that most EU Member States do not possess clearly defined national frameworks for the assessment of EES at a national level. Often, EES knowledge and competence assessment frameworks are not developed because the national curriculum does not explicitly include EES topics. For example, in **Italy**, knowledge and competences relating to environmental sustainability are included in the curriculum of disciplines such as Natural Science. However, they are not included in national tests. They are therefore left to the forms of assessment used in Italian schools, and assessed as individual teachers see fit.

Some assessment frameworks that exist in those countries in which EES is not included in the national curriculum are prepared by NGOs and other partners. For example, in **Denmark**, there is a lack of institutional EES assessment instruments, but some NGOs, such as Eco-Schools Denmark and UNESCO SDG Schools Denmark, have established educational programmes with their own assessment frameworks.[175] This ensures that schools and teachers who consider EES knowledge and competences to be important, and who incorporate them into their teaching practices, can find tools and guidance to assess students' knowledge. However, this also creates disparities between schools and between

173 Glackin, M., King, H., Cook, R. and Greer, K. (2018). Understanding Environmental Education in Secondary School in England: Report 2: The Practitioners' Perspective. London: King's College.

174 Leicht, A., Heiss, J. and Byun, W.J. (2018). Issues and trends in Education for Sustainable Development. Paris: United Nations Educational, Scientific and Cultural Organization.

175 Lysgaard, J.A. et al. (2015). Green Flag Eco-Schools and the Challenge of Moving Forward. In: Thoresen, V.W., Doyle, D., Klein, J. and Didham, R.J. (Eds.), Responsible Living – Concepts, Education and Future Perspectives,, Springer.

assessment practices, as it depends solely on the enthusiasm of individual schools and teachers towards EES topics.

EES assessment frameworks are also often missing in practice, even if EES knowledge and competences are included in the national curriculum or education policy documents on a national level. For example, in **Slovakia**, environmental education is part of national education programmes at pre-primary, primary and secondary education level, as well as being part of curricula at most universities. However, the implementation of environmental education in practice is highly dependent on individual schools. Even though they have this obligation, educational institutions rarely teach (or especially assess) EES-related knowledge and competences.[176] There are also no standardised assessments focusing on EES knowledge, skills, and attitudes or behaviours in Slovakia. In **Portugal**, EES-related competences are assessed according to the Portuguese National Strategy for Citizenship Education (ENEC, *Estratégia Nacional de Educação para a Cidadania*)[177], but at the school level its assessment guidelines are still very generic (DGE, 2017)[178]. Schools are required to develop their own school strategy for citizenship education, which includes elements of EES. It is also often a case that even though guidelines exist on the development of EES curriculum and assessment, they are not binding. Consequently, schools often do not develop curricula or necessary assessment frameworks. For example, in **Spain**, the *Libro Blanco de la Educación Ambiental en España* [White Paper on EE in Spain[179]] was introduced in 1999. This document provides guidelines for the development of a curriculum that considers EES. However, this document is not binding, and has not been reviewed since 1999. In **Finland**, because there is no national EES curriculum, education for sustainable development is implemented in Finnish schools in very different ways. The school principal is the key person in developing the school's operating culture for sustainable development, as well as its assessment framework.[180]. Consequently, each school has the autonomy to create its own strategy with regard to EES, as well as deciding how to assess it. While EES teaching and assessment may be well developed in certain schools, it is underdeveloped in others. This, again, may result in significant differences in assessment practices between schools, as the practical implementation of assessment is highly dependent on individual schools and teachers.

The national reports suggest that more than half of all Member States face problems in monitoring and assessing EES, at both school and classroom levels. This stems from the fact that few Member States have appropriate indicators designed to measure EES (see Table 10). Notably, only **Cyprus and Czech Republic** have well-developed assessment

176 Interview with a specialist in environmental education and training from SEA, online, 22 February 2021; interview with an expert on environmental education from Živica, online, 16 February 2021; interview with an expert on environmental education from the MPC, online, 9 February 2021.

177 Portuguese Republic, National Strategy for Citizenship Education (ENEC) (2017). Available at: https://cidadania.dge.mec.pt/sites/default/files/pdfs/national-strategy-citizenship-education.pdf [Accessed 22 February 2021]

178 Directorate-General for Education (DGE)., 'Proposal for a School Citizenship Education Strategy Guide'. Available at: http://www.dge.mec.pt/sites/default/files/ECidadania/Docs_referencia/proposta_de_guiao_estrategia_de_educacao_para_a_cidadania_de_escola.pdf [Accessed 5 March 2021]

179 Ministry of Environment.(1999). 'Libro blanco de la educación ambiental en España'. Available at http://www.magrama.es/es/ceneam/recursos/documentos/libro_blanco.aspx [Accessed 5 February 2021]

180 Saloranta, S. (2017). Koulun toimintakulttuurin merkitys kestävän kehityksen kasvatuksen toteuttamisessa perusopetuksen vuosiluokkien 1–6 kouluissa. University of Helsinki, Faculty of Educational Sciences. Doctoral dissertation; Helsinki Studies in Education, number 14. http://urn.fi/URN:ISBN:978-951-51-3610-7

criteria for EES, while some other Member States have partially developed indicators. Capelo et al. (2012)[181] posit that without adequate tools, it is difficult to monitor and evaluate changes with regard to EES at local, national and regional levels. Monitoring and assessment instruments relating to EES indicators are required to clarify which educational approaches are necessary, and to evaluate the quality of these approaches in terms of their relevance in promoting sustainable development. The national reports for **Bulgaria, Denmark, France, Germany, Hungary, Italy and Spain** all point to a common denominator as to why EES assessment and monitoring mechanisms are insufficiently well developed: EES is not linked to any learning outcomes. **Slovakia** proves to be an interesting case in this regard, as teachers are obliged to implement elements of EES in classroom education. The national report even suggests that EES is also linked to the learning outcomes. However, current evaluations and assessments at the national level only focus on examining whether or not EES is implemented in any way, using a binary principle. No standardised assessment mechanisms focus on knowledge and skills as well as attitudes and behaviours.

The national reports for **Czech Republic, Estonia, Luxembourg, Malta, Netherlands and Sweden** suggest that having a national assessment system for EES acts as a great enabler for the implementation of EES. **Czech Republic**'s evaluation culture serves as a great example. The national expert explained that, *"while the trend [towards assessing EES] is relatively new, it may be said that the evaluation culture has become widespread and well accepted in the EES field in the Czech Republic. Nowadays, there exist a large number of guidelines, instruments, published evaluation research studies and other evaluation-related outputs. Evaluation, self-assessment, quality assurance and certification are undisputed elements of EES practice, and are supported by public administration bodies".*

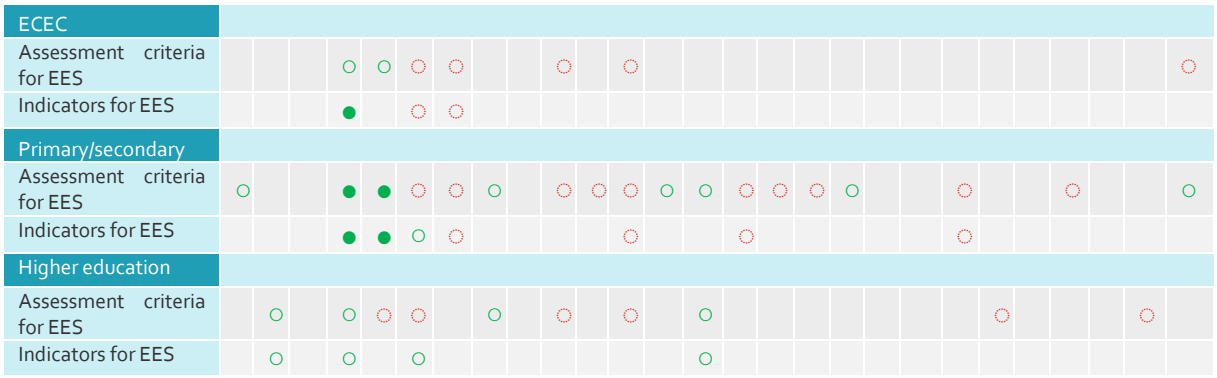
Among the assessment methods used, summative assessments often stand out. These are often 'high stakes', which means that they have a high points value. The lack of summative assessment is a missed opportunity, as topics up for summative assessment often gain more weight in lessons. UNECE reports acknowledge that assessment has so far not been prioritised by most Member States, but that this will be a priority area over the next five years. Yet, while advancing summative assessment on EES is often recommended in the literature, one also needs to consider a future for assessment in which multiple forms of assessment are applied, as well as the critical literature that questions the effectiveness of standardised testing for testing complex and interconnected skills such as sustainability.[182]

Table 10. Education for environmental sustainability assessment, EU-27

ASSESSMENT	Member States																										
General	AT	BE	BG	CY	CZ	DE	DK	EE	EL	ES	FI	FR	HR	HU	IE	IT	LT	LU	LV	MT	NL	PL	PT	RO	SE	SI	SK
Assessment criteria for EES	○	○	○	○	●	○	○	○	○	○	○	○	○	○	○	○	○		○	○		○	○	○	○	○	○
Indicators for EES	○	○	○	●	●	○	○	○	○		○					○		○	○	○				○			○

181 Capelo, A., Santos, M.C. and Pedrosa, M.A. (2012). Chapter 5: Education for sustainable development Indicators, competences and science education. Environmental Education, Communication and Sustainability, (1), 99-123. doi:10.3726/978-3-653-01631-4/7

182 Dumcius et al. (2020). Prospective report on the future of assessment in primary and secondary education. PPMI. Luxembourg: Publications office of the European Union.



Source: Authors. *Note*: ● – Present in the country ○ – only partially present ○ - not present. Blank cell indicates N/A.

One of the obstacles most commonly highlighted at the ECEC level in the national reports is the low status and priority of EES as a subject. Stoltenberg and Benoist-Kolser (2020)[183] outline the following two reasons why there is a lack EES within the existing childcare system: a different prioritisation of subjects, and the fear of overwhelming children. This line of thought is also reflected in the findings of the national reports. In **Cyprus**, subjects such as mathematics and languages are given higher priority politically than more transdisciplinary and 'experimental' subjects. In other cases, it is not political but rather personal interference that stunts the growth of EES. In Greece, parents often criticise schools when 'deviations' occur from the formal education model, as there is fear that children who do not adhere to the formal education model will perform poorly in comparison to their peers. This introduces the second issue mentioned by Stoltenberg and Benoist-Kolser (2020)[184] – the perceived complexity of EES. In **Austria** and **Poland**, the concept of sustainable development, and even more so EES, is deemed too complex to introduce to young students, with the notion being that it should be left for later education levels. The national report for **Latvia** argues that the general line of thought is that children are not interested in environmental principles and problems at the ECEC level, and that engaging them through demonstrations rather than theory is challenging.

Regarding the processes used to evaluate sustainability competences, research emphasises the importance of context-based assessment tools covering a diverse range of instruments. These range from summative to formative assessments, self- and peer-evaluation. Questionnaires are used most frequently, but an emerging strand of literature also discusses the use of reflective diaries, conceptual maps, rubrics and vignette questioning instruments and interviews as useful assessment tools.[185] Importantly, several scholars argue that the development and implementation of summative assessment in this

183 Stoltenberg, U. and Benoist-Kosler, B. (2020). ESD Coalition of Preschool and Municipality. In: Researching Early Childhood Education for Sustainability (pp. 1-13). Routledge. Retrieved June 3, 2021, from https://www.taylorfrancis.com/chapters/edit/10.4324/9780429446764-6/esd-coalition-preschool-municipality-ute-stoltenberg-barbara-benoist-kosler

184 Stoltenberg, U. and Benoist-Kosler, B. (2020). ESD Coalition of Preschool and Municipality. In: Researching Early Childhood Education for Sustainability (pp. 1-13). Routledge. Retrieved June 3, 2021, from https://www.taylorfrancis.com/chapters/edit/10.4324/9780429446764-6/esd-coalition-preschool-municipality-ute-stoltenberg-barbara-benoist-kosler

185 Cebrián, G. and Junyent, M. (2015). Competencies in education for sustainable development: Exploring the student teachers' views. Sustainability7, 2768–2786.

regard can further help to scale up teaching on ESD.[186] Lastly, some parents tend to contribute partially to this obstacle. They often ask a school to remain a 'school of the past' by continuing the transmissive tradition of teaching based on content knowledge. This guarantees formal certification but not the acquisition of competences, which are often conceived by parents as 'practical skills' and therefore of lesser value compared with knowledge. This is a prevalent phenomenon in **Italy**, despite EES being fairly well developed there at national level.

The comprehensive integration of EES on the basis of interdisciplinarity serves as an important enabler for the mainstreaming of EES. The enabler focuses on the notion that while interdisciplinarity is perceived as a barrier by some, this can be overcome by developing or having comprehensive guidelines and assessment frameworks on how to apply EES to each respective subject. This is accompanied by workshops, seminars and networking events between experts and teachers/schools, in which experts elaborate in greater detail the interdisciplinarity of EES and how to address it as a barrier.

3.5. Monitoring and evaluation

Monitoring and evaluating the quality of EES provision can be carried out in several ways, whether focusing on the whole institution through an environmental management system approach, or monitoring the impact of specific programmes[187]. Monitoring and evaluation frameworks are mostly implemented at national level by national authorities. However, other important actors such as NGOs focusing on sustainability and environmental education also tend to play an important role in the monitoring of EES, especially given the programmes prepared and coordinated by NGOs and the non-formal education sector.

Monitoring and evaluating the integration of EES can be a part of the general education system and its quality monitoring and evaluation mechanisms. In some countries, the quality and effectiveness of EES integration is also monitored and evaluated through external evaluations, namely state and national exams, if these include EES-related topics and competences. The inclusion of EES in general evaluation and monitoring systems can be beneficial. Research suggests that policy frameworks are more effective if monitoring and accountability mechanisms are incorporated into policy and planning strategies[188], which is the case if EES is included within general monitoring and evaluation frameworks. Some countries have developed national systems specifically for monitoring EES, which can increase the effectiveness of EES policy frameworks still further.

186 Leicht, A., Heiss, J. and Byun, W.J. (2018). Issues and trends in Education for Sustainable Development. Paris: United Nations Educational, Scientific and Cultural Organization.

187 Kanyimba, A.T., Richter, B.W. and Raath, S.P. (2013), The effectiveness of an environmental management system in selected South African primary schools. Journal of Cleaner Production 66 (2014) 479-488.

188 UNESCO (2015a). Education 2030: Incheon Declaration and Framework for Action – Toward Inclusive and Equitable Quality Education and Lifelong Learning for All. Paris: UNESCO. www.uis.unesco.org/Education/Documents/incheon-framework-for-action-en.pdf (accessed 15 February).

Countries also tend to commission external assessments of their education systems, which may include the evaluation of EES practices. For example, in **Luxembourg**, the National Education Report ('Bildungsbericht')[189] is published every three years by the University of Luxembourg and the Ministry of Education. This report offers a unique and diverse insight into the country's education system. While EES is not a permanent part of the Education Report, the 2021 edition will focus on digital learning and education for sustainable development, and will provide an overview of projects in this area in Luxembourgish primary and secondary schools.

In **Estonia**, the Estonian Environmental Education and Awareness Action Plan was adopted in 2018, which created a quality system for environmental education. The Estonian Environmental Association, in cooperation with the Ministry of Education and Research, supported by the Environmental Investment Centre, developed quality criteria for environmental education. Evaluation of the quality of environmental education began in the spring of 2020, with the aim of achieving a uniformly high level of environmental education across Estonia, and to ensure its availability. By February 2021, 401 programmes had been recognised as meeting all of the quality criteria, and had been awarded the 'Thoughtful Programme' quality label ('Muraka märgis'). This label indicates that the programme is well prepared for students' study visits and supports the implementation of the Estonian National curriculum and the achievement of its learning outcomes.[1]

In **Slovakia**, the National School Inspectorate monitors the quality and level of implementation of environmental sustainability across Slovak education system. It carries out inspections every year regarding the level of education and fulfilment of national educational programmes. It randomly selects schools across Slovakia and publishes official reports on its inspections. Inspections mainly evaluate the level and implementation of EES as a cross-cutting topic.[1] In **Malta**, the Ministry of Education assigns awards to schools participating in the ASPnet programme, which focuses on projects including a global perspective in learning, and to school participating in the GENE programme for the adoption of a whole-institution philosophy based on global education and EES principles.

In the **Czech Republic**, environmental education centres have been operating a national system of certification since 2013. The auditors assess the overall quality of the programmes offered by these centres, the level of the centres' environmental management, and their human resources[1].

Self-assessment frameworks are also sometimes available that allow institutions to check their own practices. In **Hungary**, self-assessment based on the Green Kindergarten system[190] is available for all Hungarian kindergartens on a voluntary basis. Kindergartens can obtain the title of 'Green Kindergarten' on the basis of a 20-point system of criteria and indicators. For primary, secondary and vocational schools, self-assessment based on the Eco-school system[191] is available. The self-assessment of EES performance is supported by an eco-school criteria system[192] covering eight areas of school-life: school documents, school organisation, operation, education, school specialisms, communication, and co-operation with external ESD actors and the local community. Primary, secondary, vocational schools and dormitories for school students can obtain the 'Eco-school title on

189 University of Luxembourg, ‚Der Nationale Bildungsbericht 2018'. Available at: www.bildungsbericht.lu. [Accessed 11 March 2021].

190 Hungarian Ministry of Agriculture (2016). 'The Hungarian Green Kindergarten Network'. Available at: https://eionet.kormany.hu/akadalymentes/download/5/18/62000/Green%20Kindergarten%20Network%20-%20Hungary.pdf. [Accessed 17 February 2021]

191 Hungarian Ministry of Agriculture (2016). 'The Hungarian Green Kindergarten Network'. Available at: https://eionet.kormany.hu/akadalymentes/download/5/18/62000/Green%20Kindergarten%20Network%20-%20Hungary.pdf. [Accessed 17 February 2021]

192 Hungarian Institute of Educational Research and Development (2018). Self-assessment criteria for Eco-schools in Hungary, 2018. Available at: http://ofi.hu/self-assessment-criteria-eco-schools-hungary-2018. [Accessed 17 February 2021]

the basis of a complex of system criteria and indicators[193]. In **Cyprus**, the EESD Unit of the Ministry of Education and Culture, in cooperation with education departments and universities, has designed a self-assessment mechanism for pre-primary and primary education to become sustainable in the long term. This is a self-assessment report for schools based on qualitative criteria, which is completed by schools at the end of each year. It aims to help schools identify the extent of their achievements with regard to EES, as well as gaps and weaknesses. The self-assessment tool covers the administrative, technical, pedagogical, organisational and social levels of the school. These practices include EES within their general monitoring and evaluation frameworks. As mentioned previously, if monitoring mechanisms are incorporated into policy and planning strategies, they tend to be more effective.[194]

In some countries, the national authorities and other institutions provide guidelines for education assessment and monitoring practices, including the assessment of EES. Unfortunately, only some countries have evaluation and monitoring frameworks specifically for EES (see Table 11). Notable cases are **Cyprus, Czech Republic, Malta and Portugal**.

Table 11. Education for environmental sustainability monitoring and evaluation, EU-27

MONITORING AND EVALUATION	Member States																									
General	AT	BE	BG	CY	CZ	DE	DK	EE	EL	ES	FI	FR	HR	HU	IE	IT	LT	LU	LV	MT	NL	PL	PT	RO	SE	SI	SK
EES is monitored	○	○	○	●	●	○	○	○		○	○	○	○	○		○	○	○	○	●	○	○	●	○		○	○
ECEC																											
EES is monitored	○	○		●	○	○	○	○		○	○	○	○	○							○		○				○
Primary/secondary																											
EES is monitored	○	○	○	●	●	○	○	○		○	○	○	●	○		○	○						○	○		○	○
Higher education																											
EES is monitored	○	○		○	○	○	○			○	○	○	○	○		○	○			○			○	○	○		○

Source: Authors. *Note*: ● – Present in the country ○ – only partially present ○ - not present. Blank cell indicates N/A.

The following are examples of good practice in national EES monitoring:

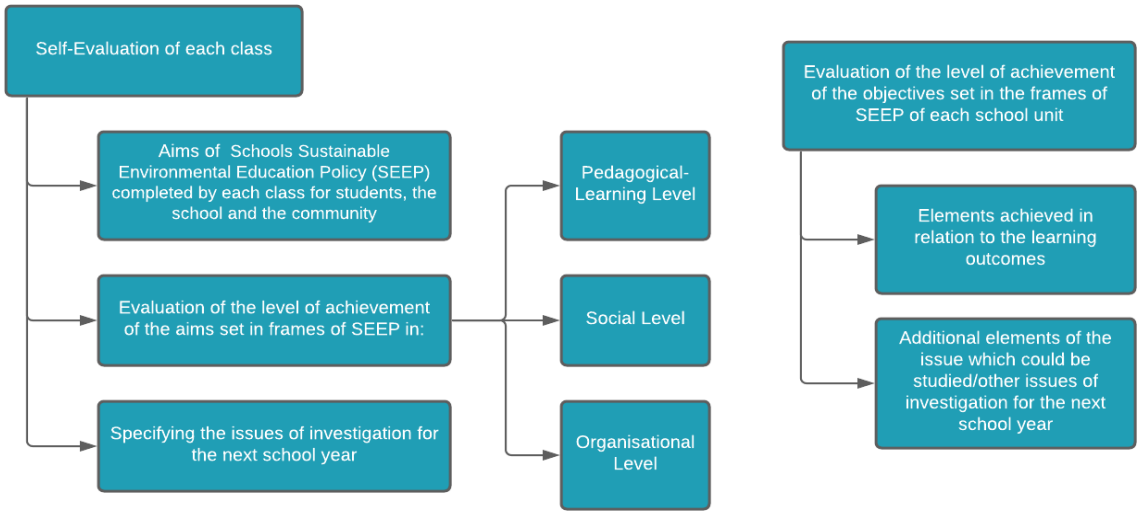
***Cyprus**. EES school self-reporting in Cyprus aims to help schools identify their progress with regard to their transformation towards sustainability. This self-evaluation allows each school to decide whether to continue with the same ESD issues for the next school year, or to set a new issue, based on what was studied last year.*

- Figure 5. provides a systematic overview of this process.

193 The English translation of the whole criteria system is available: 'Self Assessment Criteria for Eco-schools in Hungary, 2018'. Available at: http://ofi.hu/sites/default/files/self_assessment_criteria_ecoschools_hunagry_2018.xlsx. [Accessed 1 March 2021]

194 UNESCO (2015a). Education 2030: Incheon Declaration and Framework for Action – Toward Inclusive and Equitable Quality Education and Lifelong Learning for All. Paris: UNESCO. www.uis.unesco.org/Education/Documents/incheon-framework-for-action-en.pdf (accessed 15 February).

Figure 5. Evaluation of ESD School Plan in Cyprus



Source: UNECE (2014). Questionnaire for 2014 Informal Country Reporting on the Implementation of the Priority Action Areas. Available at: https://unece.org/fileadmin/DAM/env/esd/9thMeetSC/Documents/Cyprus.pdf

- **Czech Republic.** The quality of formal EES education was assessed on a more national scale in 2016 and 2019[195]. To support schools' reflections, a free online EES self-assessment system (ASEV) was developed in 2016[196]. ASEV applies the national framework for EES as defined in *The Recommended Expected Outcomes and The Goals and Indicators of Environmental Education*, and asks teachers to identify the level of implementation of the selected type of EES practice, and to describe the conditions in their school. Generally, the instrument assumes that EES should be implemented across subjects by the whole institution, in an action-based and competence-oriented manner, and that it should link schools with their communities. In 2016 and 2019, ASEV was used for a representative survey of EES school practice (N=645 and N=641 schools, respectively).[197]
- **Malta**. As of 2012, the Directorate for Quality and Standards in Education (DQSE) of the Ministry of Education conducts an evaluation and external audit of every school to ensure that the principles of the National Curriculum Framework for All (including ESD provision) are being followed, and that students are achieving the learning targets set down and acquiring the necessary skills[198].

195 Novosák, J., Suchomel, P., Dvořák, J. and Andrys, O. (2020). Environmentální výchova na základních školách ve školním roce 2019/2020. Tematická zpráva. Praha: Česká školní inspekce.

Činčera, J. and Kroufek, R. (2021). Metodika hodnocení environmentální gramotnosti žáků. Praha: BEZK.

Činčera, J., Jančaříková, K., Matějček, T., Šimonová, P., Bartoš, J., Lupač, M. and Broukalová, L. (2016). Environmentální výchova z pohledu učitelů. Brno: BEZK, Agentura Koniklec a Masarykova univerzita.

196 http://mojeautoevaluace.cz.

197 For the key findings, see 1.2.1..

198 UNECE (2021). Informal country reporting. 16th Steering Committee meeting 10-11 May 2021. Available at: https://unece.org/sites/default/files/2021-05/Secretariat_Item2b_summary_of_Informal_reporting%202021_Nona_10.05.%202021.pptx

- **Portugal**. ENEA[199], the national strategy on EES, includes in its evaluation process measures to assess the quality, effectiveness and efficiency of activities, projects and programmes, compare their results, and allow the exchange of experiences. These assessment tools must be developed with the promoters of the projects/ actions (within their respective scopes). Aside from this, the strategy requires: (a) the monitoring of its results; (b) population surveys on perceptions of behavioural change; and (c) a final assessment report. As ENEA has completed its 1st cycle (2018-2020), this self-assessment is ongoing, and a general inquiry is currently being undertaken[200]. This aims to assess the Strategy's first implementation cycle (2018-2020), and to identify/validate trends to incorporate in the planning of the next cycle.

The evaluation and monitoring of education quality, including the implementation of EES, can also be the responsibility of regional or local authorities rather than national authorities. In Slovakia, the evaluation of environmental education also takes place at regional level through the associations that are involved in it. For example, Trenčín region created its own assessment framework, 'Analysis of the state of the system of environmental education in the Trenčín self-governing region',[201] in cooperation with the environmental education network Špirála.

Often, the monitoring and evaluation of EES integration is carried out not at national or regional level, but by schools themselves. In **Portugal**, each school is responsible for monitoring and evaluating its strategy for citizenship education, which includes aspects of EES. Schools tend to adopt different strategies for the self-assessment of EES. While there is a proposal to adopt the 'Integrated Educative School Projects' Model (ESCXEL) (NOVA FCSH, 2018)[202], which is endorsed by national experts, this has not been incentivised by the government, and assessment practices remain fragmented. In **Slovakia**, there are no official national indicators that aim to evaluate the learning outcomes of EES and its effectiveness. Insights into the extent to which EE is implemented, at least in theory, are also produced by schools themselves. Unfortunately, no evidence or measurements are available as to the extent to which EE issues are integrated in practice. In Finland, schools and other educational institutions are free to create indicators if they find them useful, which has resulted in a vast range of different indicators[203]. EES projects have also been set up in some countries to create indicators and target policy makers, but it is unclear to

199 ENEA (2020). Available at: (https://apambiente.pt/_zdata/DESTAQUES/2017/ENEA/AF_Relatorio_ENEA2020.pdf [Accessed 5 March 2021]

200 APA, Portuguese National Strategy on Environmental Education for Sustainability (ENEA), 'ENEA survey'. Available at: https://enea.apambiente.pt/https%3A//docs.google.com/forms/d/e/1FAIpQLSfhZ2Zv0NEhlrQQa7fOxBMAe5NVH7pQCSukEab5tLopxeBeow/viewform) [Accessed 5 March 2021]

201 Špirála (2018). 'Analýza stavu systému envronmentálnej výchovy a vzdelávania v Trenčianskom samosprávnom kraji'. Available at: https://www.minv.sk/swift_data/source/rozvoj_obcianskej_spolocnosti/participacia/vystupy_np_parti/PP3-%20Analyza%20stavu%20systemu%20envronmentalnej%20vychovy%20a%20vzdelavania%20v%20TSK.pdf [Accessed 10 February 2021].

202 CICS.NOVA / FCSH da Universidade NOVA de Lisboa. (2018). 'Educational and curricular project: contribution to the development of an integrated model'. Available at: http://www.escxel.com/uploads/1576576928_26PEPCcontributomodelointegrado2018.pdf [Accessed 5 March 2021]

203 UNECE (2020). Information paper no. 2: 'Learning from each other: achievements, challenges and ways forward. Fourth evaluation report of the UNECE Strategy for Education for Sustainable Development'. Available at: https://unece.org/fileadmin/DAM/env/esd/6thMeetSC/Informal%20Documents/PhaseIIProgressReport_IP.8.pdf

what extent national governments or schools actively make use of these[204]. While this autonomy given to schools over their EES monitoring practices can ensure that schools employ the monitoring and evaluation tools that are most suited to their situation, it also results in significant variations in monitoring practices between education institutions, and thus difficulty in comparing evaluation results.

While most countries lack national level frameworks to monitor the quality of EES in schools, several NGOs working in this field have developed their own monitoring and evaluation frameworks to aid schools in this regard, as they have with assessment practices. One programme entitled 'Eco-School Global' is implemented in several EU Member States. This aims to ensure that students acquire EES- and ESD-related competences and knowledge. To gain the label of being an Eco-School, schools and kindergartens must pass an evaluation and demonstrate environmentally-friendly thinking in the school's everyday activities, as well as implementing sustainable practices fully and methodically.[205] UNECE also plays an important role in monitoring and evaluation, as it evaluates EES integration in schools. National NGOs and organisations also play an important role in providing schools with tools to monitor and evaluate their EES practices. In **Latvia**, the World-Wide Fund for Nature Latvia[206] provides various self-monitoring tools to primary, secondary and HEIs to assess their practices in relation to EES. These tools include an Ecological Footprint calculator, Marine Eutrophication calculator, and Lifestyle Effect on Climate calculator. In Austria, schools within the ÖKOLOG-programme write annual reports that reflect on their achievements and evaluate ESD-related activities within the school[207].

One important problem is that reporting the results of monitoring and evaluation is often seen as more important than the hands-on implementation of EES practices. In **Czech Republic**, while school coordinators are supposed to regularly evaluate environmental education within their schools, they usually focus on the number of events that have been implemented by the school, or the number of participating students. In some cases, simple instruments for student assessment, usually based on various types of student reflection, are included in various EES materials.[208] An excessive focus on reporting rather than the actual implementation of effective EES pedagogical approaches, may have opposite results from those intended, and could draw an unrealistically optimistic picture of EES in education systems across the EU.

In their analysis of **Dutch** accreditation systems for higher education and the development of an external quality assurance system, van Berkel and Wijnen (2010) argued that an accreditation system works well until it expands too far and the administrative burden limits innovation. This results in it becoming more difficult for HEIs to create new interdisciplinary graduate programmes. The authors state that, "*Currently the accreditation*

204 SEPN (n.d.) The Monitoring and Evaluation of Climate Change Education (MECCE) Project. Available at: https://sepn.ca/mecce/. Accessed 22.02.2020.

205 https://www.tartuloodusmaja.ee/en/eco-schools-global/

206 World-Wide Fund for Nature Latvia. Calculators. Available at: https://lv-pdf.panda.org/publikacijas_un_testi/testi_un_speles/ [Accessed 10 March 2021].

207 ÖKOLOG (n.d.). Jahresberichte nach Handlungsbereichen. Available at: https://www.oekolog.at/jahresberichte/handlungsbereiche/ [Accessed 10 February 2021].

208 Jančaříková, K. (2007). Student's portfolio – proper form of evaluation of environmental education (Reviewed version, 3/2007). Envigogika, 2(3). https://doi.org/10.14712/18023061.23

system is twice as expensive as the previous one. The accountability aspect of the accreditation system needs additional procedures and more paperwork. If an institution loses its accreditation, the consequences are severe, and therefore the procedures leading to this have to be proved to be legal <...> The amount of information that the institutions must deliver continues to grow. The regulations for institutions, external review committees, visiting and assessing institutes and accreditation organisation also continue to grow and expand. Communication between these actors is becoming increasingly complicated." [209] Moreover, there is also a fear that accreditation will lead to uniformity and might restrict institutions' capacity for innovation, as HEIs may prefer to conform to traditional patterns to increase their chance of gaining accreditation. From this perspective, accreditation is seen as hindering innovation. In addition, internal quality assessment systems are not often embedded within the institutions. NVAO (the accreditation organisation of the Netherlands and Flanders) states that having an internal quality assessment system is very important. Consequently, all institutions have created such a system, not because they felt it was necessary, but merely because NVAO recommended that they do so. In other words, inside many institutions a 'culture of quality' is missing.[210]

In **Italy**, quality assurance within higher education has been completely reformed over recent decades. Research was carried out on AVA (the self-evaluation and accreditation of the higher education system), sampling 118 university study programmes (Stura et al, 2019). [211] Its general findings confirm that it is easier for certain disciplines to achieve accreditation. The process itself was also criticised. Accreditation refers to the checking of quality standards in study programmes conducted by an external evaluation committee, based on relevant documentation and on an in-situ audit, which is implemented by the academic staff. This method has generated much criticism, because quality assurance requires a great deal of work for already overloaded and sometimes underqualified academic staff. As a possible solution, the authors suggest creating central units of experts at university level for internal quality assurance. Another solution could be to draw up guidelines at national level on the application of quality standards to particular study programmes, and to follow these at the level of individual universities. Such guidelines would facilitate an understanding of how to overcome the problems and respond to specific requests in each disciplinary area – just as guidelines are drawn up for the application of the general ISO 9001 standard specific sectors of industry. In this way, academics could achieve accreditation using an instrument that responds to their specific requests or difficulties. This could be even more relevant to interdisciplinary programmes for EES, which are more complex at their core. [212]

209 van Berkel, H. and Wijnen, W. (2010). Accreditation in the Netherlands: does accountability improve educational quality?, Research in Comparative and International Education, Volume 5 Number 1, p. 93. Available at https://journals.sagepub.com/doi/pdf/10.2304/rcie.2010.5.1.88 [Accessed 9 July, 2021]

210 van Berkel, H. and Wijnen, W. (2010). Accreditation in the Netherlands: does accountability improve educational quality?, Research in Comparative and International Education, Volume 5 Number 1, p. 93. Available at https://journals.sagepub.com/doi/pdf/10.2304/rcie.2010.5.1.88 [Accessed 9 July, 2021]

211 Stura, I., Gentile, T., Migliaretti, G., and Vesce, E. (2019). Accreditation in higher education: Does disciplinary matter?, Studies in Educational Evaluation, Volume 63, p. 46. Available at: https://doi.org/10.1016/j.stueduc.2019.07.004.

212 Stura, I., Gentile, T., Migliaretti, G. and Vesce, E. (2019). Accreditation in higher education: Does disciplinary matter?, Studies in Educational Evaluation, Volume 63, p. 46. Available at: https://doi.org/10.1016/j.stueduc.2019.07.004.

The national experts in **Bulgaria, Czech Republic, Germany, Ireland, Malta, Netherlands and Romania** noted that the ecological aspect of each educational specialism should be included in the process of institutional and programme accreditation in order to accelerate the uptake of EES by HEIs and integrate EES accreditation into the ranking system. The national expert for **Romania** suggested that international rankings have been found to motivate HEIs towards making progress. The expert noted that "introducing authentic sustainability principles in the accreditation criteria will make the real difference in SDG implementation in HEI".

3.6. Cross-sectoral partnerships and collaboration

The national reports provide limited information concerning systematic conditions or enablers that allow cross-sectoral partnerships in EES to flourish, particularly across different levels of education. For the most part, data from the national reports suggests that governments and policy makers are the key existing/potential facilitators, as they are in a good position to foster multi-stakeholder cooperation through the provision of transfer offices and targeted resources for sustainability transfer. In addition, they can establish transfer-friendly funding formats, or raise the status of sustainability transfer within universities, so that commitment to this area is rewarded with additional funds, career opportunities and a reputational boost for the university. At present, governments that actively encourage collaboration tend to place their focus on capacity building (e.g. in **Estonia**, EE round-tables exist, which call together educators, EES specialists, university and college authorities, NGOs and local institutions that deal with EES to clarify cross-sector cooperation expectations, feasible support for networking, etc.) rather than on explicit financial support (e.g. in **Malta**, there is a funding scheme supported by a partnership between government, businesses and banks, which provides salaries for teachers who take part in an initiative with BirdLife Malta and Nature Trust – FEE Malta, to assist in the running of the Dinja Waħda and EkoSkola programmes, respectively).

This capacity building vs. explicit financial support paradigm is also supported by the findings of the literature review. According to Aaron Benavot[213], few countries have succeeded in creating public budget lines and/or economic incentives for nationwide ESD activities and projects. Those that have, tend to be high-income countries, in which the success of sustainability education is variously linked to policy uptake by government, teacher training and enthusiasm, the presence and availability of resources, and participation in initiatives. However, in many national contexts, financing for public education is limited, and ongoing challenges such as access to basic schooling tend to deprioritise EES.

Less than half of all experts (11 out of 27) indicated in their national reports any examples of existing systematic cross-sectoral partnerships at ECEC level (see Table 12. Education for environmental sustainability). Data from the national reports suggests that ECEC has the fewest cross-sectoral partnerships involving EES. Furthermore, even though roughly half of the national experts indicated that ECEC EES initiatives exist within their respective Member States, few confirmed that such initiatives were commonplace or widespread.

213 Benavot, A. (2014). Education for Sustainable Development in Primary and Secondary Education. Available at: https://www.researchgate.net/publication/282342116_Education_for_Sustainable_Development_in_Primary_and_Secondary_Education

According to national mapping data, one of the factors that facilitates cross-sectoral partnerships at ECEC level is direct intervention by education ministries. Ministries of education in the Member States can create and fund specific initiatives by targeted collectives of societal actors– be they NGOs, businesses, local communities or other government branches – to interact within the sphere of EES. Examples of this are evident in Bulgaria and Italy. In both countries, the education ministries have created funding mechanisms to which cross-sectoral partnerships can exclusively apply to kick-start ECEC EES initiatives. In **Bulgaria**, schools have partnered with SMEs and NGOs (under the 'ПУДООС' initiative) to teach kindergarten children about water management. In Italy, schools partnered with national park authorities to apply for funding from regional/local authorities that allowed kindergarten children to become more familiar with ESD, using the woods/national parks as a medium for teaching (under the 'Kindergarten in the Woods' initiative). Government intervention, in the shape of leadership and political will, was also highlighted as a vital facilitator of ESD in the 'Report on the Implementation of the UNECE Strategy for Education for Sustainable Development from 2005 to 2015'.[214]

Regardless of the type of partnership, cross-sector partnerships mostly result in initiatives that either engage kindergarten children in some kind of activity or lesson (e.g. in **Portugal**, a partnership between the Superior Institute of Agronomy of the University of Lisbon and local schools has resulted in visits and ludic-pedagogical activities at Tapada da Ajuda – a green space in Lisbon); or instruct educators who specialise in ECEC (e.g. in **Hungary**, a partnership between the energy/gas sector and schools has resulted in a large-scale virtual learning programme called 'EnergiaKaland' ['Energy Adventure'], which helps to instruct educators on how to engage students – kindergarten children included – about the subject of energy, and to increase their energy-related knowledge). In some cases, collaboration results in a tangible EES-related output, rather than an initiative (e.g. in **Romania**, the Department of Sustainable Development collaborated closely and consulted with schools to develop the 'Book of Sustainable Development Goals for Children', which addresses EES at ECEC level).

In their national reports, 15 out of the 27 experts indicated existing examples of systematic cross-sectoral partnerships at primary/secondary level (see Table 12. Education for environmental sustainability). The primary/secondary education level is the most saturated when it comes to cross-sectoral partnerships relating to EES. Unsurprisingly, this level is also the most diverse in terms of the nature of these cross-sectoral partnerships. The national reports identify the following types of cross-sectoral partnerships: school-national parks; school-local community; school-parents' association; school-government; school-NGOs; school-EdTech; school-business; school-university/academia; and school-NPOs. It should be noted that partnerships featuring a mixture of more than two actors are also present (e.g. school-business-NGOs).

Data from the national reports suggest that one of the more frequent and easily developed types of cross-sectoral partnerships at primary/secondary level are those between schools and local community/school-parents' associations (e.g. the 'ÖKOLOG: School Meets Community' initiative in **Austria**). Some national experts indicate that these partnerships

214 United Nations (2016). Evaluation Report on the Implementation of the UNECE Strategy for Education for Sustainable Development from 2005 to 2015. Available at: https://unece.org/environment-policy/publications/10-years-unece-strategy-education-sustainable-development

act as a gateway for better environmental learning. Data from the literature review support this finding, and add that school-community links play a more impactful role in enhancing environmental learning when community members are actively involved in school programmes that have an emphasis on an experiential learning approach.

School community/school parents' associations partnerships are closely followed by school-NGO partnerships. Partnerships with NGOs usually manifest either in teacher training, as well as providing educators with valuable teaching materials (e.g. the 'LORA – Sustainable Development Laboratory' initiative in **Croatia**), or in initiatives that engage students (e.g. the 'CELL Earthship' initiative in **Luxembourg**). School-business and school-university/academia cooperation appears to be less frequent, and is often based around project implementation rather than systematic cooperation.

The national reports of 14 out of the 27 experts indicated examples of existing, systematic cross-sectoral partnerships at higher education level (see Table 12. Education for environmental sustainability). Data from the national reports suggests that while such cross-sectoral partnerships are present in most Members States, they are widespread in only a handful of countries.

Types of partnerships at HE-level are analogous to those present at primary/secondary level. However, the nature of the partnerships and their final outputs differ. This is illustrated by initiatives in **Belgium, Cyprus and Sweden**. It should be noted that these examples are not commonplace, but represent exemplary approaches that serve as examples of good practice. In **Belgium**, under the 'School Community Collaboration for Sustainable Development' initiative (CoDeS), universities partner with local communities to produce, publish and disseminate a range of materials useful to school and community stakeholders in facilitating EES. These include locally sourced case study reports, toolboxes, travel guides and different types of workshops. In **Cyprus**, under the 'Liaison Offices with the Labour Market' initiative, HEIs partner with businesses and NGOs to place students into work-related environments in order to gain subject-specific professional experience (EES included). In **Sweden**, under the SWEDESD initiative, HEIs partner with businesses, schools and policy makers to share research and conduct high-level panels, seminars, conferences, workshops and forums for practitioners.

In some Member States, the lack of existing cross-sectoral partnerships at the level of higher education can be attributed to poorly established communication mediums and cultural factors[215]. The Baltics serve as a good example of this. Member States such as **Latvia and Lithuania** have historically displayed low levels of university-business and university-NGO cooperation. Both countries have also been urged to expand cross-sector partnerships in order to ensure regional prosperity in the past.[216]

National mapping data find that in Member States in which cross-sectoral partnerships are well established, HEIs are frequently in a position to provide new materials, theory, research findings or other types of data to their partners. Compared with partnerships at

215 Davey, T., Meerman, A., Galan Muros, V., Orazbayeva, B. and Baaken, T. (2018). The State of University-Business Cooperation in Europe. Available at: https://www.ub-cooperation.eu/pdf/final_report2017.pdf

216 President of The Republic of Lithuania (2010). Close Cooperation Among Academia, Business and Politics is a Key to Prosperity of the Baltic Sea Region. Available at https://www.lrp.lt/en/press-centre/press-releases/close-cooperation-among-academia-business-and-politics-is-a-key-to-prosperity-of-the-baltic-sea-region/6607/8778

the primary/secondary school level, HEIs are highlighted as being more likely to hold systemic advisory positions that are not necessarily project-related.

In his analysis of the impact of universities on regional innovation, Robert Tijssen (2021) states that a lack of government incentives leads to untapped opportunities for universities to benefit from cross-sectoral collaboration. "Universities may simply lack the sense of urgency, critical resources or necessary infrastructures to develop or exploit relationships with external partners. Universities do not always have the right kind of incentive structures to become more heavily engaged with regional partners, partially because they are not meant to act as regional development agencies and also because of organisational practices which are, by nature, difficult to change and often resistant to external pressure." [217] It must be noted, however, that prematurely forcing academia and business to cooperate can have negative consequences, as **research indicates that the current trend towards increasing the responsiveness of academia towards the needs and requirements of business has resulted in a great deal of dissatisfaction on both sides of such partnerships** (Anna Lašáková et al. 2017). On the one hand, entrepreneurial actors create pressure on HEIs to deliver well-prepared and skilled graduates with the ability to apply the theoretical knowledge they have learned within the corporate praxis. On the other hand, academia would like to gain access to businesses to develop their R&D activities and become genuine partners with the business sector. [218]

Table 12. Education for environmental sustainability Cross-Sectoral Collaboration, EU-27

CROSS-SECTORAL COLLABORATION	Member States																										
General	AT	BE	BG	CY	CZ	DE	DK	EE	EL	ES	FI	FR	HR	HU	IE	IT	LT	LU	LV	MT	NL	PL	PT	RO	SE	SI	SK
Supported at system level		○	○	●	●		○	●	○		○	○	○	●		●	◌		●		○				○	○	○
ECEC																											
Supported at system level		○	○	●	●	○						○	○	●		●		○									●
Primary/secondary																											
Supported at system level	○	●	○	●	●	○		●		○		○	●	●		●		●					●				●
Higher education																											
Supported at system level		○	○	○	●	○		●		○		●	○	●		○		●					○				●

Source: Authors. *Note*: ● – Present in the country ○ – only partially present ◌ - not present. Blank cell indicates N/A.

In their national reports, more than half of all experts indicated examples of existing systematic cross-sectoral partnerships at the level of non-formal education (NFE). Some Member States have used the legal/judicial measures to increase the extent to which cross-sectoral partnerships occur at NFE level. In **Bulgaria**, the Cultural Centres Act dictates that local authorities are partly responsible for maintaining cultural centres, which are tasked with fulfilling state cultural and education tasks – including those relating to EES.

217 Tijssen, R., Edwards, J. and Jonkers, K. (2021). Regional Innovation Impact of Universities. Available at: https://doi.org/10.4337/9781839100536.00007

218 Lašáková, A., Bajzíková, L. and Dedze, I. (2017). Barriers and drivers of innovation in higher education: Case study-based evidence across ten European universities, International Journal of Educational Development, Volume 55, pp. 69-79, ISSN 0738-0593, https://doi.org/10.1016/j.ijedudev.2017.06.002

Other countries have created and maintained thriving and plentiful cross-sectoral partnerships at NFE level due to the prevalence of sustainability as a cultural element. Data from the national reports suggest that this is the case in **Finland and Sweden**.

Data from the national reports also suggest that cross-sector partnerships at the NFE level tend to involve a dynamic in which government institutions/branches and NGOs provide services or outputs to their partners, e.g. local communities, businesses and schools/universities. NFE is the level at which the outputs and activities of cross-sectoral partnership are most varied. These outputs/activities can be divided into three broad categories. First, data from the national reports suggests that it is common for governments and NGOs to create mediums for the sharing of materials and promotion of collaboration, such as a platform or dissemination network. This is reported in the cases of **Belgium, Cyprus and Hungary**. The second category of partnerships is based on governmental institutions and NGOs providing on-demand workshops, training, lectures and seminars aimed at children, educators or university students. Experts from NGOs or government branches are invited as lecturers or guest speakers to schools or universities. This is noted in the cases of **Croatia, Luxembourg and Slovakia**. The last category can be defined as 'direct collaboration', in which members of the partnership work together to promote EES principles. For example, in **Czech Republic**, under the initiative 'We Teach Outdoors', teachers and parents cooperate to promote outdoor education as an extracurricular activity outside school hours. In Latvia, under the initiative 'Clean. Good. A City Without Waste', NGOs, municipality representatives and local communities collaborate to make local are greener and more sustainable.

Whitehouse (2015)[219] suggests that partnerships between institutions, groups and individuals are necessary relationships to get things done in the field of EES. Whether they are cooperating with parents, NGOs, or governments branches, teachers have an easier time implementing place-based education and exploring the various aspects of EES within a cooperative environment. As one might expect, a lack of such relationships tends to limit the growth of EES. The national report for **Croatia** provides a more contextualised view as to what might be the cause. It argues that if no incentives, structures, guidelines or other practices are defined, cooperation will not be promoted between education institutions and other stakeholders to encourage and deliver EES. The process is not automatic. Without pre-defined foundations for cooperation at system level, cross-sectoral cooperation relies solely on motivation of individual actors to continue.

219 Whitehouse, H. (2015). Cross-Sectorial Relationships for Education for Sustainability. In: Moscardo, G. and Benckendorff, P. (Eds.), Education for Sustainability in Tourism. CSR, Sustainability, Ethics & Governance. Berlin, Heidelberg: Springer. https://doi.org/10.1007/978-3-662-47470-9_8

The national experts from **Cyprus, Greece, Hungary, Latvia, Portugal, Romania and Slovenia** suggest that the establishment of a national point of contact for EES would serve as an important enabler for the implementation of EES. These national points of contact for EES should act as a harmonisation medium for EES, clarifying (a) concepts, policies and strategies; (b) responsible and intervening agents; (c) implementation guidelines and tools; and (d) monitoring and quality assurance instruments and results; organised according to educational levels, cycles and years, and responding to segmented targets such as teachers, students, local authorities, NGOs and businesses. Data from the national reports suggest that in some countries, (e.g. **Cyprus**), pseudo-contact points already exist, but are underdeveloped and cannot achieve their full potential due to funding limitations.

The national experts from **Austria, Cyprus and Italy** highlighted existing university alliances supported at state or international level, which act as important enablers. These allow the exchange of innovative ideas and good practices in the field, as do EU financial instruments themselves, which make a significant contribution towards institutional initiatives relating to EES.

Permanent Unit of Education for the Environment and Sustainable Development (EESD). The EESD was established in Cyprus with the aim of implementing, monitoring and upgrading the National Strategy on ESD, which includes all activities relating to ESD at the level of formal, informal and non-formal education. The EESD is a horizontal structure of the State not only between the directorates and services of the Ministry of Education, but also between all ministries, as well as with the private sector and NGOs. The study carried out to develop the EESD involved the participation of stakeholders from the public and private sectors, local authorities, universities, NGOs, etc. The EESD's mission is to promote and effectively implement ESD at all levels of formal and non-formal education in the long term, in a unified, holistic and coherent way.

The EESD works closely with all stakeholders (Ministries, public services, private organisations, social partners, professional groups, local communities, NGOs, universities, etc.) to promote ESD in civil society. It focuses on the formation of an educational system that provides tools to all stakeholders (teachers, students, principals, parents, professionals, etc.) to deal effectively with SD issues in the educational process, but also in non-formal and informal education. Furthermore, it seeks to tackle chronic problems that exist in the field of ESD in Cyprus, such as the fragmentation and overlapping of ESD issues within and between each directorate of education, to ensure the best use of human resources on ESD, to establish 'institutional memory' and long-term planning on ESD, in order to ensure the unity and holistic implementation of ESD at all educational levels, taking into account its interdisciplinary nature[1].

4. Integrating education for environmental sustainability at institutional level

This chapter presents findings from the mapping exercise of the study – primarily the teacher survey, literature review and inventory of good practices. It discusses various practices across institutions in the EU-27 that aim to develop sustainability mindsets. In line with the study's analytical framework, it recognises that transformative and sustainable change needs to occur at both policy level and institutional level, with purposeful and holistic approaches and supportive synergies between these levels. At institutional level, all kindergartens, schools, universities as well as non-formal training institutions need to support EES in a whole-institution and holistic manner. Collaboration is also vital with other actors within their respective communities, as is a guarantee that educators and leaders have the necessary support, qualifications, financial resources and

motivation to implement EES[220][221]. This chapter, therefore, presents an overview of the existing barriers faced by education institutions, as well as the enablers that can help to ensure the holistic and transformational implementation of EES.

4.1. Transformative practices and vision

The '**whole-school' or 'whole-institution' approach (hereafter WIA)** is often referred to as a key transformative strategy for implementing EES at institutional level. WIA involves the inclusion of sustainable practices in every aspect of school life and school culture. This includes school governance (mission statements concerning the institution's value); teaching and learning design; campus and facilities management; as well as cooperation with partners and the broader communities and students (reconsidering and redesigning schools' operations and environmental management: conserving water and energy, providing healthy food, minimising waste and providing green and healthy school grounds[222]).[223] The principle underlying WIA is education *for* environmental sustainability, rather than education *about* sustainable development[224]. WIA thus directs the focus of ESD from the cognitive dimension of learning towards the behavioural dimension.[225] Co-engaged learning environments enable participants to explore shared matters of concern, and are good areas for developing the collaborative problem-solving skills needed to address climate change both locally and globally.[226] In this regard, WIA that focuses on engaging students in decision-making and school life has been found to be especially influential in shaping sustainability mindsets.[227] The literature suggests that several WIA approaches to sustainability exist (see Table 16 for more detailed information)[228]:

- **OECD Environment and School Initiative (ENSI) Eco Schools.** ENSI (1986-2019) was a decentralised international government-based EE learning network under the umbrella of the OECD's Centre for Educational Research and Innovation (CERI). ENSI was made up of member countries primarily originating from Europe, but also including Australia, as well as partner countries such as New Zealand and South Korea. Under this programme, each country funded its

220 Verhelst, D., Vanhoof, J., Boeve-de Pauw, J. and Van Petegem, P. (2020). Building a conceptual framework for an ESD-effective school organization. Journal of Environmental Education, 1–16. Doi:10.1080/00958964.2020.1797615

221 Mogren, A., Gericke, N. and Scherp, H.-Å. (2019). Whole institution approaches to education for sustainable development: a model that links to school improvement, Environmental Education Research, 25:4, 508-531, doi: 10.1080/13504622.2018.1455074

222 UNESCO (2016). Global Education Monitoring Report, 'Planet: Education for Environmental Sustainability and Green Growth'. Available at: https://unesdoc.unesco.org/ark:/48223/pf0000246429/PDF/246429eng.pdf.multi.

223 UNESCO (2020). Education for Sustainable Development. A Roadmap. #ESD for 2030. Paris, UNESCO. Available at: https://unesdoc.unesco.org/ark:/48223/pf0000374802)

224 Delors, J. (1996). Learning, the Treasure Within: Report to UNESCO of the International Commission on Education for the Twenty-First Century. Paris: UNESCO

225 Hargreaves, L.G. (2008). 'The whole-institution approach to education for sustainable development: From pilot projects to systemic change.' Policy & Practice – A Development Education Review 6. Available at: https://www.developmenteducationreview.com/issue/issue-6/whole-institutionapproach-eduation-sustainable-development-pilot-projects-systemic-change

226 Leicht, A., Heiss, J. and Byun, W.J. (2018). Issues and trends in Education for Sustainable Development. Paris: United Nations Educational, Scientific and Cultural Organization.

227 Shaw, N., Rueckert, C., Smith, J., Tredinnick, J. and Lee, M. (2017). Students as Partners in the real world - A whole-institution approach. International Journal for Students as Partners, 1(1), pp. 1-8.

228 Australian Research Institutes in Education for Sustainability (2004). Whole-institution approaches to sustainability: An international review of whole-institution sustainability programs. Available at: https://aries.mq.edu.au/projects/whole_school/files/international_review.pdf

own work, while ENSI provided opportunities for members to come together in formal settings and share practice and research on EE. One of ENSI's main projects related to research and school development work in 'Eco Schools'. The aim of this project was to develop, test and publish methods of teaching and learning that defined good practices in EE by setting up international school partnerships and conducting comparative studies in such areas as 'quality criteria for Eco School development'[229]. The term 'quality criteria' was used to refer to the implicit and explicit criteria used to support Eco Schools in incorporating EE and EFS as part of their school development[230]. Through this work, ENSI aimed to promote, share and build upon the experiences and practices of member countries, and to identify international standards for a set of 'quality criteria'.

- **Foundation for Environmental Education (FEE International) Eco Schools.** The FEE Eco Schools programme (1994-present) is the world's largest environmental education organisation, with members in 77 countries[231]. Originally founded as a European programme, it has since expanded to countries in Africa, Asia and South America. FEE is a not-for-profit umbrella organisation that brings together national NGOs implementing programmes for "environmental education, management and certification"[232]. These NGOs work in close partnership with their national educational authorities and the FEE International Secretariat. While the overall programme is coordinated through a common framework at international level, members have the flexibility to tailor programmes to suit their own needs. In general, participating schools undertake a seven-step process to work towards Green Flag certification[233], although variations exist in the content and focus of these steps.
- **Sweden's School for Sustainable Development Award**. The School for Sustainable Development Award/Utmärkelsen Skola för hållbar utveckling (1998-present) is an ESD award programme created by the Swedish National Agency for Education[234]. The programme is underpinned by a range of 'award criteria' for schools to meet in order to work towards sustainable development. Participating schools must meet specified criteria before they can apply for the award, which is valid for up to three years. The programme aims to incorporate all aspects of school life, including management, activities and teaching, occupational health and safety, physical welfare, and the physical environment. These criteria were developed though a multi-disciplinary and participatory process, and are based on the national curricula and syllabuses. The areas of focus for the School for Sustainable Development Award can be summarised as

229 Australian Research Institutes in Education for Sustainability (2004). Whole-institution approaches to sustainability: An international review of whole-institution sustainability programs. Available at: https://aries.mq.edu.au/projects/whole_school/files/international_review.pdf

230 OECD (2004). Environment and School Initiatives (ENSI). Available at: www.ensi.org

231 Foundation for Environmental Education (n.d.). Positive Change on a Global Scale. Available at: https://www.fee.global/

232 Australian Research Institutes in Education for Sustainability (2004). Whole-institution approaches to sustainability: An international review of whole-institution sustainability programs. Available at: https://aries.mq.edu.au/projects/whole_school/files/international_review.pdf

233 Eco-Schools (n.d.). The Seven-Step Methodology. Available at: https://www.ecoschools.global/how-it-works

234 Evans, J.A. (2015). Education for Sustainable Development (ESD) Awards in Sweden: A qualitative study of the motivations and barriers of two ESD award initiatives from the perspective of local and national stakeholders. Available at: https://www.edu.su.se/polopoly_fs/1.404854.1538748211!/menu/standard/file/James_Evans_Master_Thesis_2015_.pdf

follows: school life; consumption; democracy; and ethical, aesthetic, cultural and health considerations.

Several good examples of WIA exist in various education institutions across the EU at various levels of education. In **Cyprus**, the Schools Sustainable Environmental Education Policy (SEEP) is an official whole-institution policy adopted by most primary and secondary schools. SEEP focuses mainly on ensuring that sustainability becomes part of all school plans[235]. Without sustainable school plans/policies to establish responsibility and provide guidelines for schools to act upon, long-term and systemic ESD change might not be sustained[236]. In the **Czech Republic**, the education centre TEREZA has developed an eco-school programme that has been implemented in 50 kindergartens. This programme focuses on participatory approaches, allowing learners to take part in making decisions abut which sustainability topics should be a priority for the institution. In the Czech example, a study found a significantly higher level of environmental attitudes among children at the eco-kindergartens in which this more participatory approach was applied.[237]

Schools Sustainable Environmental Education Policy (SEEP), *Cypriot Greek: Αειφόρος Περιβαλλοντική Εκπαίδευτική Πολιτικών των Σχολείων (ΑΠΕΠ)*. The SEEP is developed by the whole institution, and consequently the entire school works towards its implementation. It responds to the needs and particularities of the school unit and the school's immediate environment. The issues included in the SEEP are agreed by the whole institution, and everyone in the school engages in their exploration and studies through the curriculum's thematic units. The SEEP requires cooperation with the community and the formation of collaboration networks with organisations and institutions. Its evaluation takes the form of schools' self-evaluation at a pedagogical, organisational and social level, and the outcomes become the basis for its long-term continuation[1]. The enactment of the SEEP in every school in Cyprus contributes to reinforcing the on-going international dialogue on ESD and meeting the need to establish ESS within school plans, "since this is considered necessary for ensuring the long-term implementation of ESD based on a progressive, coherent and adaptative approach. Without sustainable school plans/policies to establish the responsibility of and provide guidelines for schools to act upon, long-term and systemic ESS change might not be sustained"[1].

While the WIA is often implemented at primary and secondary educational levels, and increasingly in HEIs, note should be taken of the Czech example described above. The involvement of young children in sustainable practices is of great importance in creating sustainable mindsets and initiating long-term exposure to environmental sustainability. Leeming et al. (1997) evaluated various EES programmes and concluded that the impact of EES on the development of lasting sustainable attitudes depends strongly on the length of one's exposure to it. Therefore, the integration of sustainable practices at early childhood level is an important point at which children can start to develop sustainable mindsets.[238]

The review of literature and country profiles prepared for the current study show a growing interest among kindergartens in adopting a sustainable vision or sustainable practices. While increasing attention is paid to nature in government curricula, no overarching policies

235 Zachariou, A. (2021). National policy and research review for Cyprus. Prepared in the framework of data collection for the EAC Study on national and institutional policies and approaches to education for environmental sustainability. Unpublished manuscript.

236 United Nations Economic Commission for Europe (UNECE) (2013). Concept paper on priority action areas (Information Paper No. 5). http://www.unece.org/fileadmin/DAM/env/esd/ 8thMeetSC/Information_Paper_5_Final.pdf. Accessed 23 July 2013.

237 Cincera, J., Kroufek, R, Skalik, J., Simonova, P., Broukalova, L. and Broukal, V. (2017). Eco-School in Kindergartens: The Effects, Interpretation, and Implementation of a Pilot Program. Environmental Education Research, 23(7), 919-936. doi: 10.1080/13504622.2015.1076768.

238 Leeming, F.C. et al. (1997) 'Effects of participation in class activities on children's environmental attitudes and knowledge', Journal of Environmental Education.

exist for the WIA approach. Therefore, as mentioned above, and particularly highlighted by the **Hungarian** national report, the integration of EES depends to a large extent on the resources and interest of the staff[239]. Challenges to the implementation of EES through transformative practices and visions at kindergarten level, and also other levels, relate closely to their reliance on staff capacity, educators' awareness, resources, support from local municipalities and motivation towards the integration of WIA approaches.[240]

The country profiles prepared by the national experts indicate that in most EU countries in which whole-institution approaches have been adopted, WIA takes place through one particular international programme: the global **Eco-school programme**. While the box below describes the standard approach of this programme, there may be differences its the application from country to country and from school to school, particularly with regard to the pedagogical approaches chosen.[241] For example, in **Denmark**, where there are around 200 eco-schools, the Green Free School (Den Grønne Friskole) is made entirely from sustainable materials and places experiential learning and eco-pedagogy at the heart of its syllabus, thereby going beyond what most eco-schools in the country offer[242].

The **Eco-School Programme** is the largest and best-known global environmental education programme for educational institutions (in more than 80 countries), in which EES and ESD related competences and activities are evaluated at institutional level through the awarding of a 'Green Flag' and 'Green Key' . The programme is run globally by the Foundation for Environmental Education (FEE).

To become part of the programme and be recognised as an eco-school, schools must implement seven steps:

1. Form a student-led eco-committee
2. Carrying out a Sustainability Audit
3. Design a corresponding Action Plan
4. Monitor and evaluate the implementation of the Action Plan
5. Link Eco-Schools activities to the curriculum
6. Inform all school staff, pupils, and wider community of the eco-school activities
7. Produce an Eco-Code describing the school's commitment to sustainability
8.

Usually, after two years of implementing the programme and reaching a high level of performance in complying with the seven steps (sometimes national mandatory criteria also apply), schools can apply for and be awarded the Green Flag. Eco-schools rely on certification systems set up to incentivise and facilitate change, following clear criteria for action at school level[243].

The Eco-Schools programme is also being expanded to universities through FEE Campus, which encourages student and staff involvement in sustainable practices at the level of tertiary education.

Source: https://www.ecoschools.global/seven-steps/

239 Varga, A. (2021). National policy and research review for Hungary. Prepared in the framework of data collection for the EAC Study on national and institutional policies and approaches to education for environmental sustainability. Unpublished manuscript.

240 HUMUSZ (2016). 'Civil szervezetek szerepe a környezeti nevelés terén/ (The role of NGO-s in environmental education). Available at: http://www.humusz.hu/sites/default/files/Dokumentumok/gyerekoktatas/korny_nev_ajanlas.Pdf [Accessed 10. March 2021]

241 Boeve-de Pauw, J. and Van Petegem, P. (2017). Eco-school evaluation beyond labels: the impact of environmental policy, didactics and nature at school on student outcomes, Environmental Education Research, doi: 10.1080/13504622.2017.1307327

242 Clasper, J. (2020). Meet Denmark's school where education is all about sustainability. DW, 19.02.2020. Accessed 06.07.2020 from https://www.dw.com/en/denmark-copenhagen-sustainability-school-education/a-52341880

243 Affolter, C. and Varga, A. (2018). Environment and school initiatives lessons from the ENSI Network – Past, present and future. Vienna, Austria/Budapest, Hungary: ENSI/Eszterhazy Karoly University. Retrieved October 18, 2018, from http://ofi.hu/sites/default/files/attachments/lessons_from_the_ensi_network-book_web_0905.pdf

Studies on the effectiveness of the eco-school system find that it has a significant positive but limited effect on the implementation of ESD in educational systems[244]. First, Gan et al. (2019) highlight that the eco-school programme may suffer from being a pre-defined approach, which makes it hard to successfully implement in different local settings.[245] Second, Boeve-de Pauw and Van Petegem (2017) find that eco-schools generally have a positive impact on theoretical knowledge, but less so on applied knowledge, and there are key differences among implementation practices and school levels[246]. Overall, the reasons for their minimal impact on behavioural outcomes is that eco-schools foster only 'controlled' motivation, while teachers and leaders have misconceptions about how behaviours change through knowledge, while values and intrinsic motivation matter more in relation to behavioural change. The challenges and opportunities faced by eco-schools are likely relevant for the implementation of other whole-institution-approaches too, as these apply similar methods.

On the other hand, Boeve-de Pauw and Petegem (2017) find that those eco-schools which do have a positive impact on applied knowledge and the intrinsic motivation of students, ensure the spatial and pedagogical use of green elements, meaning that real educational impacts can be achieved when nature is used actively in teaching and learning, rather than serving purely as decoration. The researchers also find than an integrated approach to teaching methods in eco-schools is much more impactful than a normative approach. This integrated approach consists of methods such as 'debate', 'guest speaker', 'active group assignment', 'year project', 'cross-curricular attention', 'trip to a field centre', while the normative approach might consist of 'day projects' and 'clear rules in hallways'[247].

In line with the recommendations by Boeve-de Pauw and Petegem (2017), the following example from the **Netherlands** demonstrates how a WIA initiative can involve children actively in sustainable practices rather than providing only education *about* the importance of, for example, waste management. In one Dutch EES programme, primary and secondary schools can acquire a quality mark if their school building and its surroundings are kept very clean. This certification is called 'The Clean School' (De schone school). The children are called upon to actively participate and work with checklists and measuring instruments to ascertain the level of litter before and after the clean-up, and to help maintain the school surroundings, with the aim that this will positively influence their future behaviour.[248] Interestingly, the framework does not spell out any specific environmental or sustainability behaviours that educational projects or programmes should foster, but instead stresses the importance of getting students actively involved and allowing multiple voices, including marginalised ones, to be heard.

244 Gan, D. et al.(2019). 'Do eco-schools really help implementation of ESD?: A comparison between eco-school systems of Hungary and Israel.' Hungarian Educational Research Journal 9.4: 628-653.

245 Gan, D. et al. (2019). 'Do eco-schools really help implementation of ESD?: A comparison between eco-school systems of Hungary and Israel.' Hungarian Educational Research Journal 9.4: 628-653.

246 Boeve-de Pauw, J. and Van Petegem, P. (2017). Eco-school evaluation beyond labels: the impact of environmental policy, didactics and nature at school on student outcomes, Environmental Education Research, doi: 10.1080/13504622.2017.1307327

247 Boeve-de Pauw, J. and Van Petegem, P. (2017). Eco-school evaluation beyond labels: the impact of environmental policy, didactics and nature at school on student outcomes, Environmental Education Research, doi: 10.1080/13504622.2017.1307327

248 Tauritz, R. and Wals, A.E.J. (2010). A history of environmental education and youth participation in the Netherlands. In: Corcoran, P.B. and Osano, P.O. (Eds) Young people, education, and sustainable development. Exploring principles, perspectives and praxis. Wageningen: Wageningen Academic Publishers, pg. 253-264.

Taking into account the academic literature and reports by national experts across the EU, the following lessons can be drawn as key elements and actions (enabling factors) that can ensure the success of the whole-institution approach, either by making sure it is comprehensively implemented and long-lasting, or has a proven impact on students' behaviours.

1. **Initiative and an open-minded attitude on the part of key actors (preferably several) within the institution.** Overall, WIAs are voluntarily structures and thus rely on teachers to innovate and ensure the buy-in of their school leaders or vice versa, so that they can be lasting and empowering bottom-up initiatives. Without a person – a "change agent," – or the commitment of the principal, however, the central eco-school initiative may not trigger changes at a local level, nor will it necessarily ensure the nationwide level of take-up crucial to initiating widespread change. Schools that incorporate ESD in a lasting and comprehensive manner will therefore often have a common, school-wide understanding of what they mean by ESD as an organisation, why they feel a need to incorporate it, and what they hope to achieve by working with ESD, with a sustained collective engagement and efficacy to achieve it.
2. **Adaptability.** Adaptability refers to the way in which schools adapt to internal and external demands or opportunities for change. An effective school can respond to these demands and by doing so, improve. Lastly, collective efficacy refers to a school team's conviction that their efforts will have a positive effect on student outcomes, as well as their high expectations of what the school and its pupils can achieve. It is therefore crucial that institutions build lasting cultures and systems. Example of good practices that ensure WIA is sustainable and successful are peer-to-peer networking between institutions, policy incentives and support, and a long-term approach to planning and strategising[249].
3. **Shared leadership.** Evidence shows that for a school to be ESD-effective, shared or distributed leadership is needed and a 'heroic' leadership style is not sustainable over time[250][251]. Shared or distributed leadership[252] means that both teachers and pupils are involved in decision making. This affects the feeling of ownership among both students and staff towards sustainable practices, as well as the development of students' competences.
4. **Vision and plan.** As with the example of **Cyprus** above, including sustainability into the planning and vision for a school's identity and core operations can be particularly impactful, and can ensure that the institution both implements the WIA and also engages in monitoring and quality assurance of it.
5. **Student engagement**. Several studies indicate that the integration of sustainability topics at the operational level in schools is an important pedagogical tool for skills development. Studies find that participation in school

249 Boeve-de Pauw, J. and Van Petegem, P. (2017). Eco-school evaluation beyond labels: the impact of environmental policy, didactics and nature at school on student outcomes, Environmental Education Research, doi: 10.1080/13504622.2017.1307327

250 Bennell, S. (2015). Education for sustainable development and global citizenship: Leadership, collaboration, and networking in primary schools. International Journal of Development Education and Global Learning 7. 10.18546/IJDEGL.07.1.02.

251 Abrahamsen, H. and Aas, M. (2016). School leadership for the future: heroic or distributed? Translating international discourses in Norwegian policy documents, Journal of Educational Administration and History, 48:1, 68-88, doi: 10.1080/00220620.2016.1092426

252 Bennell, S. (2015). Education for sustainable development and global citizenship: Leadership, collaboration, and networking in primary schools. International Journal of Development Education and Global Learning 7. 10.18546/IJDEGL.07.1.02.

elections and having a democratic student body that participates in decision making is a beneficial experience that prepares young people to become active citizens (see 2.3).[253]

In the teacher survey implemented as part of this study, most of the teachers surveyed (52 per cent) perceived EES as part of their school culture (including those who answered 'partly'). Most respondents recognised the visibility of EES in their school's culture through its waste management practices. We suggest that these positive findings should be interpreted with caution. The fact that teachers primarily list waste management as well as the use of sustainable learning materials, as proof of a 'whole-institution' culture, potentially shows a lack of understanding of what such an approach entails. Among those teachers who said no, most answers related to the lack of an institutional vision and concrete actions from the school management, and the fact that initiatives for EES rely on the motivation of individual teachers without sustained support from the school management.

Both the exploratory teacher survey and reports by national experts demonstrate that the lack of comprehensive and mandatory government policies for WIA in school education creates a lot of pressure on school staff to design and implement school-level approaches. In **Hungary** and **Greece**, there is a lack of financial resources dedicated to environmental sustainability-related activities, both on the part of schools and by government.[254][255] Many national experts referred to overloaded curricula and the workload of both teachers and students, which hinder the implementation of additional EES activities.

It should be noted, however, that universities are predominantly autonomous, and are thus far less affected by national education policies, curricula and pedagogies in comparison to schools. Therefore, WIA initiatives to enhance sustainability in HEIs are usually driven by internal initiatives, through government incentives, or through collaborative networks of universities and other stakeholders. The literature and the national reports suggest that the following factors effect change at universities with regard to the development of appropriate guidelines and mission statements that support a whole-institution approach:[256]

— **Structural transformation and the entrance of sustainable development into universities' operational structures or infrastructure.** Some HEIs in **Belgium** (formally or informally) have calculated their ecological (and/or carbon) footprint, and used this to involve students and improve campus operations.[257] As such, Ecological Footprint Analysis (EFA) can serve as a tool, turning a university's own campus into a living laboratory.

253 Saha, L.J. and Print, M. (2010). Student school elections and political engagement: A cradle of democracy? International Journal of Educational Research 49(1), 22-32.

254 Varga, A. (2021). National policy and research review for Hungary. Prepared in the framework of data collection for the EAC Study on national and institutional policies and approaches to education for environmental sustainability. Unpublished manuscript.

255 Skanavic, C. (2021). National policy and research review for Greece. Prepared in the framework of data collection for the EAC Study on national and institutional policies and approaches to education for environmental sustainability. Unpublished manuscript.

256 University Educators for Sustainable Development (UE4SD) (2014). 'State of the art report on mapping opportunities for developing education for sustainable development competences in the UE4SD partner countries'.

257 Lambrechts, W. (2021). National policy and research review for Belgium. Prepared in the framework of data collection for the EAC Study on national and institutional policies and approaches to education for environmental sustainability. Unpublished manuscript.

- **Internal factors (institutional culture, strategic agency, relationships and power on campus).** Research from 13 universities in **Austria** found that the major drivers for change in half of cases were single actors who initiated changes based on their personal motivation and engagement, in combination with their position and decision-making power, which fostered processes of structural embedding. The research concludes that good interplay between bottom-up engagement and top-down support leads to broad embedding within various areas of activity in the university[258].
- **External factors (funding/regulative bodies, networks, other HEIs).** Many Austrian universities, applied science universities and colleges of teacher education have participated in collaborative programmes to support EES as a whole institution (the Alliance of Sustainable Universities, UniNetz, uniko-manifest for sustainability). This development is fostered by performance agreements between the Ministry of Education, Science and Research and the institutions concerned, which positively incentivise action by the HEIs.[259] In addition to this, external funding is often seen as an important driver in the process of implementing sustainability[260]. National experts reported examples of Erasmus+-funded projects to enhance EES practices at university level. To avoid the sequence and continuity of projects being dependent on external funding, research suggests that HEIs could assign responsibility for the integration of sustainable development to one or more employees, using internal funding[261].
- **Focus on organisational learning and change processes than consider the benefit for students[262].** The Budapest University of Technology and Economics has introduced an EES-related innovation into its evaluation system. The 'Green Diploma' certificate is a supplement to diplomas, and certifies that students have attended a particular number of courses covering environmental economics and environmental management-related subjects during their studies.[263]
- **Decision-making processes, leadership strategies, and strategic planning dynamics.** The Belgian national report indicates that universities often lack knowledge and awareness of how to integrate EES at an institutional level, or do not perceive the importance of integrating it into their strategic plans.[264]

258 Bohunovsky, L., Radinger-Peer, V. and Penker, M. (2020). Alliances of Change Pushing Organizational Transformation Towards Sustainability across 13 Universities. Sustainability, 12(7), 2853, doi:10.3390/su12072853

259 See UNESCO (2018). 'Report on implementation of the UNECE Strategy for Education for Sustainable Development in Austria'. Available at: https://unece.org/DAM/env/esd/Implementation/NIR_2018/Austria_NIR_2018.pdf [Accessed 10 February 2021].

260 Verhulst, E. and Lambrechts, W.(2015). Fostering the incorporation of sustainable development in higher education. Lessons learned from a change management perspective. J. Clean. Prod. 106, 189–204, doi:10.1016/j.jclepro.2014.09.049.

261 Verhulst, E. and Lambrechts, W.(2015). Fostering the incorporation of sustainable development in higher education. Lessons learned from a change management perspective. J. Clean. Prod. 106, 189–204, doi:10.1016/j.jclepro.2014.09.049.

262 Bohunovsky, L., Radinger-Peer, V. and Penker, M. (2020). Alliances of Change Pushing Organizational Transformation Towards Sustainability across 13 Universities. Sustainability, 12(7), 2853, doi:10.3390/su12072853

263 Attila, V. (2021). National policy and research review for Hungary. Prepared in the framework of data collection for the EAC Study on national and institutional policies and approaches to education for environmental sustainability. Unpublished manuscript.

264 Lambrechts, W. (2021). National policy and research review for Belgium. Prepared in the framework of data collection for the EAC Study on national and institutional policies and approaches to education for environmental sustainability. Unpublished manuscript.

4.2. Professional learning communities

As suggested by the Belgian national expert, lack of knowledge and awareness among educational staff is another barrier to the implementation of WIA. However, teachers can benefit extensively from peer-learning activities to exchange practices and experiences and work collaboratively to improve teaching skills and the academic performance of students. Peer learning is the acquisition of knowledge and skills through interactions between people who share similar characteristics or status, and who are in a non-hierarchical relationship. It is a key part of WIA. [265] Hargreaves and Fink (2006) and Miquel and Duran (2017) note that it is essential for schoolteachers to work together and learn from each other to develop practices that respond to the challenges of today's educational systems[266]. Doing so can improve their understanding of environmental concepts and attitudes, as well as the ability to adjust programmes to their own context using cooperative learning methods[267]. Professional learning communities can also foster teachers' agency and role as instrumental actors or 'subjects', as opposed to 'objects', of education[268]. The development of professional learning communities is therefore an especially important factor in implementing EES.

To understand how professional learning communities can be used in an effective way that supports learning for both teachers and students, this section highlights three main approaches reported in the inventory of good practices and national reports: 1) learning communities established by environmental education centres, non-formal organisations or universities; 2) inter or intra-institutional learning communities established by teachers or education staff themselves; and 3) tools and approaches that are supportive of professional learning communities (e.g. online platforms).

First, the national reports for **Cyprus, the Czech Republic, Estonia, Latvia and Slovenia** indicate that the incorporation of NFE initiatives into formal education and the curriculum is important for better enabling EES. NFE centres design programmes for schools, produce materials, offer in-service teacher training, or voluntary nature- and sustainability-oriented clubs and summer camps for children[269]. More importantly, due to their long lists of services and direct engagement with teachers and school leaders, NFE initiatives or environmental education centres tend to be quite successful in establishing professional learning communities and spaces for teachers to engage with new pedagogies and education content. For example, in the **Czech Republic**, programme-specific communities of practice and networks are organised by environmental education centres. In such programmes, such as GLOBE[270] or Eco-School[271], coordinators organise the

265 Topping, K. (2005). Trends in Peer Learning. Educational Psychology 25 (6): 631–645.

266 Hargreaves, A. and Fink, D. (2006). Sustainable Leadership. San Francisco, CA: Jossey Bass.

267 Miquel, E. and Duran, D. (2017). Peer Learning Network: implementing and sustaining cooperative learning by teacher collaboration. Journal of Education for Teaching, 43(3), 349–360. Doi:10.1080/02607476.2017.1319509

268 Philpott, C. and Oates, C. (2016). Teacher agency and professional learning communities; what can Learning Rounds in Scotland teach us? Professional Development in Education, doi: 10.1080/19415257.2016.1180316

269 Kulich, J. (2006). Co jsou a kde se vzala střediska ekologické výchovy, ekocentra, ekologické poradny. Bedrník, 4, 2: 12-14.

270 https://globe-czech.cz/cz.

271 https://ekoskola.cz/cz.

teachers involved into non-formal communities of practice, with the aim of exchanging experiences, organising workshops, testing new materials, etc.[272]

One challenge in relation to this is that only limited research has so far been conducted on peer-learning activities specifically aimed at ECEC educators, and the data yield less information about this education level. In reference to ECEC teacher education and EES, most national experts mentioned that the (limited, mostly optional) integration of EES into ECEC teacher training differs between institutions. The only examples of peer learning for environmental sustainability in ECEC could be found in Erasmus+ projects. The 'Empowering Teachers and Pupils for a Better Life through Nature. Project, for instance, develops curricula and activities for ECEC educators and children that helps them to connect with nature. Sharing experiences between teachers is one of the dimensions of the project.[273]

Meanwhile, some universities that carry out research into EES have proven adept at facilitating professional learning communities across all levels of educators. While the SciTeach Centre at the University of **Luxembourg** works with teachers and experts in science education to research innovative approaches to science teaching in the unique educational context of Luxembourg's primary schools, the MultiLab project in **Italy** cuts across levels by targeting kindergarten, primary school teachers and student teachers. MultiLab carries out research and works to connect children, teachers, museums and university researchers to innovate and test new and established pedagogical approaches (see more in Chapter 5).

Regardless of these positive examples, the participation of teachers in peer learning or in-service teacher training activities is often not mandatory, and depends on the motivation of individual schools or teachers and their ability to participate. In **Belgium**, schools create a professional development plan for each year, which includes the topics to be focused upon. Whether EES activities are included in this depends on the local context of the school.[274] In the teacher survey conducted for this study, more than one-third of respondents indicated a lack of peer learning opportunities as a barrier to teaching EES. This supports the finding that there are no systematic approaches to peer learning for teachers – only *ad hoc*, standalone initiatives that cover only selected groups of teachers, or teachers with the opportunity and motivation to build such communities for themselves.

Lastly, this study has recorded some good practices in terms of online platforms that can help teachers either to access international professional learning communities, or to obtain materials that will hep them set up their own communities. One such example is 'The Global School' in **Sweden**. This initiative, which is a part of the Swedish Council for Higher Education (UHR), works to develop competences in learning for sustainable development among teachers, school leaders and student teachers , as well as providing support to municipalities and decision makers. All resources are free and available online.[275] In a

272 Činčera, J. (2021). National policy and research review for Czech Republic. Prepared in the framework of data collection for the EAC Study on national and institutional policies and approaches to education for environmental sustainability. Unpublished manuscript.

273 https://ec.europa.eu/programmes/erasmus-plus/projects/eplus-project-details/#project/2016-1-PL01-KA201-026412

274 Lambrechts, W. (2021), National policy and research review for Belgium. Prepared in the framework of data collection for the EAC Study on national and institutional policies and approaches to education for environmental sustainability. Unpublished manuscript.

275 Utbyten (n.d.) Den Globala Skolan. Accessed 08.06.2021 from https://www.utbyten.se/mojligheter/mojligheter-inom-forskola-och-skola/den-globala-skolan/

forthcoming study on NBS, **online platforms** were highlighted as particularly effective at enabling teachers to contact each other and plan projects, share or discuss resources with other teachers at other schools. This is also acknowledgement by project evaluations for ESD/EE international collaboration projects such as the E-School4Sa Comenius project, which designed an operational e-learning platform for cooperation and the exchange of information and experiences in the field of ESD[276]. By becoming a part of online networks such as the Consumer Classroom or the Sustainability Education Network Service, teachers can also gain direct access to relevant materials – a critical factor, since in many cases there is a lack of sufficient resources on environmental sustainability[277].

4.3. Partnerships

The previous section touched on the importance of cross-sectoral partnerships in providing teachers with resources and establishing professional learning communities. Multi-stakeholder cooperation is perceived as an integral part of the promotion of EES. Given the importance of grand transitions in contributing to addressing climate change, multi-stakeholder cooperation is crucial to underpinning a consensus-based vision and strategy. In its teaching or whole-institution approach, EES could therefore also address more explicitly the role of collective action, multifactor networks, and sociotechnical innovation in shaping energy transition processes[278]. Interestingly, data from the national reports suggest that cross-sectoral partnerships that involve multiple stakeholders tend to be more systematic and to foster resource sharing, while cross-sector partnerships involving only two partners tend to be of a more participatory and collaborative nature, focusing on project-based initiatives.

To create diverse and cross-boundary learning settings that draw holistic, comprehensive pictures of global sustainability challenges, Leicht et al. advise educational institutions and educators to foster partnerships at local, national and international level[279]. Learning within partnerships that involve a range of societal actors, such as businesses, NGOs, public institutions and/or policymakers, becomes a source of creativity and innovation through dialogues or projects that enable students to learn about real-world challenges and benefit from partners' expertise and experiences. At the same time, they can be empowering for partners, increasing their capacity as critical agents of change. In addition, partnerships between learners from around the world foster the exchange of different perspectives and knowledge concerning similar topics. Partnerships for EES can take various forms, but usually include:

- Collaboration with parents and communities;
- Collaboration with other education institutions (nationally or internationally), e.g. school networks, university alliances and labels[280];

276 Monus, F. and Lechner, C. (2017). An innovative way in education for sustainable development: e-School4s – e-school for sustainability in the Danube region. Journal of Applied Technical and Educational Sciences Vol. 7, No. 4.

277 European Commission (2017). '7 projects that educate young citizens for a sustainable economy'. EC, 26.06.2017. Available at: https://ec.europa.eu/programmes/erasmus-plus/news/7-projects-educate-young-citizens-sustainable-economy_en [Accessed 20.01.2021]

278 Jorgenson, S.N., Stephens, J.C. and White, B. (2019). Environmental education in transition: A critical review of recent research on climate change and energy education (p. 168), https://doi.org/10.1080/00958964.2019.1604478

279 Leicht, A., Heiss, J. and Byun, W.J. (2018). Issues and trends in Education for Sustainable Development. Paris: United Nations Educational, Scientific and Cultural Organization.

280 A good example is 'e-School4s' – e-school for sustainability in the Danube region. Available at: https://core.ac.uk/display/148787609

— Collaboration with other stakeholders (businesses, NGOs).

Across Europe and across different educational institutions, a plethora of good examples of collaborations exist between schools and NGOs or non-formal education institutions. Yet challenges exist – in particular in relation to building durable and impactful partnerships. In **Denmark** and **Greece,** there is often a lack of coordination and effective management of all of the stakeholders involved in EES, due to a lack of clear policies on EES at institutions[281][282]. In **Latvia**, there is a lack of formalised inclusion of different stakeholders, particularly of experienced civil society organisations (NGOs) in the field of EES.[283] The Dutch expert indicated that:

> "*National and institutional practices of cooperation among different stakeholders do indeed occur at different levels, school-business, school-university, university-business, university–NGOs/CSOs, school–NGOs/CSOs, school/universities–local government, EdTech sector–schools, etc. However, these partnerships appear transitory and constantly changing: a search of some organisations showed cooperative for a number of years, but apparently no follow-up, while some relationships are more durable*."

At ECEC level, EES is based on pedagogies suitable for young children, such as structured play. Therefore, partnerships for EES in ECEC focus on integrating elements of nature and sustainability into children's play and learning. This means a smaller role for businesses, universities, or technical institutions, and the enhanced importance of NGOs and institutions that focus on topics such as interaction with nature and animals in a playful manner. However, the following example demonstrates the potential for ECEC institutions to collaborate directly with institutions that are not directly associated with play and childhood. For example, in **Belgium**, Fostplus vzw (an NGO focusing on waste reduction and recycling), together with the Flemish waste organisation OVAM and Goodplanet Belgium, developed an interactive school theatre play specifically oriented towards early childhood education (kindergarten, which in Belgium includes children between 2.5 and 6 years old). This might be regarded as one of the best practices within EES at ECEC level.
Examples also exist of more structural, long-term cooperation between ECEC or school institutions and other stakeholders. These include setting activities throughout the year in which children engage in EES-related activities. The following examples from **Denmark,**

281 Lysgaard, J.A. (2021). National policy and research review for Denmark. Prepared in the framework of data collection for the EAC Study on national and institutional policies and approaches to education for environmental sustainability. Unpublished manuscript.
282 Skanavis, C. (2021). National policy and research review for Greece. Prepared in the framework of data collection for the EAC Study on national and institutional policies and approaches to education for environmental sustainability. Unpublished manuscript.
283 Belousa, I. (2021). National policy and research review for Latvia. Prepared in the framework of data collection for the EAC Study on national and institutional policies and approaches to education for environmental sustainability. Unpublished manuscript.

Forest kindergartens in Denmark, Hungary and Austria: Forest kindergartens and schools offer several days of outdoor learning experience during the school year. These programmes enable pupils to spend time in forests, national parks and protected environmental areas. They provide opportunities for children to discover these locations as natural learning environments while carrying out unique learning activities that differ from ordinary class-based situations. Forest kindergarten and forest school programmes are usually organised in close cooperation between schools and programme providers. Programme providers may be state organisations such as national parks and forestry companies or governmental organisations such as local environmental organisations, as well as companies in the tourism sector.

The **PILGRIM-network in Austria** aims to stimulate ideas of sustainable development using various means, such as co-operation between different world religions and philosophical approaches. Furthermore, it integrates discourse between science and religions and their approaches to the topic of sustainability, educational institutions and the general public.

Hungary and **Austria** demonstrate long-term cooperation between schools and stakeholders in this regard.

In terms of engaging the broader school community in ESD delivery, the national reports suggest that the role of school-community links in enhancing environmental learning is more impactful when community members are actively involved in school programmes that include an experiential learning approach. However, this depends to a large extent on the availability of parents or community members concerned, and their willingness to participate in voluntary school-based activities. Factors that could potentially strengthen the role of school-community links in support of environmental learning include: allowing space for informal learning, mediating learning in civil society settings, ongoing facilitation by a committed coordinator, community buy-in and accountability, and addressing public interests through tangible benefits[284].

Numerous NGOs and other non-formal education organisations exist across Europe that focus on environmental sustainability by creating awareness and changing people's attitudes. While NGOs more often have the time and expertise to conduct EES activities, their reach is significantly smaller than that of the formal education system. In addition, participation in the activities of NGOs is not mandatory, and therefore depends on the interest of their target groups. Collaboration between schools and NGOs or other non-formal learning institutions can provide significant benefits, by building on the expertise of the non-formal learning institution and connecting it with the curriculum and reach of the formal education institution.

Research suggests that inter-university networks and intersectoral initiatives are on the rise. Regional Centres of Expertise in ESD, led by universities networking with local stakeholders on sustainability awareness, education and capacity building, now number 180 globally[285]. Many universities have established transfer offices or transfer centres to support multi-stakeholder collaboration activities[286]. Multi-stakeholder, participatory and collaborative learning partnerships create opportunities for reflective and inclusive trust-building, which ultimately leads to the development of solutions and innovations[287].

284 Köhly, N. (2010). An exploration of school-community links in enabling environmental learning through food growing: a cross-cultural study. Available at: https://core.ac.uk/download/pdf/145046101.pdf

285 Sterling, S. 'Educating for the Future We Want', opening essay for a GTI Forum, Great Transition Initiative (February 2021), https://greattranstion.org/gti-forum/education-sustainability-sterling.

286 Nölting, B., Molitor, H., Reimann, J., Skroblin, J.-H. and Dembski, N. (2020). Transfer for Sustainable Development at Higher Education Institutions—Untapped Potential for Education for Sustainable Development and for Societal Transformation. Sustainability, 12(7), 2925. doi:10.3390/su12072925

287 UNESCO, 'Issues and trends in education for sustainable development'.

'Real-world laboratories' are another interesting example of such partnerships. Real-world laboratories (partnerships with universities) are growing in popularity as a setting for transdisciplinary and transformative sustainability research. Real-world laboratories focus on experimentation, which means applying integrated knowledge, together with cyclic learning on the basis of that knowledge during the course of the research process.[288] They follow an approach of collaboration between scientists and (local) practitioners (municipalities, NGOs, companies, government institutions), and integrate various forms of knowledge, as well as jointly organised participation and learning projects including those in the form of exploratory learning. Transformative learning in higher education addresses two pressing problems in the current structure of HE: 1) the gap between theory and practice (real-world labs motivate people to test prior knowledge and derive lessons from practice); and 2) they fosters a more pronounced culture of learning through failure.

On the basis of the data from this study, it is impossible to reach a conclusion as to the extent to which inter-university ESD networks take place in the EU. However, in Chapter 5 several innovative and forward-looking initiatives at European HEIs are analysed to further understand the importance of this process and the impact such initiatives can have on teaching and learning.

Relationships between universities and practitioners are not limited to the transfer of knowledge, ideas and technologies to society, but also involve co-creating them. This is claimed to have great potential in solving sustainability problems that require cooperation between actors from different sub-systems in society, and can lead to significant contributions to a local or regional transition to sustainability[289]. In this direction, there is an increasing trend in research towards extending the 'traditional' missions of the university (teaching and research) with the 'third mission', focusing on transferring and co-creating solutions for the society.

Depending on the complexity of the societal problem, different forms of transfer can take place[290]:

- **Provision of knowledge**. The basic form of transfer includes all cooperation between the university and external partners (transfer of knowledge, technologies, and ideas from university to practice). At its own initiative, the university provides societal actors with findings, knowledge and products from teaching and research without getting feedback. Such forms of transfer can be carried out with few resources, and offer comparatively extensive coverage. Examples include exhibitions, popular science publications, lectures, training, communication, or technology transfer in companies.
- **Interaction**. University actors strive to ensure that their transfer activities are effective in practice. This requires input and feedback loops from the practitioners to the university. Examples include mutual problem descriptions for

288 Wanner, M., Schmitt, M., Fischer, N. & Bernert, P. (2020). Transformative Innovation Lab: Handbook to Facilitate Students' Real-World Laboratory Projects to Promote Transformative and Transdisciplinary Competencies. Germany: Wuppertal Institute for Climate, Environment and Energy. Retrieved from https://epub.wupperinst.org/frontdoor/index/index/docId/7685

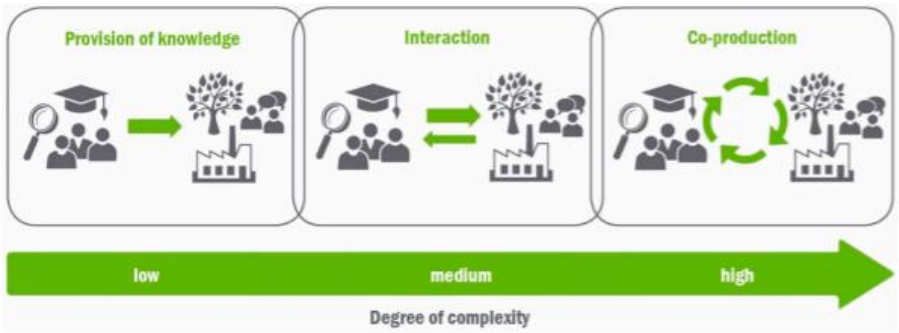
289 Trencher, G.P., Yarime, M. and Kharrazi, A. (2013). Co-Creating Sustainability: Cross-Sector University Collaborations for Driving Sustainable Urban Transformations. Journal of Cleaner Production, 50, 40-55, doi: http://dx.doi.org/10.1016/j.jclepro.2012.11.047

290 Nölting, B., Molitor, H., Reimann, J., Skroblin, J.-H. and Dembski, N. (2020). Transfer for Sustainable Development at Higher Education Institutions—Untapped Potential for Education for Sustainable Development and for Societal Transformation. Sustainability, 12(7), 2925. doi:10.3390/su12072925

knowledge-based problem resolution, or the mutual evaluation of knowledge and technologies in the context of the particular activity concerned.

— **Co-production**. Societal actors and universities jointly produce knowledge to address sustainability problems. All transfer partners contribute their competences, strengths and perspectives to joint learning and research processes as part of co-production. Examples include joint problem descriptions, the joint development of guiding principles, visions and solutions (e.g. in real-world laboratories)[291].

Figure 6. Type of transfer per degree of problem complexity



Source: Nölting, B., Molitor, H., Reimann, J., Skroblin, J.-H. and Dembski, N. (2020). Transfer for Sustainable Development at HEIs—Untapped Potential for Education for Sustainable Development and for Societal Transformation. *Sustainability*, 12(7), 2925. doi:10.3390/su12072925

According to Nölting et al. (2020) successful transfer depends on the overarching structural conditions (laws and funding), but also on the **organisational conditions** for implementation, which can be shaped by the HEIs. The key role in this respect is played by **transfer offices**, which coordinate and support transfer activities, take on recurring tasks, pool and process knowledge, establish and maintain contact between potential transfer partners, and act as key points of contact for interested actors. In addition, systems that incentivise transfer and create scope for developing transfer projects and concepts in day-to-day operations are also suggested as enablers in research. To achieve successful sustainability transfer, academics recommend setting explicit transfer goals, as well as evaluation criteria to capture their effects.

Limited cross-sectoral cooperation is highlighted in many of the national reports. Its absence is emphasised most strongly in the reports for **Latvia** and **Slovakia**. Overall, the experts indicate that there is a low level of willingness among the existing EES community to cooperate and transfer knowledge. While there is acknowledgement of the potential for sharing ideas, good projects, programmes, inspirations, examples of good practice, etc., such potential is insufficiently used. To transfer and co-create solutions and innovations that address societal problems, the involvement and cooperation of different stakeholders is vital. The national research reports suggest that transfers can take different forms, such as knowledge and technology transfer, training, consulting, participating in social and cultural life, participating in policymaking, science communication, as well as contracts with

291 Nölting, B., Molitor, H., Reimann, J., Skroblin, J.-H. and Dembski, N. (2020). Transfer for Sustainable Development at Higher Education Institutions—Untapped Potential for Education for Sustainable Development and for Societal Transformation. Sustainability, 12(7), 2925. doi:10.3390/su12072925

companies, public agencies and municipalities. Some exemplary attempts at creating broad partnerships for collaboration and the sharing of best practice are further explored through the case studies discussed in Chapter 5.

4.4. Student engagement and student-led change

Another key area of EES that requires investigation if we wish to know how well EES is implemented at institutional level across Europe, is the extent to which students are involved in decision-making and environmental activities at each institution. EES initiatives based on student engagement can take several shapes, and may be either **participatory** (to ensure social learning and develop citizenship competences by engaging students in key decisions relating to the initiative) or **socio-constructivist transformative**.[292] The latter focuses on transactional/co-created and socially critical/action-oriented involvement of students, which requires that students also aim to have a visible and critical impact on their environment.

Several studies attest that it is not enough for schools to promote action for the environment, but that one also has to develop learners' feelings of 'ownership' towards positive environmental behaviour[293]. In their empirical evaluation of student attitudes toward consumption, Barth et al. (2012) describe the modest success of a participatory, whole-institution approach in Germany[294]. Meanwhile, Vare (2021) demonstrates how student-led sustainability projects can shift hierarchies and improve student agency[295]. Students demonstrated more sustainable self-reported consumption behaviours, as well as higher measures of the perceived effectiveness of their own consumer choices and the perceived relevance of consumer knowledge gained at school[296]. These findings also build on decades-long research from pedagogical and psychological studies, which suggests that education that is reoriented towards self-realisation will more naturally help children mature and become independent. In addition, such education enables children to gradually learn to take more responsibility for their actions, and to become self-determined and self-responsible.[297] Resistance to learner-centred pedagogies, as well as a lack of awareness among education staff as to how to involve students, and inflexibility at the education institution, are the main barriers to active student involvement.[298]

292 Tauritz, R. and Wals, A.E.J. (2010). A history of environmental education and youth participation in the Netherlands. In: Corcoran, P.B. and Osano, P.O. (Eds.), Young people, education, and sustainable development. Exploring principles, perspectives and praxis. Wageningen: Wageningen Academic Publishers, pg. 253-264.

293 Gayford, C. (2008). Learning for sustainability: from the pupils' perspective. WWF. Department for Children, Schools and Families.

294 Barth, M., Fischer, D., Michelsen, G., Nemnich, C. and Rode, H. (2012). 'Tackling the Knowledge-action Gap in Sustainable Consumption: Insights from a Participatory School Programme'. Journal of Education for Sustainable Development 6 (2): 301–312, doi:10.1177/0973408212475266.

295 Vare, P. (2021) 'Exploring the Impacts of Student-Led Sustainability Projects with Secondary School Students and Teachers', Sustainability 13, no. 5: 2790. https://doi.org/10.3390/su13052790

296 Barth, M., Fischer, D., Michelsen, G., Nemnich, C. and Rode. H. (2012). 'Tackling the Knowledge-action Gap in Sustainable Consumption: Insights from a Participatory School Programme'. Journal of Education for Sustainable Development 6 (2): 301–312. doi:10.1177/0973408212475266.

297 Tauritz, R. and Wals, A.E.J. (2010). A history of environmental education and youth participation in the Netherlands. In: Corcoran, P.B. and Osano, P.O. (Eds.), Young people, education, and sustainable development. Exploring principles, perspectives and praxis. Wageningen: Wageningen Academic Publishers, pg. 253-264.

298 Benavot, A. (2014). Education for Sustainable Development in Primary and Secondary Education. Available at: https://www.researchgate.net/publication/282342116_Education_for_Sustainable_Development_in_Primary_and_Secondary_Education

More recently, research on student participation in relation to ESD has revolved more *positively* around the impact students can have at education. In fact, students have been the driving force behind changes towards whole-institution approaches, advocating for sustainability to be included in schools' visions and strategic plans.[299] Conversely, a lack of inclusion of students into the development of school policies and actions, limits student engagement on these issues[300][301]. As with national policy, schools need to avoid an administrative rationalist storyline in which students are framed as 'ignorant' or 'passive'[302]. A forthcoming study on NBS found that having an active student council led to sustainability being included in school visions and the school agenda, echoing the impression that the 'Greta Thunberg generation' is motivated to initiate environmental change[303]. Active student participation is thus often described as instrumental to the success of the eco-school or whole-institution approach.[304]

In ECEC, the best example of student involvement of from the data collected at institutional level is the eco-kindergarten approach (WIA at pre-primary) in the **Czech Republic**. In this programme, children are asked to identify what they would like to have in the ecological management (waste, water consumption, schoolyard) of their kindergarten. They are then invited, in cooperation with their teachers and parents, to promote these changes. The programme is based on a participatory approach that develops students' interpersonal, strategic and anticipatory competences. Evaluation of the initiative found a significantly higher level of environmental *attitudes* among children from kindergartens in which a more participative approach was adopted.[305]

At the school level, the data provides insights into particularly good examples from Latvia, Denmark and Malta. Between them, these represent the different way to engage students – socio-constructive and participatory. In **Latvia**, a non-formal education organisation provides an environmental education programme cross-cutting with journalism education for young people between the ages of 11 and 25, with the aim of researching environmental problems, promoting solutions and learning about modern media tools to inform the public. It draws on the action research approach, and requires students to choose their own sustainability-related topics about which to research and disseminate news. The programme is engaging, and very popular among the youth. In **Denmark**, the problem-based interdisciplinary courses planned in recent years in Folkeschule require students to act not only on externally created content, but to be involved in determining parts of the

299 [to be published] Mulvik, I. B., Pribuišis, K., Gras-Velázquez, À., Dumčius, R. and Coles, N. (2020). Nature-Based Solutions in education – A Pilot Study, European Commission, December 2020.

300 Kelsey, E. (2003) Constructing the public: implications of the discourse of international environmental agreements on conceptions of education and public participation, Environmental Education Research, 9:4, 403-427, doi: 10.1080/1350462032000126087

301 Schröder, L.-M.U. Wals, A.E.J. and van Koppen, C.S.A. (2020). Analysing the state of student participation in two Eco-Schools using Engeström's Second Generation Activity Systems Model, Environmental Education Research 26:8, 1088-1111, doi: 10.1080/13504622.2020.1779186

302 Kelsey, E. (2003) Constructing the public: implications of the discourse of international environmental agreements on conceptions of education and public participation, Environmental Education Research, 9:4, 403-427, doi: 10.1080/1350462032000126087

303 Jung, J.; Petkanic, P., Nan, D. and Kim, J.H. (2020). 'When a Girl Awakened the World: A User and Social Message Analysis of Greta Thunberg', Sustainability 12, no. 7: 2707. https://doi.org/10.3390/su12072707

304 Shaw, N., Rueckert, C., Smith, J., Tredinnick, J. and Lee, M. (2017). Students as Partners in the real world – A whole-institution approach. International Journal for Students as Partners, 1(1), pp. 1-8.

305 Cincera, J., Kroufek, R, Skalik, J., Simonova, P., Broukalova, L. and Broukal, V. (2017). Eco-School in Kindergartens: The Effects, Interpretation, and Implementation of a Pilot Program. Environmental Education Research, 23(7), 919-936, doi: 10.1080/13504622.2015.1076768.

content and processes of teaching. These courses give students opportunities to take a stand and to act locally, municipally, regionally and globally, thereby reinforcing implementation competences. In **Malta**, the implementation of the eco-school programme has proven particularly impactful in engaging students, but takes an approach that is more socio-constructivist and transformative. Aside from joining parliament sessions and Young People's Summits targeted at politicians, a special place within the community is chosen for students from the Eco-Schools Committees of nearby schools to conduct Environmental Audits. These students identify sustainability- related issues, and present actions to be taken in order to foster sustainable lifestyles. In addition to providing an opportunity to promote change in the community, these audits allow students to experience real-life sustainability issues/dilemmas that challenge the 'textbook' approach to sustainability.

Several good examples of student involvement exist across Europe at HEI level. The national experts report several noteworthy examples, some of which are further explored in Chapter 5. Another good example is the Socratic Institute in **Slovakia**, a leading educational programme for university students and graduates from various fields, run by the Centre for Environmental and Ethical Education. In the course of one academic year, students complete block teaching in the form of nine practical workshops, and implement their own non-profit community project. The workshops are aimed at active ESD and connected topics such as environmental activism, global education, sustainable development practices, active citizen participation and others, aimed at building awareness in society and supporting SD. Proof of the success of this project is its persistence and long-term continuity. The education provided focuses on important topics connected with creating habits for a sustainable way of life. At the end of the study period, students must present their smart projects. Many of these continue today as examples of good-practice businesses – another indication of the initiative's success (examples include projects promoting products without packaging, or the project 'Less waste' in the Banská Bystrica region). Lecturers remain in contact with graduates even after they have completed their studies, to strengthen cooperation and the ability of graduates to contribute to the development of a more sustainable development and the green economy in the regions.

4.5. Transformative pedagogies and organisational practices

Environmental sustainability is usually linked to pedagogical practices that promote more learner-centred and participatory approaches, as described in the previous section. However, in many countries the transmissive pedagogical approach dominates, according to which teachers play the role of deliverers of knowledge that learners need to understand and reproduce during exams or tests,[306] and which may not benefit the development of action competences and a sustainability mindset or behaviours. A recent UNESCO study that examined policy documents from 10 countries shows that almost half of the references in policy documents relate to the cognitive dimension of ESD (teaching scientific knowledge on environment), while more emphasis should be placed on the dimensions of social and emotional and behavioural learning[307]. To increase knowledge, skills *and* attitudes relevant to creating sustainable behaviour, pedagogies must be adjusted towards practising and

306 Bourn, D; Hunt, F; Bamber, P; (2017) A review of education for sustainable development and global citizenship education in teacher education. (UNESCO GEM Background Paper). UNESCO: Paris, France.

307 UNESCO (2020). Education for Sustainable Development. A Roadmap. #ESD for 2030. Paris: UNESCO. Available at: https://unesdoc.unesco.org/ark:/48223/pf0000374802).

instilling such behaviour.[308] This section thus discusses suitable teaching methods in greater depth. In addition to the typology introduced in the previous chapter – namely, socio-constructivist and participatory approaches – other core types of pedagogies include behaviouralist, liberalist, constructivist, collaborative, integrative, reflective and inquiry-based. In the following section, we also reflect on what pedagogies are reported, both by teachers themselves and by the national experts, as being in use – and whether such methods can be considered effective. We will achieve this by distinguishing between teaching methods that *complement* and assist education for environmental sustainability, and those that are very *specific* to education for environmental sustainability.

4.5.1. Teaching methods that enhance and assist education for environmental sustainability.

This section discusses pedagogies that have been found to enhance and assist EES by combining teaching *about, for, through and in* a sustainable environment.

First, **digital tools** can be used to implement a game-based learning approach such as Sustainable Strategies Games. These are interactive and engaging, and can help the students gain not only knowledge, but also relevant green skills.[309] **Game-based learning** provides an environment that is suitable for ESD, and can enable students to learn and test their own behaviour in an entertaining game setting.[310] It is evident that these approaches have the potential to facilitate attitudinal changes in learners, and offer the opportunity to integrate the assessment of diverse skills into their design. They also possess the potential to produce the desired changes in attitudes among students by engaging their empathy and compassion.[311]

The effectiveness of digital technology should not be overstated, however, and should be considered carefully. The effect of digital technology on children's empathy is positive when its content, use and interactions are **prosocial**, and when the amount of time spent in front of a screen do not reduce face-to-face interactions[312]. Furthermore, one must consider that not all schools, particularly those in disadvantageous regions, have access to advanced technology, and that in the context of climate change one must also consider the use of energy-intensive technology for teaching considering its potential harmful carbon footprint[313]. Another challenge is that it may require additional specific professional development for teachers to prepare them to use the tools correctly and ethically.[314] Lessons learnt from a game-based initiative applied in a cross-national context in Greece,

308 UNESCO Education Sector, 'Educational content up close – Examining the learning dimensions of Education for Sustainable Development and Global Citizenship'. Available at: https://unesdoc.unesco.org/ark:/48223/pf0000372327

309 Emblen-Perry, K. (2018). Promoting education for sustainability through Game-Based learning: using the sustainable strategies game to improve students' knowledge and skills of sustainable business practices. In: Handbook of Sustainability Science and Research (pp. 849-866). Cham: Springer.

310 Janakiraman, S., Watson, S.L. and Watson, W.R. (2018). Using game-Based learning to facilitate attitude change for environmental sustainability, Journal of Education for Sustainable Development, 12(2), 176-185.

311 Janakiraman, S., Watson, S.L. and Watson, W.R. (2018). 'Using Game-based Learning to Facilitate Attitude Change for Environmental Sustainability', Journal of Education for Sustainable Development, vol. 12(2), pages 176-185.

312 Flecha, R., Pulido, C., Villarejo, B., Racionero, S., Redondo, G. and Torras, E. (2020). 'The effects of technology use on children's empathy and attention capacity', NESET report, Luxembourg: Publications Office of the European Union. doi:10.2766/947826.

313 Barth, M. and Burandt, S. (2013). Adding the 'e-' to Learning for Sustainable Development: Challenges and Innovation.

314 Ketelhut, D.J. and Schifter, C.C. (2011). Teachers and game-based learning: Improving understanding of how to increase efficacy of adoption. Computers & Education, 56(2), 539-546.

UK and Portugal, which successfully engaged students and built awareness and engaging them, are that when such initiatives are implemented on a project basis, they may not have an enduring impact, which may not continue after the project ends – even if the material itself remains available.

Besides providing students with the stimulation of experiences that they may not be able to experience in their normal environments, digital tools can help teachers ensure that the learning environment is tailored to the individual needs of each student and is more learner-centred. **Learner-centred pedagogy** regards students as autonomous learners and emphasises the active development of knowledge rather than its mere transfer and/or passive learning experiences. The learners' prior knowledge, as well as their experiences in the social context, are the starting points for stimulating learning processes in which learners construct their own knowledge base. Learner-centred approaches require learners to reflect on their own knowledge and learning processes, in order to manage and monitor them. Educators should stimulate and support those reflections. Learner-centred approaches change the role of an educator from that of an expert who transfers structured knowledge to that of a facilitator of learning processes[315]. Learner-centred pedagogies are often recommended for ESD/EES, as they correlate positively with action and behavioural competences and transformative learning outcomes.

Art-based enquiry experiences. Scholars such as Ewing[316], Eisner[317] and Greene[318] agree that the Arts have a proven potential for personal transformation and to facilitate social change. They are inclusive and a natural part of everyday life, bringing the student's lived experiences into their learning. They are also well suited to scientific learning contexts such as STEAM[319]. According to McGregor[320], both internationally and nationally there is a growing practice of adopting art-based teaching strategies as more and more social activists, cultural workers and educators realise their benefits for learning, and their social impact[321]. Adlong (2012) argues that EE should "develop the discourses of the large-scale transition to renewable energy, particularly in interaction with social movements"[322]. Appreciation for technical innovations that transform society, such as moving to renewable energy, is also an important aspect of environmental literacy[323]. The arts can help students to visualise and imagine alternative ways of living and working sustainably, as well as

315 Barth, M. (2015). Implementing Sustainability in Higher Education: Learning in an Age of Transformation. London: Routledge.

316 Ewing, R. (2011). The Arts and Australian education: Realising potential. Available at: https://research.acer.edu.au/aer/11/

317 Eisner, E. (2005). Reimagining Schools. Available at: https://www.routledge.com/Reimagining-Schools-The-Selected-Works-of-Elliot-W-Eisner/Eisner/p/book/9780415366458

318 Greene, M. (2000). Releasing the Imagination: Essays on Education, the Arts, and Social Change. Available at: https://www.wiley.com/en-us/Releasing+the+Imagination%3A+Essays+on+Education%2C+the+Arts%2C+and+Social+Change-p-9780787952914

319 Garza-Reyes, J.A. (2015). Lean and Green-A Systematic Review of The State of The Art Literature. Journal of Cleaner Production, 102, pp.18–29.

320 McGregor, C. (2012). Art-informed pedagogy: tools for social transformation. Available at: https://www.tandfonline.com/doi/abs/10.1080/02601370.2012.683612

321 Werberger, R. (2016). Arts-Based Research: Surprise and Self-Motivation. Available at: https://www.edutopia.org/blog/arts-based-research-surprise-self-motivation-raleigh-werberger

322 Adlong, W. (2012). 100% renewables as a focus for environmental education. Australian Journal of Environmental Education, 28(2), 125–155.

323 Jorgenson, S.N., Stephens, J.C. and White, B. (2019). Environmental education in transition: A critical review of recent research on climate change and energy education (p. 168). https://doi.org/10.1080/00958964.2019.1604478

developing a personal relationship with the environment necessary for action competences[324].

Outdoor education and learning in nature, as a basis for ESD learning. The outdoors is an extremely powerful focus for learning through direct experience using the hand, heart and head. While outdoor education is often associated with adventurous activities that take place outdoors such as climbing, rafting, hiking, etc., it can also be understood as a form of learning in and with nature. It places young people in real situations and encourages them to take responsibility and reflect on their actions. Motivation and learning come easily. This experiential approach has long been recognised as a powerful means of learning, especially when it is processed through a learning cycle of "plan, do and review"[325]. Some evidence suggests that ESD that actively makes use of nature (e.g. CCE programmes in nature-base museums) is particularly effective in teaching students ESD values[326]. The national reports suggest that outdoor education is quite popular in EU countries (before COVID), and is used widely (e.g. in Greece, Cyprus and Romania), particularly in the form of forest pedagogy (see the next section).

Project and problem-based learning[327]. PBL is an instructional method in which student learning occurs in the context of solving an authentic problem. Knowledge is constructed via interactions with the environment[328]. PBL is highly effective at enabling deep and transformative student learning, and has been considered an ideal approach for tackling the complex, multidisciplinary problems of sustainability, and for providing genuine opportunities for students to tackle real-life sustainability issues within their immediate environment. Due to the nature of this approach, higher levels of student engagement and self-efficacy are often reported[329], as well as creativity, critical thinking and linkages to several disciplines at the same time[330]. Similar to PBL is service-learning[331],[332], in which students also work on real-world problems, but in cooperation with local external partners (e.g. NGOs, municipalities), responding through projects to concrete needs in the local community.

324 Gray, T. and Thomson, C. (2016). Transforming environmental awareness of students through the arts and place-based pedagogies. LEARNing Landscapes, 9(2), 239–260.

325 European Institute for Outdoor Adventure Education and Experiential Learning (2010). Encountering, Experiencing and Exploring Nature in Education. Available at: https://www.eoe-network.eu/fileadmin/PDFs/Zbornik_2010_4.pdf

326 Swim, J.K., Geiger, N., Fraser, J. and N. Pletcher (2017). Climate Change Education at Nature-Based Museums. Available at: https://onlinelibrary.wiley.com/doi/abs/10.1111/cura.12187#:~:text=The%20goal%20of%20NNOCCI%20was,and%20to%20be%20solution%E2%80%90focused

327 Bascopé, M., Perasso, P. and Reiss, K. (2019). Systematic Review of Education for Sustainable Development at an Early Stage: Cornerstones and Pedagogical Approaches for Teacher Professional Development. Sustainability, 11(3), 719. doi:10.3390/su11030719.

328 Marra, R., Jonassen, D., Palmer, B. and Luft, S. (2014). Why Problem-Based Learning Works: Theoretical Foundations. Available at: https://eric.ed.gov/?id=EJ1041376#:~:text=Problem%2Dbased%20learning%20(PBL),of%20solving%20an%20authentic%20problem

329 Bessant, S., Bailey, P., Robinson, Z., Bland-Tomkinson, C., Ormerod, M. and Boast, R. (2019). Problem-Based Learning: A Case Study of Sustainability Education. Available at: http://ifors.org/developing_countries/index.php/Problem-Based_Learning:_A_Case_Study_of_Sustainability_Education

330 Getting, M. (2016). Putting it all together: STEAM, PBL, Scientific Method, and The Studio Habits of Mind. Art Education, 69(4),10–11.

331 Barth, M., Adomßent, M., Fischer, D., Richter, S. and Rieckmann, M. (2014). Learning to Change Universities from Within: A Service-Learning Perspective on Promoting Sustainable Consumption in Higher Education. Journal of Cleaner Production 62, 72-81, doi: https://doi.org/10.1016/j.jclepro.2013.04.006

332 Molderez, I. and Fonseca, E. (2018). The Efficacy of Real-World Experiences and Service Learning for Fostering Competences for Sustainable Development in Higher Education. Journal of Cleaner Production 172, 4397-4410, doi: https://doi.org/10.1016/j.jclepro.2017.04.062

Lastly, learning as 'action research' or 'action competence' has been increasingly discussed in relation to education curriculum and policy from the late-1990s through to 2013. For example, Scheunpflug and Asbrand (2006) compared two pedagogical strands associated with global education and sustainability education in Germany: action theory focusing on building solidarity, empathy, and a holistic world view; and systems theory focusing on complexity, abstract thinking, and self-organised learning for students. Other pedagogical approaches in education are **enquiry-based, citizenship, economic participation, indigenous** and **wild pedagogies**[333].

The literature suggests that the following teaching tools can be used to successfully integrate EES into the classroom: (1) civil discourse; (2) engagement in a single local issue; (3) exploring different contexts of an issue; (4) computer modelling; (5) gamification; and (6) experimentation/fieldwork with a basis in PBE; and (7) escape rooms. Furthermore, research shows that combining Smart Classrooms with the recommended pedagogies mentioned before (PBL, project-based, case study, simulation and cooperative enquiry) can positively contribute to the performance and development of ESD methodologies.[334] Recently, co-creation and co-created knowledge has become used more and more in the classroom to teach EES, as well as citizen science (one example being citizen science projects on biodiversity at schools in Central Europe), or real-world-laboratory approaches.[335]

Although some examples of game-based and outdoor learning were included in the inventory of good practices, most of the supporting pedagogies reported by experts in the inventory fall under the typology of 'collaborative'. According to the teacher survey, the most popular supporting pedagogy was project-based learning.

Lozano et al.[336] assessed the connection between the pedagogical approaches used in HE and the development of sustainability competences, showing that traditional pedagogies (such as lecturing and case studies) need to be rethought and a combination of different pedagogical approaches should be employed to achieve progress in developing sustainability competences. In the transfer of sustainability in university teaching, practitioners are involved in students' learning processes on sustainability through a vast range of activities, from lecturing to teaching in a practical setting[337]. Therefore, in-the-field and project-based pedagogies such as service learning, entrepreneurial projects, internships, excursions and field trips[338] that incorporate ESD topics appear to be the way forward. **Living labs** is a potentially powerful way to promote transformative and integrative learning. The main idea behind this is to "leverage the campus as a test bed

333 Donatuto, J., Campbell, L., LeCompte, J.K., Rohlman, D. and Tadlock, S. (2020). 'The Story of 13 Moons: Developing an Environmental Health and Sustainability Curriculum Founded on Indigenous First Foods and Technologies', Sustainability 12, no. 21: 8913, https://doi.org/10.3390/su12218913

334 Cebrián, G., Palau, R., Mogas, J. (2020). 'The Smart Classroom as a Means to the Development of ESD Methodologies', Sustainability 12, no. 7: 3010, https://doi.org/10.3390/su12073010

335 Singer-Brodowski, M., Beecroft, R. and Parodi, O. (2018). Learning in Real-World Laboratories: A Systematic Impulse for Discussion. GAIA - Ecological Perspectives for Science and Society, 27(1), 23-27, doi: 10.14512/gaia.27.S1.7

336 Lozano, R., et al. (2019). 'Teaching sustainability in European higher education institutions: Assessing the connections between competences and pedagogical approaches', Sustainability 11.6: 1602.

337 Nölting, B., Molitor, H., Reimann, J., Skroblin, J.-H. and Dembski, N. (2020). Transfer for Sustainable Development at Higher Education Institutions—Untapped Potential for Education for Sustainable Development and for Societal Transformation. Sustainability, 12(7), 2925. doi:10.3390/su12072925

338 Examples: https://www.case-ka.eu/index.html%3Fp=972.html.

for sustainability". Living labs integrate faculty, staff, researchers and students into the process, and use rapid prototyping methodologies for finding local solutions to global sustainability challenges. Living labs focus on real-world application and effective problem solving through collaborative and open research.[339]

The transdisciplinary research delivered in universities has three characteristics:

- It addresses problems relevant to society;
- It enables the sharing of learning processes and integrates knowledge from scientists in different disciplines and, notably, also from outside the scientific community; and
- It aims to produce solution-oriented, socially robust knowledge that can be transferred both into society and into science[340].

4.5.2. Pedagogies specific to education for environmental sustainability

The following section discusses pedagogies and teaching methods that are specific to EES – either because they link particularly well to EES thematic areas or to competences considered to align closely with sustainability competences (e.g. natural science literacy).

The most significant pedagogies reported by national experts were **forest, earth pedagogies and eco-pedagogy**[341]. Earth education is an educational process that fosters learners' personal relationship with nature, encouraging them to experience being part of an interconnected system. The affective relationship with the Earth becomes a source of intrinsic motivation to live in a more environmentally friendly way. It also involves improving cognitive and affective relationships with the Earth's natural communities and life-support systems, with the ultimate goal of developing their own more environmentally-friendly lifestyles. Statistically significant gains in ecological understandings, environmental values and attitudes have been found. Qualitative results also indicate changes in behaviours, knowledge and attitudes.[342] Forest and earth pedagogies are usually combined with outdoor learning. Since one of the main ways to teach EES has been through the natural sciences, **enquiry-based learning** and **citizen science** are also key pedagogies that can be tailored more specifically to EES.

In ECEC, EES is closely linked to general pedagogies such as learning through play. However, the examples below describe how an ECEC institution can create an environment for EES and develop more specific teaching methods, in line with the eco-pedagogy approach, which is more suitable for use in ECEC.

339 Giesenbauer, B. and Müller-Christ, G. (2020). 'University 4.0: Promoting the Transformation of Higher Education Institutions toward Sustainable Development', MDPI Sustainability.

340 Wanner, M., Schmitt, M., Fischer, N. & Bernert, P. (2020). Transformative Innovation Lab: Handbook to Facilitate Students' Real-World Laboratory Projects to Promote Transformative and Transdisciplinary Competencies. Germany: Wuppertal Institute for Climate, Environment and Energy. Retrieved from https://epub.wupperinst.org/frontdoor/index/index/docId/7685

341 Misiaszek, Greg. (2018). Educating the Global Environmental Citizen: Understanding Ecopedagogy in Local and Global Contexts. 10.4324/9781315204345.

342 Manoli, C.C., Johnson, B., Hadjichambis, A.C., Paraskeva-Hadjichambi, D., Georgiou, Y. and Ioannou, H. (2014). Evaluating the impact of the Earthkeepers earth education program on children's ecological understandings, values and attitudes, and behaviour in Cyprus. Studies in Educational Evaluation 41, 29-37.

Table 13. Examples of physical environments and teaching approaches on EES in ECEC

Examples of designing the physical environments in ECEC	Examples of teaching approaches and pedagogies in ECEC
▪ Plants at school ▪ Rainwater harvesting system ▪ A place where children sit and chat and do activities outside ▪ Opportunities for children to taste vegetables and fruits they have grown at school ▪ Information boards about the environment at school ▪ A space where natural materials are displayed ▪ Published environmental materials at school ▪ Visuals showing animals' life cycles ▪ Visuals about endangered animal species ▪ Spaces at school where solar energy is used	▪ Stimulating children's interest in protecting the environment we live in ▪ Providing opportunities for children to talk about international environmental news ▪ Having natural materials in the classroom setting ▪ Making use of visuals showing animals' life cycles during activities ▪ Taking children on field trips to natural areas ▪ Including activities about animal protection in the curriculum ▪ Activities with children about water protection ▪ Directing children in activities about protecting plants

Source: compiled by the authors on the basis of Korkmaz, A. and Guler Yildiz, T. (2017). Assessing preschools using the Eco-Schools programme in terms of educating for sustainable development in early childhood education. *European Early Childhood Education Research Journal* 25(4), 595–611, Doi:10.1080/1350293x.2017.1331074

While forest and eco-pedagogy are clearly more specific pedagogies, the study findings suggest that EES is more likely to be taught as a combination of supportive pedagogies and specific thematic areas that are cross-cutting. EES topics are **interdisciplinary** and concern multi-faceted issues that require knowledge and skills from different fields in an integrated manner.[343] Therefore, EES pedagogies are relevant for all teachers, not just those involved in science-related subjects. However, the results of the teacher survey show that only 29% of teachers report the cross-curricular integration of EES in their schools, compared with 83% who responded that EES was part of natural sciences, and the 58% who mentioned EES as part of extracurricular activities. The chart below indicates which topics related to environmental sustainability are often integrated into school education (either by subject, or through a cross-curricular approach). In the survey, teachers listed a variety of pedagogies that they use to integrate EES into their teaching, of which some are more specific than others. "Use of environmental sustainability-related resources", followed by "Environmental projects on a school/class level" are listed by more than 70% of respondents. "Use of pedagogical approaches that promote environmental sustainability" is also quite common, with 65% of respondents selecting it, as well as approaches that introduce EES within specific or short-term activities (e.g. eco-days, awards and competitions). The most common approach to teaching EES in the classroom, however, appears to be the combination of specific resources with project-based learning.

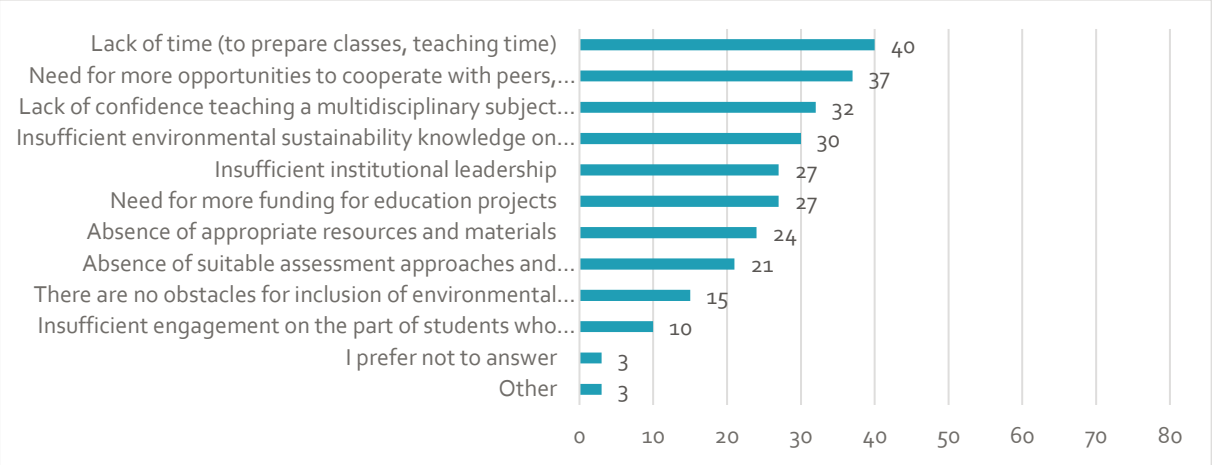
343 Annan-Diab, F. and Molinari, C. (2017). 'Interdisciplinarity: Practical approach to advancing education for sustainability and for the Sustainable Development Goals'. International Journal of Management Education 15.2: 73-83.

Figure 7. Pedagogies and practices most commonly used for EES

Source: authors

While many teachers indicate using certain forms of pedagogies or practices for EES, they also noted numerous obstacles they face in implementing EES. Aside from a clear lack of time, which was mentioned by 40% of respondents, the most pressing obstacles seem to be linked to teachers' own skills, resources and confidence. The respondents reported feeling that they had insufficient knowledge about environmental sustainability (30%), a lack of opportunities to collaborate with peers and other organisations (37%) and, consequently, an overall lack of confidence about teaching EES in a multidisciplinary way (32%). Comprehensive teaching of EES that combines several approaches can be time-consuming and challenging, especially during the COVID pandemic. It is therefore especially important that teachers are supported with training in the use of effective teaching and assessment methods, and provided with the necessary materials and pedagogical guidelines.

Figure 8. Main obstacles to teaching EES, as perceived by teachers



Source: authors

NGOs and non-formal education providers often collaborate with schools to provide supplementary education experiences. However, various organisations also provide learning opportunities in the field of EES independently. In VET, one particularly relevant pedagogy is **sustainable entrepreneurship**[344]. According to Greco and de Jong (2011), the common ground between entrepreneurship and sustainability is the concept of longevity – that is, assuring long-lasting goods, values or services; preserving current resources for future generations (sustainability) and developing unique solutions for the long run (entrepreneurship)[345]. Shepherd and Patzelt (2011), meanwhile, define it as "the discovery, creation, and exploitation of entrepreneurial opportunities that contribute to sustainability by generating social and environmental gains for others in society"[346].

Lucas Veiga Ávila (2017) revealed that newly emerging organisational structures in most of the HEIs they researched had a great impact towards **innovation and sustainability**, which are the building blocks for EES implementation. Several examples were listed with regard to the mergers of existing organisational units, as well as the creation of new positions and units to speed up the innovation processes. **The existence of formal groups or committees, or – ideally – dedicated sustainability offices**, is important in offering guidance. These need to be trans- and multidisciplinary, as well as having multi-level hierarchies, which may prevent conflicts of interests arising from within these groups. By creating settings such as an 'office of sustainability', a university can hire someone to deal (full-time or on a part-time basis) specifically with sustainability, as well as creating a hierarchical position that fills the leadership gap among minor stakeholders with decision-making powers. The lack of a person to deal specifically with these issues within a university translates into a weakening of the university community's sense of identity of

344 Schaltegger, S. and Wagner, M. (2011). Sustainable entrepreneurship and sustainability innovation: categories and interactions. Business Strategy and the Environment 20(4), pp.222-237.

345 Greco, A. and de Jong, G. (2017). Sustainable entrepreneurship: definitions, themes and research gaps. (Working paper series; Vol. 6, No. 17). Rijksuniversiteit Groningen/Campus Fryslân.

346 Shepherd, D.A. and Patzelt, H. (2011). The new field of sustainable entrepreneurship: studying entrepreneurial action linking "what is to be sustained" with "what is to be developed". Entrepreneurship Theory and Practice 35(1), pp.137-163.

the community. Having someone or some specific place to address doubts or observations about sustainability issues is essential.[347]

5. The road to transformation

To move towards change that can impact education and learning at both system and institutional levels, it is important to better understand the *process* of change that occurs at different levels and in different forms of education. This chapter therefore presents a more in-depth reflection on the process of transformation, drawing on findings from the case study programme to better understand what needs to be done to overcome the barriers faced by European education systems and institutions. Building on the preceding discussions, this chapter assumes that the capacity of both educational institutions and communities to participate in EES is crucial for the effectiveness of such programmes, as well as for their longevity. The priority in terms of impact on students' learning is on building action competences and sustainability mindsets, which is unlikely to be achieved through transmissive teaching methods, but requires pedagogies that are collaborative, behaviourist, socio-constructivist and/or participatory.

Overall, this chapter finds that the road to transformative change should include the following four lanes. It discusses how the initiatives in the case studies overcame key road blocks relating to the achievement of the following milestones:

- Achieving a whole-institution approach
- Engaging communities and students
- Fostering action competences
- Supporting and preparing teachers

The research team chose five cases from the inventory of good policy and practice. These were selected on the basis of whether they:

1. Were particularly innovative in tackling the barriers to EES;
2. Were scalable (the initiative is upscaled to regional/national level);
3. Provided evidence on transformation;
4. Changed behaviour and attitudes (i.e. going beyond knowledge) and;
5. Provided synergies with national policy.

To present cases that can be transferred to other contexts, it was necessary to consider the five cases holistically, and to encompass a diversity of initiatives stemming from different parts and socio-economic contexts in Europe, covering different types of policies and levels of education. A more detailed table describing the criteria used can be found in the Annex. As a result of the selection process and consultations with the European Commission, the following initiatives were selected:

Table 14. Educational initiatives chosen as case studies

1. **Austria: School network and programme ÖKOLOG (type of initiative: schools, WSA, partnership, teacher education, assessment, innovative content, pedagogies)**

347 Ávila, L.V., Filho, W.L., Brandli, L., Macgregor, C.J., Molthan-Hill, P., Gökçin Özuyar, P., Martins Moreira, R. (2017). Barriers to innovation and sustainability at universities around the world, Journal of Cleaner Production, Volume 164, pp. 1268-1278, https://doi.org/10.1016/j.jclepro.2017.07.025

ÖKOLOG is a school programme and network supported by the Austrian Federal Ministry of Education, Science and Research. The approximately 600 ÖKOLOG-schools and 10 ÖKOLOG-university colleges of teacher education focus on environmental, social and ecological issues, a whole-institution approach and student engagement. This long-running programme has impacted thousands of learners and communities – several publications account for this. Interestingly, ÖKOLOG has recently developed a 'Competency compass' for teachers. It builds on the basic decree on environmental education for sustainable development (demonstrating its link to policy processes), and is a tool with which teachers can assess the competences they have acquired in the field of environmental education for sustainable development.

2. Czech Republic: Network of Environmental Education Centres Pavucina (type of initiative: formal and non-formal education, partnership, support to schools, teacher training)

The Pavucina network consists of almost 50 (mostly non-profit) organisations that focus on both formal and non-formal EES. Indirectly, approx. 580,000 participants have been involved in the events of the network members. The network a) advocates EES nationwide; b) promotes cooperation and social learning among its members; c) sets guidelines for the quality of EES programmes; and d) organises joint events and programmes. The network has initiated the discourse on EES in the Czech Republic, and promoted its implementation in both formal and non-formal education. It is a very interesting example of (non-)formal education and network collaboration with several innovative and connected activities that can be further explored, such as the activities and collaboration between the TEREZA and SEVER centres (e.g. the Masters of Peer Support programme). Several publications account for the positive impact of the network and its activities.

3. Italy: MultiLab (type of initiative: higher education, research and teacher training, collaboration between different education levels)

MultiLab is a physical space within the Faculty of Education (Free University of Bozen-Bolzano), as well as an opportunity for project co-planning. It creates synergies between universities, pre-schools, schools and educational institutions (local, national and international networks) and provides teacher training. It cultivates active and transformative didactics and carries out research for and with pre-schools and primary schools. Over time, it has built a model of work that involves university researchers, teachers, children and museum operators, favouring the active-participatory didactic approach based on storytelling and metaphors and methodologies of research for children. Importantly, it promotes collaboration between different school levels, tackles different pedagogical approaches. It is very action-oriented and focuses on changing school cultures and connecting disciplines. It has reached thousands of pre- and in-service teachers. Several publications document the transformative value of its methods.

4. Portugal: Autonomy and Curricular Flexibility (type of initiative: schools, curriculum innovation)

AFC is a governmental initiative regarding curricular redesign that began in 2017 with a pilot phase in which the initiative was tested and evaluated . The initiative is also part of an educational reform process that includes the national document 'Students' Profile by the End of Compulsory Schooling' (Perfil dos Alunos à Saída da Escolaridade Obrigatória, PASEO) , which constitutes an important pillar of AFC.
AFC became mandatory legislation in 2018 (Decree-Law no 55/2018), and was set up to be implemented at national level by all public and private schools within compulsory education (from primary education to secondary education). The main activities relating to the AFC implementation consist of interdisciplinary educational projects, often in collaboration with local communities. These activities can be divided into: (i) curricula options, in which the interdisciplinary thematic fields – so called 'DACs' (domains of curricula autonomy) – appear to be the most frequently chosen option; (ii) educational and pedagogical dynamics; (iii) community projects; (iv) strategies and projects in citizenship education; and (v) 'perspective sharing' - i.e. communication outputs in the form of reports or brochures on specific projects or topics elaborated by schools.
Another pillar of AFC implementation consists of activities relating to the training of educational staff, which still requires further development.

5. Pan-European University Alliance UNA (type of initiative: higher education, partnership, institutional strategy on sustainability)

UNA Europe is an example of an initiative and a green university alliance. UNA Europa draws on the collective strengths of its eight partners to create a European inter-university environment and a Europe-wide living lab for testing Joint Innovative Formats for education and mobility, and shaping the European Higher Education Area. Sustainability is one of the focus areas and strategic building blocks of the network, and it employs a 'whole-institution' approach, challenge-

based learning and microcredentials. Sustainable development goals are approached holistically, and the institutions involved focus on community collaboration and cross-sectoral partnerships, which is frequently highlighted by literature as being crucial for the mainstreaming of EES.

5.1. Achieving a 'whole-institution' approach

All of the initiatives examined in the case studies aimed to some extent to involve and bring a WIA to EES. To do so, they adopted various approaches. The pan-European university alliance and MultiLab in Italy differed slightly from the other case studies in this regard by focusing more on cross-sectoral collaboration, while the Austrian, Czech and Portuguese examples focus inward at the school or towards engagement with the immediate community. For example, to build the necessary school culture, ÖKOLOG works more closely with parents' associations and blue-light organisations than with universities, service or industrial companies. Even so, all of the initiatives took a *collaborative* and *inclusive* approach both to designing a coherent methodology, and to implementing it.

AFC (Portugal) ensures WIA adherence by having **a powerful and convincing political vision**, and through the **structured legal framework** that accompanies AFC. Interviewees highlight AFC's promotion of a certain perspective of seeing the world as our home, as well as seeing the school as a place to connect with the world, an (eco)systemic perspective closely linked to the vision and concept of the whole-institution as described in the OECD's 2018 report 'Future of Education and Skills: Education 2030'. In particular, it relates to the "design principles for moving toward an eco-systemic change", which state that "engaging with school will be the first step to engage with the world". AFC, which is a legal framework in itself, is supported by legislation on the Inclusive School, which provides the legal basis for a school that includes everyone and promotes citizenship values – a document that further deepens the vision and concept of the whole institution. Diversity in the implementation of EES and 'flexibility' to choose one's own approach also lie at the heart of AFC. The inclusive school approach strengthens the links between AFC and EES here, since diversity is an educational asset and schools are compelled to do things differently (according to their own reality and specificities – human, territorial and others).

According to the majority of the case study reporters, **the key challenge is to transcribe the vision of the initiatives into the local institutional context**. This requires a high level of dialogue, critical reflection and collaboration between teachers and school staff, students, parents and other agents in the broader school community. A **co-creative and participatory approach** has been crucial to the design of the initiatives, as well as to the success and longevity of these programmes. Most AFC initiatives were developed following **consultation processes** that involved diverse groups of stakeholders. Strong engagement of the community and all stakeholders in reflection on the meaning and importance of the initiative help to ensure that the vision and recognition trickles down and leads to increased motivation to implement the programme. A key take-away from this finding is that transferring EES initiatives to other countries is likely to require just as much effort in re-thinking and co-creating the initiative in the new context.

As discussed earlier in this report, research has found that WIA often relies on a few very engaged individuals, and may disintegrate when they leave. This is probably the reason why structural frameworks and guidance are needed to keep initiatives going in spite of shifting personnel. The initiatives have also avoided this obstacle by focusing on **developing a supportive team culture within the initiative – not just a supportive**

school culture. For example, the Austrian case study ÖKOLOG is organised through regional teams as well as school teams, and therefore does not depend on individual people. Similarly, to support AFC implementation in Portugal, there is also a national coordination team, assisted by a technical team, and five regional teams covering the territory. In Portugal, all public training centres for educational professionals (Centros de Formação de Associação de Escola, CFAE - 91 in total) were called upon to participate, with each team being reinforced with one teacher from teachers' mobility (released from teaching duties), working in liaison between the Government (AFC National Coordination and Regional Teams) and schools. Similarly, in the case of Pavucina in the Czech Republic, the network of core members frequently meets to discuss the challenges that the network faces in its implementation of WIA, to uphold an open and solution-oriented team culture ('evaluation culture') surrounding the potential challenges they face.

Funding and backing at system level have strengthened the initiatives' position and ability to operate smoothly. The team at the Austrian Ministry of Education, Science and Research (BMBWF) provides one person (30%) for the steering of the ÖKOLOG programme, and one person (30%) for office tasks. The Ministry of Education, Science and Research provides the University of Klagenfurt with EUR 85,000 per year for the coordination of the ÖKOLOG programme and network. This includes one full-time position (50% for coordination and 50% for office tasks), (travel) costs for meetings and the maintenance of the ÖKOLOG-website, while teachers in the regional teams receive two units of value (teaching hours). It should be noted that ÖKOLOG has been running since 1995, and is a more mature initiative than, for example, the Portuguese or Italian initiatives. Portugal's AFC is also supported from the main education budget, but receives complementary funding from the European Structural Funds. Compared with the other initiatives, the Network of Environmental Education Centres Pavucina (Czech Republic) has a much more diverse and vulnerable funding structure. Its main office and the projects implemented by the network are funded by grants from the Ministry of the Environment, European Funds, membership fees, participation fees, counselling, audits, analytical services, gifts, and other sources. UNA Europa also has a more uncertain funding situation, but primarily due to uncertainty with regard to the management of its funding across jurisdictions. The quote below regards the Austrian case study and also shows how stable funding mechanisms is crucial to the effectiveness of the EES initiatives.

> *"A challenge is still posed by sustainably anchoring ÖKOLOG at schools at the interface of innovation and as part of the dynamic everyday culture of these schools. In relation to regional support systems in the federal states, the respective professional and political contexts play a decisive role. The provision of stable and continuous support, which, at the same time, is flexible enough to dynamically respond to change, both makes high demands on all parties involved and, at the same time, also requires adequate resources[348]."*

Similarly, the experts report that the Italian MultiLab may also be difficult to implement holistically in universities with little funding. MultiLab's approach is easier to put into practice in smaller universities, which can count on a good level of funding. However, other factors must simultaneously be present, such as a group of **university professors and**

348 Rauch, F. (2016). Networking for Education for Sustainable Development in Austria: The Austrian ECOLOG-Schools Programme. Educational Action Research 24 (1), 34-45. (DOI: 10.1080/09650792.2015.1132000)

internship supervisors with a shared vision of education and training for EES, and who are willing to invest time in a common participatory project.

Furthermore, governmental support and backing need not be solely financial. The Austrian experts highlight that the inclusion of EES topics and competences in the new curriculum for primary and secondary school in Austria is also beneficial in supporting the overall work and creating *momentum* and *need* for ÖKOLOG's services. The same is true in Portugal, where AFC, a governmental initiative, was part of a new legal framework addressing a new educational vision with clear implications for the curriculum.

The university alliance UNA Europa stands out in terms of the particular challenges and opportunities it faces with regard to WIA, due to its cross-institutional and cross-border context. While each of the eight partner institutions aim to apply WIA in their institutions, each member has different focus areas and responsibilities with regard to the implementation of UNA. It may therefore be more challenging to ensure its holistic implementation at all institutions. In some ways, UNA can be said to reinterpret the environment in which students learn by re-arranging the educational space and meaning. This is evident in two of UNA's objectives. On the one hand, it acknowledges that a university is: "not a place, but a body of knowledge, ideas, and values, evolving freely beyond borders, mediums and time", and at the same time it is "the home, therefore the responsibility of its community, namely all the people who share and contribute to its ideals". This potential tension between a place that is not necessarily physical, and the notion of a community/home, must be understood in the specific context of UNA. Students at UNA will be required to attend and participate virtually for many modules, although physical mobilities will also be encouraged. While students can have the benefit of learning from multiple institutions, they are likely to have more virtual education than is currently the case at most universities. Furthermore, when they go on mobilities, they will need to harbour a culture of tolerance that can benefit their learning across cultures and communities. UNA stakeholders recognise that **creating a coherent institutional culture across the eight participating institutions is one of the main challenges** UNA faces. Yet, if they can overcome this challenge, they will help to build a unique set of skills for learners, who will achieve sustainability competences that suit diverse socio-economic and cultural contexts.

5.2. Engaging communities and students for sustainability

The preceding section on WIA touches on and relates to the discussion on the engagement of communities and students. In this section, we look more closely at these issues; in particular, the importance of including communities and students in the direction of the initiative after its implementation, and the ways in which this can enhance its effectiveness.

While similar networks exist, both within the Czech Republic and in other countries, Pavucina stands out in terms of community engagement, thanks to its community of learning, which is connected by **shared goals and its informal, friendly atmosphere**. Stakeholders emphasise that Pavucina was not founded by any authority, and does not have top-down management. Instead, it has grown organically out of the enthusiasm and motivation of its members. In this respect, it differs slightly from the Austrian and Portuguese initiatives, which involve much closer support from government, although the Austrian initiative also grew out of an initiative that began locally. The Portuguese example is also unique in that, despite being implemented top-down, it encourages innovation,

flexibility and choice of action by schools in their implementation of EES. Thus, all of the initiatives focus on finding ways to connect the right people, who already exhibit intrinsic motivation, and proceed to strengthen their efforts.

The transfer of EES networks and programmes to other countries should be based on encouraging and supporting cooperation between existing education centres since **no real community of practice can be developed using a top-down approach if there is a lack of intrinsic motivation among its members.** Yet, experts emphasise that Pavucina and other European networks can benefit from promoting mutual contact and cooperation beyond the local or national level. As mentioned above, Pavucina is limited by its regional (Czech) perspective. **Promoting the opening of the network beyond its current borders could provide essential insights into the field of EES** – especially when environmental and biodiversity-related issues are better understood in a wider regional context. At the same time, Pavucina's experience in promoting a friendly community of practice may provide inspiration for networks and centres in other countries on how to strengthen bottom-up initiatives for EES through capacity building.[349]

In the Italian case of MultiLab, there was an exceptionally high level of awareness about the importance of the community, referred to in the quote below as 'territory', as an enabling factor for the success of the initiative:

"*EES cannot be enforced without the territory, and must try to build, as proposed by MultiLab, an 'integrated educational system', an 'educating community' in which trust in the university, and in the contribution it can give to the educational system, is established from early childhood. One of the objectives, as remembered by the interviewee, is that 'awareness of environmental and social sustainability is built as a need 'from below', with those who really work in the field, and is not imposed* from above by institutions'" [350]

In addition, the MultiLab initiative also stands out by linking and focusing on all levels of education and bringing together teachers and students of all ages in experiential research and education appropriate for different ages. Lack of synergies between educational levels has been highlighted as a barrier to effective and holistic learning for EES. Such synergies are seldom achieved, although they can help to improve the effectiveness of learning as well as adding much-needed lifelong learning and inter-generational perspectives.

International and high-level collaboration has further enhanced pedagogical innovation and research at institutions. MultiLab made itself known not only locally, through a dense network of relationships built with museums and institutions within the territory, but also at national and international level. In fact, in addition to university professors, researchers, teachers and Italian educators, the annual conference is also attended by foreign professors and researchers, with whom strong and continuous collaboration has been established. This finding is good news for UNA Europa, which aims to establish a cross-border EES community and become "a truly European inter-university environment, where

349 Simmons, V.N., Klasko, L.B., Fleming, K., Koskan, A.M., Jackson, N.T., Noel-Thomas, S., Luque, J.S., Vadaparampil, S.T., Lee, J.-H., Quinn, G.P., Britt, L., Waddell, R., Meade, C.D. and Gwede, C.K. (2015). Participatory Evaluation of a Community–Academic Partnership to Inform Capacity-Building and Sustainability. Evaluation and Program Planning 52, 19-26, doi: https://doi.org/10.1016/j.evalprogplan.2015.03.005

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outstanding research is continuously linked to transnational learning and innovative, critical thinking" (Blechinger-Talcot, 2021).

In particular, UNA can be considered an innovative initiative for its attempts to make use of collaborations with the community to solve one of the main challenges in implementing EES: applying an interdisciplinary perspective. One of the central aims of UNA Europa is to combine the complementary strengths of the partners, fostering levels of collaboration that go deeper than existing methods. The UNA Europa partners have selected five Focus Areas to launch their collaboration. Each Focus Area fosters multi-disciplinarity, and includes most of the subjects offered by the universities. These Focus Areas act as the initial thematic 'glue' that ties the universities together in their mission to create a 'virtual campus'. While the competences and skills for the Joint Bachelor Programme in Sustainability have yet to be crystallised, the Focus Areas suggest that sustainability will be linked with other Focus Areas of cultural heritage, data science and artificial intelligence, European studies and Health.

Below is a description of UNA's planned Joint Bachelor Programme in Sustainability:

"Students will gain interdisciplinary skills and critical knowledge to tackle sustainability challenges. Thinking in a broader systems perspective, they will obtain an understanding of the interlinkages between the issues, as well as their political, socio-cultural, economic, technological, and legal backgrounds, understanding of the UN SDGs and their implementation, beyond the rhetoric, offers students constructive skills to promote sustainability inclusively, create solutions, and facilitate the achievement of agenda 2030. Students will negotiate with other students and professionals from partner universities with better argumentation, digital, and co-creation abilities for sustainability transformation."

While the two initiatives taking place at the level of higher education focus more on looking outwards for collaborations, the Portuguese, Austrian and Czech initiatives, which more often target primary schools, focus more on how to engage the local community. In particular, AFC focuses heavily on involving students in decision making and monitoring whether the initiative has positively impacted students in terms of both learning and well-being. This probably explains students' 'buy-in' and the positive feedback received during the evaluation of the project. In addition, the initiative had many positive consequences for student learning (See 5.3).

5.3. Fostering action competences

The case studies confirm that transmissive teaching is a key barrier to the effective implementation of EES. The cases themselves, with their diverse forms and approaches, can be regarded as active attempts to overcome this barrier, and to demonstrate alternative ways of teaching that can better foster EES implementation. More concretely, before AFC was introduced in Portugal, the situation that limited action competences was described by students as consisting of the following issues:

- little or no pedagogical differentiation (little use of different pedagogical methods and approaches, usually focusing on traditional methods that limit collaboration and participation);
- excessive focus on the teacher; and
- overuse of expositive/passive pedagogical practices, where students are reduced to mere assimilators of information.

AFC overcomes this barrier by giving **more autonomy to the institutions** to develop their own curricula and to actively involve students and the community. The key strength of the AFC experience may not be autonomy *per se*, but the way it has built a structural framework around it to support and ensure that positive change happens (see 5.1). Students commented that the positive contributions that AFC has brought to schools in general were its ability to foster students' involvement in active learning through projects, and less teacher-centred learning. The offer an **integrated approach to different curricular areas, anchored in real-world problems**, and strengthened diverse transversal competences such as collaborative skills; self- and group responsibility; communication and decision making based on negotiation and group consensus; the critical use of information and knowledge; data collection, analysis and interpretation; and critical reflection upon possible solutions. In these projects, students consider sustainability-related questions the most interesting and relevant to study more deeply.

Prompted by a similar concern, the Bolzano MultiLab also responds to a profound need in the Italian education system, and is an example of higher education and training for teachers that builds the necessary action competences. Among the case studies, MultiLab is probably the one with the most well-defined and diverse constellation of pedagogies for developing action competences. It responds to the need to build methodologies suitable for **teaching scientific subjects** (from mathematics to physics to natural sciences) in pre-primary and primary schools. At these levels of education, teachers often feel unprepared and slavishly follow textbooks, or propose observations and small experiments. This is a key barrier to teaching it engagingly. The initiative aims to provide teachers with innovative tools they can use to shape students' behaviours. The list below provides a snapshot of some of the pedagogies or teaching methods used by MultiLab:

- Community or place-based learning (especially with museums)
- Experiments and citizen science projects
- Experiential learning (a process of lifelong, lifewide, lifedeep learning)
- Action research as a pedagogy
- Cooperative learning
- Self-enquiry-based learning
- Storytelling
- Art and STEAM approaches

In addition, MultiLab provides evidence on the impact of its methods through research and the dissemination of experiences at the university. There are several inspiring stories of students who created solutions to real-life problems using creativity and critical thinking, without these being required by the school. In addition, teachers have reported feeling more confident about teaching EES after participating in MultiLab's in-service training.

One main take-away from across the initiatives is the use of **self-enquiry-based learning**. In MultiLab and ÖKOLOG, building participants' reflexivity before, during and after the proposed actions is key. For each MultiLab internship, a personal development plan is systematically constructed, which requires future teachers to understand where they start from, the path taken and what is still missing, in order to achieve the goals they have set for themselves. An interviewee for the ÖKOLOG initiative stated: *"ÖKOLOG is an advocate for new forms of teaching and learning. It promotes self-reflection and helps not to slip into the old pattern of* teaching." Focus group participants in the Multi-Lab case

study research stated: "We use the portfolio not *as a documentation but as a self-reflection tool: where the heart of the matter is not what I did or saw, but how what I saw or did changes me, how it transforms me and outlines my professional profile based on competences that I try to highlight, linking them to the experience I have had. It is therefore not the experience itself that changes me but the use I make of it. The change is in the shared reflection and in the possibility of having a tool that allows this operation, (…) to trace a path, to be present to oneself and therefore be "intentionally educational".*

Furthermore, several stakeholders (e.g. in Portugal and the Czech Republic) highlighted as a strength the fact that institutions themselves adopted such a self-enquiry-based approach, and applied it in regular evaluations of the initiatives.

5.4. Supporting and preparing education personnel

As has been highlighted by the study so far, the curriculum and teacher education are not consistently in sync with what is required for EES to flourish and produce a great impact. A interviewee for the Portuguese case study explained the situation as follows: *"The consultation process conducted identified the following key problems of the national education system: we have a 19th-century school with 20th-century teachers and 21st-century students."* The initiatives in every case study complemented their diverse methods with teacher education to ensure that those methods were appropriately applied.

In doing so, the initiatives demonstrate further innovation by developing teacher assessment instruments or advanced training programmes. In 2019, ÖKOLOG developed a tool for (self) reflection, the **Competency Compass for teachers** [351]. Using this tool, teachers can assess their competences they have acquired in the field of environmental education for sustainable development. The Competency Compass covers the following areas: developing attitudes towards the environment and sustainability; build up, reflect on, pass on environmental knowledge; evaluate, decide, act; and methodical and didactic approach. Another reflection tool, which involves the pupils, is the footprint calculator for schools and individuals.[352]

Schools that were able to build up a sustainable ecological school structure often already had experience with ecological education and school development before they joined ÖKOLOG. Building upon those experiences, the ÖKOLOG network supports further development – for example, through regional exchange of experiences and information, generating new ideas, the provision of educational materials, and through financial resources. Such support is considered very helpful for education personnel. Further opportunities for support are found in the creation of a pool of external lecturers and advisors, the development of more varied materials depending on types of schools, as well as stronger activity in the area of public relations and the provision of material resources.

- ÖKOLOG schools are supported through **materials**, the ÖKOLOG-website, regional network meetings and seminars (e.g. 'ÖKOLOG days'), as well as opportunities for networking and exchange of experience between the ÖKOLOG regional teams and ÖKOLOG schools.

351 ÖKOLOG, Kompetenzen-Kompass (n.d.). Available at: https://www.oekolog.at/angebote-news/kompetenzen-kompass/ [Accessed 1 June 2021].

352 Footprint calculator for schools (n.d.). Available at: http://www.fussabdrucksrechner.at/schulen/index.php [Accessed 1 June 2021].

- Support for teachers in schools from **ÖKOLOG coordinators**, and motivation towards the joint implementation of ÖKOLOG activities with students.

In 2016, the Free University of Bozen-Bolzano, which is connected to and inspired by MultiLab, became a forerunner in Italy as the first university to introduce compulsory elements of laboratory and multidisciplinary training to help future teachers in the process of integrating disciplines, particularly in science. This new training course was developed over a period of two years, and involved three local educational authorities, one for each official language (Italian, German and Ladin), and schools. Overall, the approach taken to teacher training by MultiLab is broader, and represents a **'new way of thinking'** and a **'paradigm shift'**, based on the concepts of **interdependence and complexity** as described in this study: *"This can happen only if we obtain the involvement of all the actors in the field and a change of perspective regarding the very concepts of teacher education, which should become a 'reticular and net-like' project, a process of community building, starting from universities, schools and institutions involved in education"*[353] . This approach is also in line with the building of **a continuous professional learning community** as teachers remain in touch with the network and learn.

Lastly, the Portuguese case study provides the insight that learning for educators should not only cover teachers but also **the whole education community.** One of the most important challenges that had to be overcome in implementing AFC was ensuring the effective involvement and active participation of schools. To achieve this, capacity building and training for top leaders was essential. However, to be completely successful, all teachers (as well as other staff – and, broadly, the whole education community) should be trained for AFC and EES. Almost all of the participants in this study referred to the necessity to redesign and develop strong initial training for teachers that integrates the holistic perspective and whole-institution approaches, as well as leadership skills based on democratic governance, to accelerate their potential as change makers in schools. In this sense, HEIs are also required to enter more boldly into the reformulation of future teacher education. In the focus group, the improvement of initial teacher training and the continuous professional development of educational staff were among the measures most frequently mentioned as being important to further scaling up AFC.

6. Conclusions and recommendations

Education for environmental sustainability aims to develop competences that empower individuals to reflect on their actions, taking into account their current and future social, cultural, economic and environmental impacts from a local and a global perspective. As part of society, individuals should be empowered to act in a sustainable manner in complex situations, which may require them to strike out in new directions and participate in socio-political processes. This calls for every member of society to acquire a **'sustainability mindset' and environmental literacy**. The European Green Deal, the 2030 Agenda for Sustainable Development and the IPCC reports have signalled the urgency to embed the principles of environmental sustainability into all levels of education due to the tremendous

353 Dozza, L. (2020). 'Nuovi modelli dell'apprendere/insegnare all'Università. Laboratori in rete partecipati con la comunità', Atti Convegno SIPED

climatic challenges, increasing natural hazards and decline in biodiversity faced by EU Member States and the entire world.

The current situation suggests that it is time to change the way we think about the purpose of education, and to put environmental sustainability at the heart of learning. Most common understandings of education describe it either as preparation for the future more broadly, or more concretely as equipping learners with competences for the future labour market. However, climate change, with its related environmental, social, and economic dimensions, is the most defining challenge of our time, and will vastly impact the future for the current and coming generations. This study recognises the context and volatility of the current situation and the diverse impact that climate change will have on learners physically (hazards and risks) and mentally (eco-anxiety, grief and need for resilience), of which certain impacts cannot yet be predicted. As social policy, businesses, transport and production and other key policy areas and sectors adapt to account for the necessary changes –both to adjust to and to mitigate the impact of climate change – education can play the role of facilitating and easing this change, by providing learners with the knowledge, skills and attitudes to better prepare them for a more volatile but 'green' society and labour market.

The demand for sustainability as a new purpose of education requires intensified efforts to address the socio-emotional and affective dimensions of learning beyond the mere cognitive focus. From such a perspective, education is not solely limited to acting as an instrument to achieve specific formal individual needs and levels, but to serve as the integrated process and operating mode of a sustainable path of life. For such transformations to take place holistically and comprehensively, **action is needed both vertically (from individual change, to institutional and systemic changes) and horizontally** – with all stakeholders acting in synergy for the promotion of environmental sustainability.

The reason that broad and interdisciplinary partnerships are important is precisely the fast-changing field of sustainability and our understanding of the environmental crisis, a constantly evolving field of knowledge that is hard for some teachers to keep up with. The role of the teacher in this situation is that of a facilitator between outside experts and students. In addition, the teacher is the expert on pedagogy, as many outside experts will not possess this understanding of learning, and will use a didactic approach to deliver content. This is important to highlight, as a vertical and horizontal approach does not mean a diminishing role for the teacher in implementing EES.

This study consolidates evidence on the ways in which educational institutions and systems can advance sustainability mindset. It also provides a comprehensive mapping of national and institutional practices, processes, tools and strategies in education for environmental sustainability at different levels and in forms of education and training. By looking at inspirational examples of innovative practices and policy processes, this study explores what drives and supports system-wide education for environmental sustainability. In addition, this study focuses more concretely on the process of how competences required to prepare learners are developed through initiatives across system and institutional levels.

6.1. Key findings

6.1.1. Conditions for mainstreaming holistic education for environmental sustainability across systems

In all EU countries, individual ECEC centres, schools and HEIs and local communities have become more conscious about their role in promoting a sustainability mindset. **However, education for environmental sustainability is not yet a systemic feature of education policy.** The degree to which institutions (at the compulsory education level in particular) can develop and embed innovative sustainability-oriented policies, depends on the broader **system of governance** as much as on the culture and context of each institution. Factors such as the degree of autonomy, flexibility in using financial resources, sound systems of monitoring and evaluation, and professional development systems, all exert a strong influence on the ways in which formal education institutions operate and integrate various sustainability-related practices.

Different levels of education face various challenges in relation to EES. Early childhood education and care (ECEC), as well as primary/secondary education levels, share many similar enablers and barriers with respect to EES implementation. **However, EES is rarely prioritised at ECEC level due to concerns about overwhelming children.** Because the concept of sustainable development can be deemed too complex to introduce to young students, the notion that it should be left for later education levels often prevails. This line of thought also appears to be widespread at policy level – EES is seldom defined in any national policy documents, strategies or programmes aimed explicitly at ECEC. This study's findings suggest that EES appears most commonly in policy documentation aimed at primary/secondary education. This means that there is a lack of recognition of the importance of **sequencing of educational activities as students progress through different levels of education.** Understanding what a mindset involves – as opposed to just content – would enable this. A **competence framework** that helps to develop this understanding of a sustainability mindset across ages and educational levels, through the scoping and sequencing of EES learning outcomes over the years, can therefore be particularly effective.

When comparing primary/secondary education with higher education (HE), the key distinctive characteristic is the degree to which EES is implemented. Due to a high level of independence and autonomy at university level, **the implementation of EES varies significantly between HEIs**, and depends on the willingness of the university community to mainstream sustainability. **The siloed disciplinary structure of HEIs, along with overcrowded university curricula, render most institutions barely open to new paradigms such as EES.**

Key finding 1. Many EU countries commit to some sustainability-related goals and embed education for environmental sustainability in their education policy strategies; however, only a few follow this up with clear action plans.

The existence of national implementation roadmaps, strategies and other policy documents is a key enabler for the better implementation of EES. Having a well-defined national action

plan that identifies specific targets and actions to be taken helps with EES implementation at both institutional and individual levels.

Conceptually, the majority of Member States have moved away from the term 'environmental education' towards 'education for sustainable development', and thus widened their thematic focus to also factor in social and economic issues. Most policy documents reviewed in this study reflect a deep understanding of the interlinkages between environmental, social and economic challenges, and the urgent need for a green economy. The environmental dimension has gained particular importance lately, due to the increased interest in climate change education.

Effective policies for education for environmental sustainability are purposeful, reflexive, and work across all of the pillars that support the education system (curriculum, pedagogy, funding and support for institutional innovation, teacher training, etc.)

Key finding 2. Education for environmental sustainability is rarely a cross-sectoral and cross-cutting issue.

While almost all countries have specific documents relating to education for environmental sustainability, very few focus on EES across documents in other policy fields. Explicitly integrating educational elements into all policy documents relating to sustainable development renders both education and non-education policies more impactful. Prioritising education in the context of the economy and other sustainability strategies can facilitate the implementation of EES in schools and VET, and has been found to influence education systems and the purpose of education more broadly in different jurisdictions, when aligned with green growth planning. Furthermore, EES is also crucial to ensuring that green growth is properly implemented and does not rely on 'greenwashing' or superficial measures.

Key finding 3. Few countries provide clear definitions of sustainability competences and related learning outcomes.

While the UNECE reports consider it a strength for ESD implementation that countries implement the key competences for lifelong learning, Ayers (2020) find that where competences are not contextualised for sustainability, this provides no guarantee that they will achieve their desired learning outcomes. **The literature review and overall study findings highlight that the best way to crystallise the link between 21st-century skills and competences for environmental sustainability may be through an explicit competence framework for sustainability.** In the context of a curriculum framework, there needs to be *explicit* mention of sustainability competences, learning objectives, and how to achieve and assess these. As yet, very few countries do this.

Key finding 4. In most EU countries, curricula do not make links between key transversal skills, EES thematic areas, and scientific understanding.

Our review of curricula found that only three Member States explicitly linked an understanding of natural science that is specific to transversal skills, those that are relevant to a broad range of occupations and sectors, to EES. While all Member States cover various transversal skills in their overall curricula, these are not contextualised for EES learning outcomes.

Furthermore, the literature reviewed for the study suggests that some transversal skills are necessary components of sustainability competences. Several international attempts to define EES competences refer to 'system thinking competency' and 'anticipatory competency' (UNESCO, 2017, pg. 10 on cross-cutting key competences; Wiek et al., 2011; UNECE, 2012), which can also be understood as the ability to embrace complex systems, and to envision futures and change. EES is a field in which interdisciplinary and interconnected understandings of the natural and human world are particularly important. While this interdisciplinary aspect is in many ways lacking in the curricula, our study findings suggest that this may be due to a lack of clearly defined competences that describe how linkages between disciplines and fields can be approached in practice. Transversal skills such as the complex systems thinking defined in the context of EES, when built upon a good foundation of knowledge of both science and civics/citizenship (the historical, geographical, economic and political context), can help to bring out this unique aspect of EES and crystallise the interdependent nature of the social and human world.

Key finding 5. Education for sustainability goes beyond including certain topics in the curricula. It should first of all focus on transformative and transdisciplinary teaching and learning approaches, to experience the interdependency of socio-economic and socio-ecological systems.

The coverage, scope and depth of EES have increased in curricula across Europe, as the curriculum is an important tool for mainstreaming EES within schools. Yet, the ways in which environmental sustainability topics and pedagogies are included in national curricula vary, and cannot be considered comprehensive in all Member States. We consider curricula frameworks *comprehensive* when they explicitly carve out space for EES, provide in-depth understanding of the topic from multiple perspectives at local and global levels, and emphasize learning along all the learning dimensions – cognitive, socio-emotional and behavioural – to develop action competences.

Education for environmental sustainability entails much more than including topics into curricula. It must primarily focus on transformative teaching and learning approaches and transdisciplinarity, as individual, specialised disciplines have been found insufficient to address the complexity of socio-ecological systems. Thus, instruction in suitable pedagogies or pedagogical guidelines to foster nature-connectedness

and action competences is crucial, as are interdisciplinary approaches to building the necessary synergies between disciplines.

However, the study also finds that one of the root causes for the lack of prioritisation of EES, along with its thematic dismissal, is curriculum overload. The national policy mapping, in conjunction with the literature, suggests that new and innovative subjects such as EES tend to be piled on top of existing curricula rather than being designated an appropriate slot in an interdisciplinary way. Often lacking time, and without appropriate training on EES and its proper implementation, and without assessment guidelines, teachers are tasked with integrating the subject into their classrooms in an interdisciplinary manner. This frequently proves difficult, resulting in a lack of prioritisation and in thematic dismissal.

Key finding 6. Systems of professional development should better prepare educators for new ways of teaching, and for integrating behavioural and socio-emotional dimension into their teaching.

It has been established that limited teacher training on EES is characterised by lack of EES professional trainers in the field and insufficient emphasis on EES during initial teacher training. As there is often no systematised training framework in place, becoming an expert on sustainable development in the education sector appears not to be considered by many as a viable career route. In some Member States, this shortage of expertise is particularly evident during initial teacher training. Without initially learning the appropriate skills and new teaching methods, many teachers tend to lack sufficient motivation to immerse themselves in EES during continuous professional development.

Key finding 7. Monitoring and assessment are crucial to understanding the impact of existing policies and approaches: yet flexibility is needed.

Monitoring and evaluation is crucial at two levels: to evaluate the specific skills of learners on the one hand, and to evaluate institutions' progress towards benchmarks relating to EES. Without data on how learners and universities are faring, it is hard to develop clear action plans for improvement. This finding does not necessarily imply that data gathering should be standardised, or that it should be demanding. In fact, the study clearly highlights that the future of assessment is diverse, and that extensive data gathering can be overly complicated and unsuitable for EES implementation. The key take-away here is nevertheless that monitoring is useful, but that flexibility in the approaches to assessment and monitoring is advisable.

6.1.2. Drivers of change at institutions

At all levels of education, many good and innovative examples of EES occur at **institutional level**. One issue when looking at the institutional level is that it is challenging to gain a complete overview of what is happening on the ground, and to what extent institutions are applying and teaching EES. UNECE reporting and other literature suggest that the number of programmes and initiatives on the ground is increasing; however, many of these are still isolated, fragmented and project-based.

Some broader-based programmes consist of general pledges or commitments, which research has found to be not always well implemented in practice. Looking at the good practices studied in greater depth in this report, it appears that individuals play a key role in ensuring that whole-institution approaches are implemented consistently at an institution. Overall, the **key enabling factors for whole-institution approaches are personal initiative and open-mindedness among the key actors, adaptability and shared leadership, in combination with visions and plans in which students play an active role.**

In many EU countries, this positive change is also driven by environmental education centres and NGOs involved in non-formal education, working to support teachers and schools and create additional space for learning. Non-formal education institutions are particularly influential in networking and creating the professional learning communities necessary for teachers to re/upskill to better teach EES.

Key finding 8. A whole-institution approach is instrumental in ensuring effective education for environmental sustainability, and in building an institutional culture of sustainability

The whole-institution approach has been found to have positive effects in ensuring that EES is implemented. Studies and examples that also focus on the impact of whole-institution approach on students' learning highlight the need to focus on integrated approaches to teaching methods in which the environment is actively used in teaching; building up initiative and open-minded attitudes among the key actors within the institution; adaptability and self-reflection/monitoring; shared leadership; including environmental sustainability into the core vision and operational plans holistically; and engaging students and wider networks.

In ECEC, several interesting pedagogies have been widely adopted in some countries and can be seen to link very well to sustainability-specific competences (e.g. forest and earth pedagogy and eco-pedagogy). Examples in ECEC are less often engaged in whole-institution approaches and cross-sectoral collaborations, although the findings suggest that participatory pedagogies where children are involved in decision making on sustainability issues can also have a positive effort on their behavioural and attitude-related learning at this stage. At the school level, the eco-school programme has been widely rolled out, and some countries are also designing their own whole-institution approach from scratch, due to the risk that applying a global programme will not grasp local issues sufficiently well. The teacher survey, as well as the literature, suggests that teachers prefer to mix different pedagogies such as project-based or outdoor learning with EES topics, but that they wish to have more training and materials on how to design lessons and teach skills in a targeted and influential way. There is a concern across all education levels that whole-institution approaches have been found to be applied without enough pedagogical underpinning, and without the engagement of all actors in the school, especially students. As such, it can remain a 'decoration' rather than a learning site, and therefore insufficiently impact students' mindsets.

Key finding 9. The active engagement of students is a major element in driving change towards sustainable practices and learning for sustainability

Several studies attest that it is not enough for schools to promote action for the environment. In addition, they must also develop learners' feeling of 'ownership' over positive environmental behaviour. Evidence demonstrates how student-led sustainability projects can shift hierarchies and increase student agency. Going beyond simply consulting students, and instead ensuring their active participation in the governance of schools, has helped to bring them on board as powerful actors for positive change. Student engagement in the learning process has been crucial to ensuring the relevance of innovative pedagogies and organisational practices, and in making school environments attractive to young people.

Key finding 10. Preparedness, commitment and capacity to manage change on the part of educators and institution leaders are key factors in ensuring the effective implementation of education for environmental sustainability.

Evidence shows that educators, as well as school leaders, are among the key agents of change. Therefore, they need to be sufficiently well prepared and self-confident. The comprehensive implementation of a whole-institution approach requires change agents to develop good practices in order to shape the overall culture and make EES at the institution both integral and durable. Institutions that have succeeded in implementing EES have invested in the professionalisation of their teachers, promoted team learning and collaboration initiatives, provided the necessary autonomy and trust for their teachers, and also provided space and platforms for staff to engage with professional learning communities.

Key finding 11. Cooperation networks and partnerships between schools and local stakeholders have often provided spaces for joint innovative solutions on learning for sustainability

Multi-stakeholder cooperation is perceived as an integral part of the promotion of EES. Given the importance of grand transitions in contributing to combatting climate change, multi-stakeholder cooperation is crucial in underpinning a consensus-based vision and strategy. EES could therefore also more explicitly address the role of collective action, multifactor networks and sociotechnical innovation in shaping energy transition processes in its teaching or whole-institution approach.

To create diverse and cross-boundary learning settings that draw holistic, comprehensive pictures of global sustainability challenges, educational institutions and educators should foster partnerships at local, national and international levels. Learning within partnerships (involving a range of societal actors, such as businesses, NGOs, public institutions and/or policymakers) becomes a source of creativity and innovation through dialogues or projects that enable students to learn about real-world challenges, as well as from the partners'

expertise and experiences. At the same time, they can be empowering for partners, and can increase their capacity as critical agents of change.

6.2. Policy implications

This section reflects on the ways in which key actors in the European Union at all levels of education and across the non-formal/informal divide can move forward to ensure transformative change in institutions and promote system-wide change to effectively mainstream EES. It builds upon insights from all data sources, but particularly from the validation of findings during the stakeholder focus group.

Policy action 1. Place environmental sustainability as a core purpose of education

This study found that a plethora of good examples and initiatives concerning EES exist across the European Union. However, **there is a lack of interlinkages between these ongoing initiatives, as well as a lack of the strategic thinking necessary to capture the lessons learnt and their ongoing achievements, and to make sure positive initiatives are replicated in the future.** This is a profound barrier because in order to address the urgency of climatic and environmental challenges, it is necessary to move from *isolated* good practice to *mainstreamed* good practice. Most common understandings describe education as either preparation for the future more broadly or, more concretely, equipping learners with competences for the future labour market. Climate change, with its related environmental, social, and economic dimensions, is the most defining challenge of our time, and one that will vastly impact the future for current and coming generations.

The main added value of actors at system level is their ability to ensure synergies, incentives and provide support that ensures the longevity of projects for EES, and that they are holistically developed and carried out across the board. To facilitate the holistic and strategic thinking that can bring about this transformative change, policymakers at international, regional, national and local levels need to recognise that EES requires a shift in thinking around the purpose of education. They need to develop strategies and action plans that align sufficiently with this redirection and cover all of the pillars that support the education system (curriculum, pedagogy, funding and support for innovation and teacher training, etc.). **This holistic rethinking of education around environmental sustainability and sustainable futures should also be mirrored in the institutions, where leaders are particularly important in driving this change.**

Policy action 2. Engage diverse actors across age groups, sectors and forms of education around EES

The finding that cross-sectoral collaboration between institutions (micro-level) matters for EES, applies equally to actors at the meso- and macro- system levels. Policymakers and ministries can collaborate across sectors to ensure that education is always a core element of sustainability plans, as well as documents relating to economic development. Action plans must be clear and actionable, providing examples and guidelines for all stakeholders. Similarly, when engaging in consultation work and the design of policies for EES, actors at system level should also engage and invite diverse

stakeholders including not only **sectors outside of education**, but **also non-formal and in-formal education**, **students, teachers and parents.**

Policymakers should therefore adopt a **lifelong learning perspective around EES when engaging in EES policy making**. EES is most impactful and transformative when it follows the learner from early childhood to adult years in a manner that is consecutive, but also cyclical and complete. When repurposing education around environmental sustainability, it is therefore crucial for policymakers to align their strategies and actions across the different levels of education. At EU level, programmes such as Erasmus+, eTwinning and various EU-led networks can further help to engage learners and student teachers in EES and ensure lifelong learning around EES. This can be achieved by **prioritising EES** as a transdisciplinary area, and applying pedagogical approaches that are supportive to EES (e.g. project-based learning, student-centred approaches, game-based and arts-based learning and digital innovation) in EU-funded programmes.

Parents and communities play a key role in ensuring the continuous learning process from one education level to another, and could take an even more active role in facilitating an ongoing enquiry mode within sustainability learning, from ECEC throughout the compulsory school years. Similarly, literature, good-practice initiatives and the findings from the case studies show that student engagement is crucial to ensuring that EES is implemented in an engaging and adequate manner in institutions, and that policy makers can involve students in the whole process and provide funding for student-led projects in capacity and support action programmes.

Overall, more broad-based collaboration for EES among various actors at formal and non-formal institutions is advisable to comprehensively implement the whole-institution approach to EES, and to reduce the workload of teachers and school leaders in implementing EES. This study finds a plethora of good examples of innovative pedagogies and courses – in particular, those provided by non-formal training institutions or societal actors such as museums and parks.

The focus in building cross-sectoral collaboration and partnerships for EES should be an inclusive process that is driven by the interest of teachers, students and school leaders, and not by demands to privatise or outsource the work of teachers. **Overall, as with the implementation of EES at system level, an inclusive process that considers the voice of all education personnel and students is crucial at institutions.** This will ensure the sustainability of the whole-institution approach and the wellbeing of the institutional community – which again matters for the longevity and success of EES initiatives.

Policy action 3. Provide tangible links and a definition of sustainability competences that result in sustainability mindsets with transformative impact

This study finds that lifelong, community-based and interdisciplinary learning is particularly crucial for the effectiveness of EES. However, education systems face challenges in ensuring these principles are embedded on the ground. One core reason is an ingrained reliance on a system of discipline-based education, a focus on cognitive aspects, and the myth of the linear learning model, which implies that pro-environmental behaviour can

only be developed *after* environmental knowledge and attitudes. The traditional forms and contents of knowledge organisation and their respective modes of instructions need to be revised to allow us to **move away from rigid disciplinary and decontextualised content and towards more whole-person learning that links head, hands and heart for sustainability.**

In fact, one of the biggest challenges involved in the transition to a more transformative model of education is the lack of a clear and comprehensive definition of sustainability competences. In addition, there is a lack of logical linkages and guidance as to the design of educational objectives and learning outcomes with regard to EES. Very few Member States explicitly define sustainability competences in a comprehensive manner. Nor do they explicitly describe the key transversal skills crucial for effective pro-environmental learning. More concretely, the complex theoretical underpinning for EES and related skills and competences are not easily systemised, as demonstrated in our introduction to the key terms and concepts. This can appear confusing to educators with little previous experience of EES, as well as making it more difficult for educators to navigate through such complexity. Better-defined learning objectives are necessary, and could help teachers to develop new approaches to foster sustainability mindsets in students through teaching, as well as helping to better integrate EES into teacher training. Defining concrete learning objectives that link to transversal skills such as problem solving or complex systems thinking could also help teachers from various disciplines to better understand how they can design modules and learning scenarios for EES in an interdisciplinary manner. The clear definition of key competences should help to mainstream EES across the curriculum. **This will further crystallise how to assess sustainability competences and, since assessment often directs the teaching methods being used in class, should help to ensure that all teachers integrate EES.**

Policy action 4. Provide more training opportunities, and improve existing ones, *with all* education personnel

Limited opportunities for education on EES for all education personnel, including school leaders, is one of the main barriers to successfully implementing EES in schools at all education levels. At the system level, policymakers can direct and ensure that initial teacher training is in sync with the newly defined purpose of education or with their existing EES strategies, and that the **education community has a say and a voice in consultations on EES policy of relevance to their professional development.** Furthermore, policymakers can provide more support to training institutions for continuous professional development, and focus on incentivising courses that lead to teachers acquiring the necessary knowledge, skills and attitudes. In doing so, policy makers should **think outside the box and benefit from informal channels such as popular online repositories** where resources and guidelines can be shared readily with the education community. Training opportunities can take the form of workshops, seminars or lectures, and could be made available online and accessible to all teachers. Supporting teacher training centres, agencies and NGOs that provide teachers' continuing professional development with guidance on and tools for distance learning, to increase their outreach to teachers, will also be beneficial. **National points of contact specialising in EES should be established or further strengthened,** given that these have been found to act as a great harmonisation medium for EES. The establishment of such points of contact

in countries where they do not yet exist was suggested by several experts. These contact points can help to clarify concepts, policies and strategies on EES; provide implementation guidelines and tools; and produce monitoring and quality assurance instruments and frameworks. The most noteworthy example is the Permanent Unit of Education for the Environment and Sustainable Development (EESD) in Cyprus.

Policy action 5. Ensure that the institutional leadership is supportive and distributed among several leading actors, rather than being centralised in a single person

Supportive and distributed institutional leadership is key to ensuring the uptake of the principles of EES by the whole institutional community. Such leadership welcomes and actively supports the creation of a **shared school vision and strategy**, along with a **clear implementation plan** for sustainability. Evidence has shown that for a school to become EES-effective, shared or distributed leadership is required and a 'heroic' leadership style is not sustainable over time[354],[355]. Such a distribution has governance structures and mechanisms in place that include teachers and pupils in decision-making processes. This affects the **sense of ownership of sustainable practices among both students and staff**, as well as the **development of students' competences**. Including sustainability into the planning and visions for the schools' identity and core operations can be particularly impactful, and can ensure that the institution implements a whole-institution approach with relevant monitoring and quality assurance instruments. Including students in school boards and giving them real decision-making power has also shown to increase the focus on EES and good whole-institution practices at institutions.

Policy action 6. Ensure consistent and high-quality training opportunities for institutional leadership

All of the enabling factors in the previous recommendation rely on educated and qualified school leaders. Formal and non-formal institutions can therefore get involved in ensuring that school leaders are sufficiently well trained in creating the culture at the school necessary to mainstream EES through the whole-institution method in an inclusive and comprehensive manner. Improving the qualifications and skills of early childhood education and care, school and higher education leaders **will also ease the burden on educators** who, in several stakeholder groups and studies, report feeling exhausted and overwhelmed by overcrowded and rapidly changing curricula. For example, specific continuing professional development for school leaders could be developed in which leading staff can be supported in their work towards continuously improving implementation and education for sustainability at their institution, as well as change management, and enabling and creating partnerships. System-level actors can get involved too, by incentivising school

354 Bennell, S. (2015). Education for sustainable development and global citizenship: Leadership, collaboration, and networking in primary schools, International Journal of Development Education and Global Learning, 7. 10.18546/IJDEGL.07.1.02.

355 Abrahamsen, H. and Aas, M. (2016). School leadership for the future: heroic or distributed? Translating international discourses in Norwegian policy documents, Journal of Educational Administration and History 48:1, 68-88, doi: 10.1080/00220620.2016.1092426

leaders to make use of training opportunities, as well as supporting institutions that provide training through funding, advice and connections with experts (e.g. national points of contact).

Policy action 7. Factor in the impact of teacher mobility and the need for professional development and fulfilment into the design of EES strategies and practices at institutions

Institutions can also **ensure that educators are encouraged and recognised** for their continuous professional development, and that newly onboarded staff experience a natural continuation rather than a break in their professional learning path when changing jobs. This recommendation is not exclusively linked to EES, but will nevertheless help to ensure that teachers with EES training can make use of what they have learned. If teachers are to be sufficiently prepared and confident, they need a supportive culture at their workplace that encourages their learning and teaching on EES from a lifelong learning perspective. In concrete terms, this means that actors at system or institution level could **facilitate a forum or space for teachers to continue their professional development and share their experience with each other**. Such a **positive learning culture** can result in increased collaboration among teachers, and an increase in project-based and interdisciplinary approaches at institutions. This type of wider social dialogue and discussion around EES is needed at both national and local levels.

7. Annexe

Table 15. Case study selection criteria

Criteria	Description
Feasibility	Since one of the main aims of case studies is to provide examples of effective and innovative approaches in EES, the availability of evidence on the results and impact of particular approach/policy is crucial.
Diversity	The selected initiatives have to differ in terms of a) type; b) country of origins; c) implementation level; d) targeted education level. This will allow for a more thorough analysis of enabling/hindering contextual conditions for the effectiveness of the initiative.
Whole-institution and holistic approach	The selected initiatives have been measured according to how well they 'go beyond knowledge'. One way to better understand this criterion is to break down the pedagogies and trends underpinning the policy/initiative into learning 'in', 'about', 'through' (e.g., culture) and 'for' (e.g., agency) the environment, and make sure the selected case study focuses on all of these (rather than focusing on the socio-emotional and behavioural learning dimensions only). 'Through' emphasises an additional element to the three learning dimensions, by focusing on the context and importance of the setting that the learners find themselves in. EES lessons should see the person and foster the learners' agency to develop a positive future while situating the learning in a wider structure and must therefore go beyond content and didactics. 'Going beyond knowledge' is still key to this criterion, but we need to understand that this can be achieved through knowledge as long as the initiative/policy encourages comprehensive pedagogical approaches that focus on the person, purpose, tools and the setting in which the learning takes place. For this reason, the learning institution needs to be engaged in EES as well (e.g., whole-institution approach).
Offering context to other lessons	Not all examples of scaling up are positive once taken out of the national context. Research suggests that there is a need for any education system to value the local or regional culture that exists there and integrate policies in a sensitive manner that takes the local context into account. Ensuring that there is regenerative sustainability is essential, as every corner of the world has its own ecosystem. We therefore understand scalable and transferable initiatives as practices that can be connected to other initiatives and share similar general principles or ways of work in other countries, or that are flexible enough and emphasise locally embedded integrations. It is, therefore, very important to see this criterion in light of detailed information on national policy synergies and policy processes that are replicable and could empower positive and locally embedded change-making on the ground.
Transformative action	Exemplary policy/initiatives should lead to positive change and transformation. Overall, the research team understands transformative initiatives/policies as those that take place holistically and comprehensively and require action both vertically (from individual to institutional and systemic changes) and horizontally – all the stakeholders acting in synergy for the promotion of environmental sustainability. Thus, the criterion emphasizes the need to choose initiatives/policies that do not occur in a vacuum but as a part of a planned and ongoing and long-term policy process towards EES (be it at national, regional or institutional levels). The selected initiative ideally would also demonstrate positive results and impact on beneficiaries – school community and students themselves (development of necessary sustainability competences).
Mainstreaming value	The criterion on the mainstreaming abilities of the policy/initiative demands that the policy/initiative has been up-scaled nationally and implemented across the education system to have a wider impact. Besides, the initiative/policy that fulfils this criterion offers potential for it to be implemented across borders, in addition to specific settings and institutions, due to visible and measurable success factors.

Innovation	The national experts focused on listing initiatives that were well known for their potential upscaling and mainstreaming. Yet not all of these can be effective across contexts, either because of becoming a standardized approach or because of traditional pedagogies and organization of education. The literature review suggests that there is a lack of good practices on assessment, evaluation and funding although these have potential to bring about systemic impact due to their linkages and importance for the working of education and learning across schools and institutions. This criterion should not be seen in isolation but could be a great additional criterion to justify some transformative and scalable actions over others.

Table 16. Whole Institution Approaches (WIA)

		Foundation for Environmental Education Eco-schools (FEE)		
TYPE OF WIA	**School for Sustainable Development Award, Sweden**	**FEE Eco-Schools (England, Wales and Scotland)**	**FEE Eco-Schools Europe**	**ENSI Eco-Schools**
YEAR ESTABLISHED	1998	1995	1994	1986
EDUCATION FOCUS	Pre-school, Compulsory school and non-compulsory schools	Infants, Primary, Secondary and Special Needs schools	Kindergarten, Primary and Secondary schools	Schools, students, teachers, teacher trainers and administrators
FUNDING AND MANAGEMENT	Funded and managed by the Sweden National Agency for Education (developed in consultation with Swedish Environmental Protection Agency)	UK Eco Schools is run by ENCAMS (Environmental Campaigns), a national charity committed to creating and maintaining high quality local environments. Regional branches across the UK: Keep Britain Tidy, Keep Wales Tidy Campaign, Tidy Northern Ireland and Keep Scotland Beautiful. The Eco-Schools Program receives sponsorship from SITA UK Environmental Trust.	Managed by FEE International Coordination and by member organisations (NGOs) in each country.	ENSI is an international government-based EE network under the umbrella of OECD's: CERI . Self-funded by member countries 25 Members states (represented by senior educationists appointed by their government.
FRAMEWORK OF OPERATION (INTERNATIONAL INFLUENCES; NATIONAL POLICIES, STRATEGIES; AND CURRICULUM LINKS)	National Agency for Education has set the criteria for schools to meet to receive the award under the ordinance of the Swedish Government. Works towards the central principles of the School Act and links directly with the plan of action outlined in the Millennium Declaration, signed at the 2002 WSSD, Johannesburg. The award criterion is based on Swedish curriculum and national syllabus. Strong links to curriculum from pre-school to non-compulsory schools are evident.	Based on the ISO 14001 process and encourages pupils to engage with environmental and sustainable development issues. It provides a structured system for the environmental management of schools.	Based on an Environmental Management System such as ISO 14001 or the EC's Eco-Management and Audit System (EMAS), The Program methodology has been designed to be the core of the EcoSchools process, yet the structure is flexible enough to be adopted in any country, and at any level of schools' previous environmental achievement. Links to curriculum work is one of the seven steps as part of process. Schools are encouraged to integrate EE in all subject areas.	Key areas for development and research in order to connect activities and promote dialogue in: teacher education eco school development quality criteria dynamic qualities (i.e. autonomy and individual responsibility)
PARTNERSHIPS AND STAKEHOLDERS	Teacher Training Institutes, Higher Education, Swedish Environment Protection Agency, National Board of Health and Welfare and the Swedish Work Environment Authority	Support from almost all Welsh Local Authorities together with ACCAC, ESTYN and environmental organisations including the Environment Education Council for Wales, RSPB, Prince's Trust Cymru, and The Healthy Schools Network. These bodies also help to provide a network of assessors throughout Wales.	Multi-sector partnerships core feature. Internationally UNEP and EU and sponsors. Nationally: public entities such as Ministries of Education and Environment, as well as Regional Administrations and Local Authorities. Public specialised institutions, NGOs, businesses, civil-society associations and individuals.	School communities: management, teachers and pupils. Educational authorities, teacher trainers, educational research institutes and governments across the OECD area.

WHOLE-SCHOOL APPROACH	Criteria for the School for Sustainable Development Award: 1. General Aims (school management, activity and impact audit, Action programme development, yearly appraisals) support. 2. Activities (focuses on teaching, staff competence and training, cooperation and integration of activities, interaction with the local community) 3.Occupational health and Safety and physical welfare (whole school approach and responsibility) 4. Physical environment (materials and products; food, waste, water, energy, air, local environment, transport and buildings).	Whole-school initiative which encourages environmental awareness and action to address the management of the school. Must involve pupils in decision-making and taking action	Underpinning the FEE international framework is the principles of Agenda 21, including the need for environmental awareness and improved students' skills for active participation and decision-making.	Involves all school stakeholder and educational experts in research (action research) and school development. Promote international exchanges, understanding and cooperation.
KEY FOCUS AND PRINCIPLES	The purpose is to encourage and support the development of methods for teaching and learning about sustainable development. Strong emphasis on democratic principles of students being able to influence, take responsibility and participate. Award criteria looks at school life - (teaching and the school as a workplace), ethical, aesthetic, cultural and health considerations.	Based on the ISO 14001 process, with emphasis on litter and waste minimisation, although schools can also focus on Transport, Healthy Living, Energy and Water Saving or School Environment/Biodiversity. Up to 8 programs of continuing professional development.	Based on the principles of Agenda 21. Three main themes; Waste, Water and Energy but schools can go onto to participate in locally specific issues relating to LA21. Later, schools can go on to focus on other aspects of environmental and sustainable development issues, from transport and biodiversity to health and citizenship.	Aims to develop, test and publish methods of teaching and learning which define good practices of EE by setting up international school partnerships and aims to conduct comparative studies in such areas as 'Quality criteria for Eco School development'
STAGES AND CONTENT	Programme steps to achieve award: 1. Whole school support (governing body through to teachers and students). 2. A review (using criteria) of current situation and activities (audit). 3. Development of Action programme. 4. implementation of actions 5. Report documentation to apply for award and development of new action areas. 6. Receive diploma and use of logo.	The seven elements of the EcoSchools Programme: 1. establish Eco-Committee made up of pupils, staff, governors and parents 2. undertake Environmental Review, 3. implement Action Plan, 4. link to curriculum, 5. monitor and evaluate 6. Involve wider community. 7. produce 'Eco-Code' or mission statement	Seven stage process 1. Eco-committee, 2. environmental review, 3. action plan, 4. monitoring & evaluation, 5. curriculum links, 6. links to wider community 7. eco code	Create learning networks Action Research Studies, Publications Conferences Thematic Seminars
METHODS FOR MONITORING AND REPORTING	Schools must report to the National Agency by addressing actions and undertaken achievements to meet award criteria. This report must also include actions planned for future years.	Part of schools' work to monitor and evaluate their Action Plans. Progress in chosen focus areas, lesson plans and school improvement plans are recorded in a portfolio. This portfolio must be completed annually to show evidence of ongoing work and to keep Ecoschool status and flag.	Monitoring and evaluation are a required element as part of the seven steps to ensure targets of action plans are being worked towards.	Research and international opportunities are provided to exchange data and experiences from member countries and have access to research in EE and EFS
ACCREDITATION / CERTIFICATION	The School for Sustainable Development Award is granted in the form of a diploma and logo and is valid for three years.	Schools can apply for three award levels – bronze, silver and Green Flag. Schools self-assess bronze and silver; trained volunteers visit schools to assess the Green Flag award. The award is re-assessed and renewed every two years. Incentives –money and savings, recognition and publicity, links to curriculum, and links to community.	Each School program is assessed. Successful schools are awarded the Eco-Schools Green Flag.	N/A

PROGRAM IMPLEMENTATION AND SUPPORT	Agency staff available for report writing support on a needs-basis and agency website	The Eco-Schools Officer has networks of contacts for most local authorities and will try to match existing resources for specific projects. Occasionally, visits to school and/or small grants can be made when available. Website also has supplementary information, links to curriculum subjects and an interactive chatroom.	FEE Eco-Schools website; Eco-news (newsletter with issues and case studies in different languages), activities and materials for schools, regional seminars and international conferences	International conferences, thematic workshops, teacher exchanges and professional

Source: Australian Research Institutes in Education for Sustainability (2004). Whole-school approaches to sustainability: An international review of whole-school sustainability programs. Available at: https://aries.mq.edu.au/projects/whole_school/files/international_review.pdf

7.1. Note on the concept and understanding of natural sciences

The natural sciences are the sciences that seek to explain the rules that govern the natural world through scientific methods, the cornerstone of which is measured by quantitative data (Ledoux, 2002, p. 34). They also attempt to provide mathematical (either deterministic or stochastic) models of natural processes. There are five branches of natural sciences (Barr, 2006, p. 1; Simhony, 2006, p. 49), including:

1. Astronomy
2. Biology
3. Chemistry
4. Earth sciences
5. Physics.

In primary and lower secondary education, natural sciences have a holistic dimension, and they aim to ensure that students:

- Start to develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry, and physics.
- Start to develop understanding of the nature, processes, and methods of science through different types of science inquiry that help them to answer scientific questions about the world around them.
- Are equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future.

In upper secondary education (ages 15-18) and depending on the country, there are study directions where the subjects of physics, chemistry and biology are not offered separately. In these directions the afore mentioned aims are expanded and deepened while three broad subject-specific aims in natural sciences that relate to the purposes of learning science are enhanced: doing sciences; knowing the subject content and making connections; and understanding the uses of science.

In terms of content, the natural sciences in primary and secondary education, are a combination of two central branches: the life sciences and the physical sciences. The life sciences revolve around biological studies, and the physical sciences contain astronomy, chemistry, Earth science, and physics.

For instance, in Belgium, in primary education, natural sciences subject (or World orientation, as it is called for some educational networks) covers nature, technique, humankind, society, time and space and the use of natural resources. This can be considered as an example of conventional case of Natural Sciences subject in primary education which is taught in a holistic manner when students not only acquire scientific knowledge and develop scientific skills but also reflect on scientific implications on nature, humankind, society and culture. On the other hand, in Cyprus, in primary education, the natural sciences subject has more of a scientific dimension covering the topics such as living organisms; natural environment; energy; light; sound; matter; forces, movements, tools, simple machines, constructions; heaven and earth (weather phenomena and geographic orientation etc) and our body and health (main parts of human body, five senses, healthy living, etc)[356].

When it comes to lower secondary education, there are cases when natural sciences offered as a separate subject solely represents one of the central branches (either life sciences or physical sciences) while the rest of subjects are being taught separately. In Czech Republic, lower secondary students address the educational area "Humans & Nature", which comprises of Physics, Chemistry, Natural Sciences and Geography. Natural Sciences as a separate subject covers mostly biological topics including general biology and genetics, fungal biology, plant biology, animal biology, human biology, inanimate nature, fundamentals of ecology and empirical exploration of nature[357]. In other countries, Natural Sciences emerge as a separate subject providing interdisciplinary view and connections between different scientific subjects. In Portugal, in the second cycle of basic education (Grades 5 to 6), science is offered as an independent course, Natural Sciences, taught by a teacher with specialization in the natural sciences. The curriculum for this course focuses on themes that are fundamental for students' comprehension of the functions of the Sun-Earth-life system. It addresses the domains of living and non-living things and their interactions, as well as the dynamics of human interventions on this system[358].

In the upper secondary education, the study field of Natural Sciences might differ from country to country as well. While in Estonia, the study field of natural sciences comprises of 4 key subjects: Biology, Chemistry, Physics and Geography (Earth Science), in Lithuania, this is not the case for upper secondary students who choose the social or humanitarian study direction (advanced level in languages, history, arts) as a general one. These students are offered an integrated Natural Sciences course, covering all branches of natural sciences and including the following topics: composition and structure of materials; inorganic and organic compounds; properties and changes in materials; genetic information in the cell and life continuity; movement and forces; energy and physical processes; sustainability of materials and energy circuits; electricity; waves and radiation; environment and man; fundamentals of astronomy[359].

356 http://archeia.moec.gov.cy/mc/2/fysikes_epistimes_dimotiko.pdf

357 https://files.eun.org/SciEduDept/EES/subject_used_merged.pdf

358 http://timssandpirls.bc.edu/timss2015/encyclopedia/countries/portugal/the-science-curriculum-in-primary-and-lower-secondary-grades/

359 https://www.smm.lt/uploads/documents/svietimas/ugdymo-programos/vidurinis-ugdymas/Gamtamokslinis_ugdymas_4_priedas.pdf

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