D3.2 ANALYSIS OF LITERATURE AND EXISTING POLICY FRAMEWORKS

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Introduction

Human-induced climate change is putting the achievement of all Sustainable Development Goals (SDGs) at risk. Current research shows that countries are not moving simultaneously in incorporating sustainability and sustainable development into curricula. It becomes clear, then, that more work needs to be done to make education incisive enough to impact the environment positively (Boarin et al., 2022). Not only do national curricula need to address this concern and identify the knowledge, skills and attitudes that future citizens will need to display to address environmental risks as it is necessary to fill the gap between curriculum design and students' achievements to prepare them for an ever evolving and increasingly demanding society (Boarin et al., 2022).

The most significant (and probably the greatest) challenge educational systems face today is the urgency to prepare a kind of subject ready to tackle climate change consequences by the same societies that produced those problems. The inclusion of sustainability has been more significant in higher education than in other educational stages, and academic research still focuses mainly on sustainability's environmental and economic dimensions, thus revealing a narrow conception of sustainability (Suárez-López & Eugenio-Gozalbo, 2021). Early childhood, primary and secondary school, vocational education, adult education, and lifelong learning are equality, if not most important to induce societies to discover new and effective ways to address climate change, a problem that demands to re-learn to live in tune with the planet (Bianchi, 2020).

Individuals should develop attitudes and behaviours that support a sustainable future for all from an early age, and they should take an active role and responsibility for a sustainable world. It is well known that the foundations of people's attitudes toward the environment and the world are formed in childhood (Guler, 2021). PISA revealed in 2006 that almost all learners in OECD member countries attend schools where these and other issues such as pollution and environmental degradation are part of the curriculum, but the lack of a widespread and universal competence framework for sustainability has resulted in the proliferation of many definitions of what knowledge, skills, attitudes, and values for sustainability are, failing to provide a clear and unified direction to education (Bianchi, 2020).

In this report we present a review of the literature on sustainability competencies that are needed for society to be able to tackle these sustainability challenges and an exploratory study on international and national educational and environmental policies.

On a methodological note, we have undertaken a two-step methodology. First, we conducted a literature review on green skills and sustainability as a competence. Considering the availability of a recent literature review on the same topics (Bianchi, 2020), we have decided to perform our review over the articles published in the past three years and indexed in Scopus. However, we also included literature references reported by the projects' partners that fell out of the main chronology when relevant. This option had in mind the relevancy of the documents suggested.

After step one, we collected and analysed official documents related to the environment and educational policies to identify the concerns with sustainability in both areas. When available, documents officially translated into English were used. In cases where this option was not available, we resorted to machine translation by Google services. Such was the case for Hungary, Romania and Greece. Therefore, these translations must be taken with caution since we cannot

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guarantee the reliability of the translation, especially in the case of the translation from Greek to English, which is not, apparently, very accurate.

Besides the information provided by the project's partners, some databases were used to identify relevant policies and documentation about climate policies and the educational systems of each country. The resources used were **The European Climate Adaptation Platform Climate-ADAPT**, The **European Commission Energy** homepage, The **EACEA National Policies Platform,** and **National Implementation Reports ESD 2018**

The structure of the report follows this structure. We start by presenting the results of our literature review. Then we introduce the political analysis of international and national policies. To make the report useful for other researchers, we tried to quote excerpts from the documents directly. This choice eventually has the negative consequence of document extension but facilitates its appropriation.

Then, we analyse and systematize the national curricula of each participating country. The strategy of the analyses was to focus on compulsory education and the exhaustive presentation of skills and learning outcomes related to sustainability and environment awareness. The results show different realities for each country explained by their cultural traditions on ecology. However, these differences in politics must take into account the participation and initiative of school practices and civil society participation. These two elements may disclose a reality of concerns with sustainability issues and a set of behaviours that aim to tackle climate change consequences that the analyses of legal documents could not capture. The results show that although environmental concerns are present in each country, their addressing can encompass a poetic perspective that approximates the idea of children and nature and a curriculum design strategy that sets outcomes in students' knowledge, skills and attitudes.

Finally, we outline an appendix in which we present the curricula of each country, organized by level of education, discipline, topics covered and skills or learning outcome, hoping to facilitate not only the comparison between countries but also the mapping of the current provision of green skills in compulsory education.

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Literature review

The Agenda 2030 and the 17 SDG

In 2015, following the Decade of ESD, the United Nations states adopted the **2030 Agenda for Sustainable Development**. The political agenda defines **17 Sustainable Development Goals** (SDGs) comprising a total of 169 environmental, social, and economic interconnected targets aimed at fighting poverty, caring for the planet and reducing inequalities (Vallez et al., 2022) and corresponding to sustainability concerns, such as the exploitation of natural resources, environmental pollution, and social injustice (UN, 2015). The 17 goals and 169 targets are intended to stimulate structural actions from international governments to balance economic, social, and environmental issues and dimensions (Boarin et al., 2022). UNESCO condenses SDGs into four key areas: climate change, sustainable consumption and production, biodiversity, and disaster risk reduction (Diepolder et al., 2021).

This document is considered a milestone in the global discourse on sustainable development (Boarin et al., 2022) and a "watershed moment" in the long history of SD, providing an innovative and holistic approach to solving the world's most compelling challenges about sustainability and its ramifications (De Iorio et al., 2022). Ban Ki-Moon, the eighth Secretary-General of the United Nations, stated that SDGs are the most scientific, comprehensive, and ambitious set of goals that the United Nations has ever presented. There is an expansion of scope in the 17 goals, ranging from eliminating abject poverty to forging global partnerships. The 17 SDGs are a significant move forward in sustainable development, taking a much broader view of sustainability than attempted before (Nogueiro et al., 2022).

However, practical issues such as how to implement change continue to exist. Achieving the 2030 Agenda is the responsibility of all countries and industries, necessitating both private and public sector organisations to play an active and influential role. According to De Iorio et al. (2022), private businesses are expected to be critical to the success of these challenges by increasing productivity, driving inclusive economic growth, and creating jobs. On the contrary, the public sector is viewed as critical to accelerating and pursuing SDGs because it works in the public interest for social good, promoting welfare, inclusivity, and equity.

The international community recognized education as a critical promoter of sustainability and a better quality of life by setting a specific SDG on Quality Education (SDG 4) and as an essential element to achieving targets and indicators by 2030 (Cebrian et al., 2022). As a stand-alone goal, Agenda 2030 highlights the efforts to guarantee inclusive, equitable, and quality education and promote lifelong learning for all (González-Pérez et al., 2022). Furthermore, target 4.7 of SDG 4 is devoted to education for sustainable development and the knowledge and competencies to be promoted amongst learners to cultivate global citizens as change agents towards more sustainable societies (UNESCO, 2017).

More recently, the **Paris Agreement** recognized the importance of "climate change education and training" and asked involved parties to cooperate in taking appropriate measures (Boarin et al., 2022, p. 2). Also, the new **Education for Sustainable Development: Towards achieving the SDGs** framework outlines actions in five priority action areas on policy, learning environments, building capacities of educators, youth and local level action, stressing education for sustainable development key role for the achievement of the 17 SDGs (UNESCO 2020) (Cebrian et al., 2022).

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Education is also the fundamental basis of social transformation. We need to acquire new skills, values, and attitudes that lead to more sustainable societies. Education systems must respond to this pressing need by defining learning objectives and relevant learning content, introducing pedagogies that empower learners and urging institutions to include sustainability principles in their management structures. Sustainable development refers now to the use of technologies to combine the physical, digital, and biological worlds to improve the lives of citizens who live in harmony with the environment (Membrillo-Hernández et al., 2021).

The progress in reaching the goals was already behind schedule, and the world has faced significant challenges since establishing the 2030 Agenda. The disruptions resulting from the pandemic have emphasised the essential nature of the digital sphere in advancing the SDGs and the existing education inequalities. The United Nations projects that 2.8 million young people and children are at risk of lacking access to education or dropping out (Clark et al., 2022), which is a problem by itself and can undermine the establishment of the SDGs.

Table 1. Sustainable Development Goals and targets and indicators related to environmental sustainability education (Agenda 2030)

Nr.	**SDG**
1	No poverty
2	Zero hunger
3	Good health and well-being
4	Quality education *Target 4.7:* By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development. *Indicator 4.7.1*: Extent to which (i) global citizenship education and (ii) education for sustainable development are mainstreamed in (a) national education policies; (b) curricula; (c) teacher education; and (d) student assessment
5	Gender equality
6	Clean water and sanitation
7	Affordable and clean energy
8	Decent work and economic growth
9	Industry, innovation and infrastructure

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10	Reduced inequalities
11	Sustainable cities and communities
12	Responsible consumption and production *Target 12.8:* By 2030, ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature. *Indicator 12.8.1:* Extent to which (i) global citizenship education and (ii) education for sustainable development are mainstreamed in (a) national education policies; (b) curricula; (c) teacher education; and (d) student assessment
13	Climate action *Target 13.3:* Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning. *Indicator 13.3.1:* Extent to which (i) global citizenship education and (ii) education for sustainable development are mainstreamed in (a) national education policies; (b) curricula; (c) teacher education; and (d) student assessment.
14	Life below water
15	Life on land
16	Peace, justice and strong institutions
17	Partnerships for the goals

Source: Agenda 2030.

The EU Green Deal - a roadmap to sustainable economies

The **European Green Deal** (EGD) is a set of policy initiatives to make the EU countries' economies sustainable and overcome such critical challenges as climate change and environmental degradation (Widera, 2021). The Deal was approved in 2019 for the Multiannual Financial Framework 2021–2027 to promote clean energy production, smart cities and the well-being of businesses and professionals in Europe.

The European Green Deal pledged the Commission to develop a European competence framework for schools, training institutions, and universities to develop and assess attitudes, skills, and knowledge about climate change and sustainable development. The European Commission is also reinforcing its commitment to green and sustainable growth with the Recovery Plan for Europe designed to put the recovery on track by the path of the European Green Deal (García Vaquero, 2021).

In this context, the **Recovery and Resilience Facility** (RRF) was set up to offer financial support for public investments and reforms. The RRF is a vital programme of the EU Recovery Instrument

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(NextGenerationEU) in the revised Multiannual Financial Framework (MFF) for 2021–2027. It includes the provision of non-repayable financial support and loans to the Member States to support public investments and reforms, as set out in their National Recovery and Resilience Plans (NRRPs). These loans complement non-repayable support and are to be proposed in exchange for additional reforms and investments beyond those that benefit from the non-repayable financial support (García Vaquero, 2021).

However, the definition of these programmes does not guarantee their success. The National Plans for each country must enable member states to reap the full economic and employment benefits of the green transition, creating new green jobs, stable, predictable, and resilient economic growth, and less pollution with healthier and cleaner air (García Vaquero, 2021).

The EU pact for skills

The European Commission (EC) and Organisation for Economic Co-operation and Development (OECD 2005) have formulated several competency frameworks considered prerequisites for handling societal challenges, including green transformation. These competencies emphasise the importance of behavioural and attitudinal aspects in civil society and generalised approaches to develop the necessary competencies. Such frameworks are **DeSeCo**, **EntreComp**, **DigComp**, **LifeComp**, **GreenComp**, and **21st-century skills**. Unfortunately, the development of these competencies in different areas is not interrelated, and competencies for green transformation are poorly addressed. Furthermore, such articles, individually, do not meet the needs of green transition as a complex and integral competence.

The **Partnership for 21st Century Skills** is a collaborative organisation of governments and businesses that defined a framework for developing the skills, aptitudes, and attitudes necessary to succeed in the workplace and 21st-century society. It categorises competencies into three categories:

1. learning skills (creativity and innovation, critical thinking and problem solving, communication and collaboration);
2. literacy skills (information literacy, media literacy, and ICT literacy), and
3. Life skills (flexibility and adaptability; initiative and self-direction; social and intercultural skills; productivity and accountability; leadership and responsibility).

The concerns with the environment and sustainability are present in different skills frameworks. For instance, the European Entrepreneurship Competence Framework (**EntreComp**) includes the following skill:

> Ethical and sustainable thinking: Assess the consequences and impact of ideas, opportunities and actions • Assess the consequences of ideas that bring value and the effect of entrepreneurial action on the target community, the market, society and the environment • Reflect on how sustainable long-term social, cultural and economic goals are, and the course of action chosen • Act responsibly.

The Digital Competence Framework for Citizens (**DigComp**) includes "Protecting the environment: To be aware of the environmental impact of digital technologies and their use" in the set of skills.

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The document **LifeComp: The European Framework for Personal, Social and Learning to Learn Key Competence** includes the following competence: "Wellbeing Pursuit of life satisfaction, care of physical, mental and social health; and adoption of a sustainable lifestyle". This is described as "the adoption of a sustainable lifestyle that respects the environment, and the physical and mental wellbeing of self and others, while seeking and offering social support" and "adopting a systemic approach is needed to consider the interdependence of one's own and others' health and wellbeing, as well as safeguarding healthy environments".

GreenComp is a reference framework for sustainability competences at EU level, providing a common ground for learners and educators. It maps out sustainability skills and competences for learners of all ages, from young children to adults, and for all educational settings, formal, non-formal and informal. It outlines twelve competences grouped into four categories:

1. **embodying sustainability values** advocates equity and justice for future generations, while acknowledging that humans are part of the natural world;
2. **embracing complexity in sustainability** helps learners become systemic and critical thinkers who approach problems from different perspectives, spot interconnections and question their assumptions and biases;
3. **envisioning sustainable futures** empowers learners to imagine alternative scenarios for the future, deal with ambiguity and uncertainty in an adaptable way, experiment and cross disciplinary boundaries;
4. **acting for sustainability** involves political engagement as well as collective and individual action.

The twelve competences are described as follows:

1. Valuing sustainability
2. Supporting fairness
3. Promoting nature
4. Systems thinking
5. Critical thinking
6. Problem framing
7. Futures literacy
8. Adaptability
9. Exploratory thinking
10. Political agency
11. Collective action
12. Individual initiative

The European Competency Framework for Public Procurement Professionals (**ProcurComp**) is a tool designed by the European Commission to support the professionalisation of public procurement. By defining 30 key competences, ProcurCompEU provides a common reference for public procurement professionals in the European Union and beyond. It recognizes and supports public procurement as a strategic function that delivers public investment for sustainable growth. The competence matrix sets the competency of "Sustainable Procurement" and the skills identified in Table 2.

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Table 2. ProcurCompEU - European Competency Framework for Public Procurement Professionals.

Intermediate	Advanced	Expert
Is able to: Implement sustainable procurement aspects in technical specifications, selection and award criteria, contract clauses and key performance indicators; Use sustainable procurement tools and methods, such us standards, life-cycle costing and labels; Carry out research, analysis and networking activities that support sustainable procurement decisions; Monitor the sustainability impact and performance of the project, including commitments made by contractors and subcontractors.	**Is able to:** Implement the organisation's sustainable procurement strategy in terms of the targets, priorities and timeframes to achieve the organisation's sustainability objectives; Make decisions about integrating sustainable procurement aspects into e.g. technical specifications, selection and award criteria, contract clauses and key performance indicators; Promote and encourage the use of sustainable procurement tools and techniques, such as standards, life-cycle costing techniques and labels; Get an overview of the products and services available on the market by engaging suppliers and make a business case for sustainable procurement based on life-cycle costing and social impact; Reach out to stakeholders who are conducive to developing sustainable procurement markets and opportunities; Ensure there is a system for monitoring the sustainability impact of contracts, including commitments made by contractors and subcontractors.	**Is able to:** Master the concepts and application of sustainable procurement aspects and prioritise based on impact, budgetary importance and influence on the market; Secure political support and promote the organisation's sustainable procurement strategy and priorities; Design the organisation's sustainable procurement strategy, setting clear scope, targets, priorities and timeframes, and ensure it is implemented effectively; Define priority sectors with high-impact and identify approaches to tendering in the selected sectors such as construction, food and catering, vehicles, and ICT; Integrate sustainable procurement good practices to the organisation and among peer organisations; Advocate for the development and widespread use of sustainable procurement within and beyond the organisation, take part in expert groups and networks and create partnerships with other public authorities and stakeholders (e.g. civil society and NGOs) to promote and improve implementation of sustainable public procurement.

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The central role of education

Over the past 50 decades, education has been recognised as a driver of change and a path to sustainability. However, achieving the Sustainable Development Goals (SDGs) will require more ambitious and whole-scale transformations of societies worldwide through novel approaches. Therefore, the change agents must be educated in sustainability and sustainable development (Redman et al., 2021). Multiple stakeholders have advocated for the education sector to lead the transformation, considering that education is a catalyst for reshaping worldwide views and values to address sustainability challenges (De lorio et al., 2022).

Education for the SDG emphasises the significance of developing education-based strategies to develop sustainability competencies in students, the planet's future citizens (Rieckmann et al., 2017). However, other steps must be taken first. The first task is for the majority of the population to be aware of them, recognise their significance, and, most importantly, identify how these goals can be applied in their professional and personal lives. Much attitudinal and behavioural change is required to work toward achieving the SDGs this decade (Baena-Morales & González-Víllora, 2022).

As a result, the number of sustainability programs at universities and colleges has increased significantly worldwide. However, critics have long noted that most of this education is too close to the status quo and graduates of these programs are only equipped to make incremental improvements rather than being change agents capable of advancing transformations. The learning objectives of sustainability programs should reflect the characteristics of such transformational change agents (Redman et al., 2021).

The recent SDG 4.7 calls for global Education for Sustainable Development (ESD) but does not provide explicit learning objectives nor a coherent framework for advancing transformations. As a result, it is unlikely that the high-level policy can provide guidance, clarity and coordination in a unified framework of sustainability learning objectives which can undermine such programs' effectiveness, innovation, and legitimacy (Redman et al., 2021).

Aside from that, we cannot resort to collective past experiences - there is an acknowledgement that what we have learned thus far is insufficient for dealing with the challenge of sustainability and current experiences tend to remain as niches and examples of good practice. As a result, the purpose of education, the role of educational institutions, and current pedagogical approaches must be questioned and reframed (Cebrian et al., 2022).

Green skills definition

The transition to a green economy and the need for green jobs

The need to move globally to a greener economy is today in our societies a consensual affirmation in the face of the urgency raised by climate change and the threat to the planet that it represents. The adaptation of economic and social life to this reality and the central role of educational systems is perhaps the most significant force for change that education has ever known since the expansion of the mass school in the 19th century.

The term "green economy" was coined in the late 1980s by the European Environment Agency based on the reflection that environmental protection cannot be achieved unless an environmental perspective is integrated into economic and sectoral policies (Nikolajenko-

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Skarbalė et al., 2021). A green economy should result in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities. According to the European Commission (2011), a green economy is one that generates growth, creates jobs, and eradicates poverty by investing in and preserving the natural capital on which our planet's long-term survival depends (Nikolajenko-Skarbalė et al., 2021). The United Nations Environment Programme (UNEP) considers that a green economy is one that improves human well-being and social equity while significantly reducing environmental risks and ecological scarcity. In this type of economy, revenue and employment growth are driven by private and public investments that reduce pollution and carbon emissions, improve resource efficiency, and prevent the loss of biodiversity and environmental services.

The economic sectors considered to be driving the transition to a green economy are: waste, manufacturing, energy supply, industry, water, buildings, fisheries, tourism, transport, forestry, water. In fact, Eurostat is analysing "green" trends divided into two main groups of activities: (a) Environmental protection activities – preventing, reducing and eliminating pollution or another degradation of the environment (i.e. waste water management, waste management, other environmental protection activities), and (b) Resource management activities – preserving natural resources and safeguarding them against depletion (i.e. water saving, renewable energy, energy efficiency) (Nikolajenko-Skarbalė et al., 2021).

The concept of green economy is sometimes under the topics of resource efficiency; environmental sustainability; ecosystem resilience; ecological and environmental economics. Besides this ambiguity, the term is perceived and categorised differently in different countries, making it difficult to compare patterns and trends (Nikolajenko-Skarbalė et al., 2021).

Regardless of the definitions adopted by international organisations and its place as a priority for global politics, this concept can be just a buzzword over which there is a need for debate. Without clarification of what the green economy is precisely about, it will not be possible to measure its economic indicators and analyse what direction it is heading in. The idea of a green economy needs to go beyond an academic field of research and discussion.

In the past years, the concept of green economy started to lose traction, given a lack of operationalization and progress in achieving a more sustainable economy and the idea of the circular economy has now become the key policy priority in Europe.

The Green economy's implementation is expected to increase the demand for green jobs. In fact, the need and shortage of skilled labour force in the group of jobs with high green potential is especially notable for the groups of managers and professionals (García Vaquero, 2021). To meet the demand for skilled specialists, specific efforts in labour skills related to this field (primarily education at all levels and skill upgrading) should be implemented in all countries (García Vaquero, 2021).

The concept of the green job since the definition is not uniform (García Vaquero, 2021). Various papers present attempts to establish the boundaries of green jobs, specifically the type of industry, production methods, and specific jobs with the associated skills and abilities". In general, we can say that green jobs are jobs that positively impact the environment (Nikolajenko-Skarbalė et al., 2021).

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One general approach to simplifying the definition of green jobs is related to the sectors and skilled workforce that produce goods or services that aid in protecting the environment, natural resources and the development of new technologies and processes that could stop or reverse the effects of climate change (García Vaquero, 2021). These jobs can involve manufacturing products and providing services by companies from the "green" sector (Nikolajenko-Skarbalė et al., 2021). But they can also be created by a company outside this sector, but with a strong focus on environmental protection where employees perform tasks that contribute to reducing the negative impact of the company on the environment (Nikolajenko-Skarbalė et al., 2021).

These jobs demand specific skills and knowledge, making it a priority to identify and provide the right skills for new, existing and forthcoming "green" jobs that can smoothly transition to the "greener" economy (García Vaquero, 2021; Nikolajenko-Skarbalė et al., 2021).

Green knowledge refers to environmental knowledge, which includes concepts and their relationships to nature and ecosystems and is obtained through education or observation. This type of knowledge can be categorised in the following domains (Cabral, 2021):

1. Knowledge acquired through domains such as natural history as well as ecology and environmental issues and challenges;
2. Knowledge that integrates the disciplines of natural science and social sciences to focus on aspects that mitigate energy consumption, reducing environmental waste and conserving ecosystems;
3. Knowledge associated with eco-friendly practices especially compliance with law and order and safety regulations;
4. Knowledge to mitigate energy and raw materials consumption, reduce the greenhouse effect, diminish waste and pollution and conserve and preserve natural ecosystems;
5. Knowledge about the conservation of natural resources;
6. Knowledge about sustainable development;
7. Knowledge associated with recycling centres, renewable energy sources, space utilisation, territorial and personal space norms and access to sustainable services;
8. Understanding of the natural environment, environmental degradation and eco-friendly actions.

However, to engage in environmental conservation, theoretical knowledge of environmental facts or concepts is insufficient. Therefore, individuals must be equipped with **green skills** in this regard, which represent a practical application of theoretical knowledge. Green knowledge gained through education or training can be transformed into skills for dealing with the preservation of an individual's immediate natural environment (Cabral, 2021). In a recent study, Cabral (2021) found nine categories of green skills. These can be

1. The skills required product development and in the product life cycle by integrating recycling, reuse and eco-design;
2. The skills necessary for green jobs which include mitigating the usage of energy and raw materials, alleviating greenhouse gas emission, reducing pollution and conserving the ecosystem;
3. The skills acquired through formal education and training with concern for the natural environment and its ecosystem;

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4. Sustainability skills;
5. Skills required for recycling and waste management;
6. Higher-level skills for green product development;
7. Skills that extend from soft skills to skills for energy efficiency;
8. Skills that focus on human development and sustainable work account for the political economy and transform the livelihood of poor;
9. Skills associated with green jobs with green processes, green products and services, green industries and occupations evolved to meet the need for a green economy.

Generally, skills can be classified as "soft" or "hard." Hard skills can be taught in the classroom, through books or other training materials, or on the job, or easily quantifiable skill sets, such as technical, management, marketing, analytical, design, and accounting. Soft skills enable a person to fit in at work. However, they are difficult to quantify, such as attitude, flexibility, motivation, communication, creative and critical thinking, work ethic and problem-solving (Nikolajenko-Skarbalė et al., 2021).

Sustainability as a competence

The **beginning of the emergence of sustainability education can be traced back to** the 1960s with widely recognized publications on socially induced environmental disasters. While the initial emphasis was on environmental issues and the concept of environmental education, issues of development, social justice, and economics arose in subsequent years, and the discourse shifted to the concept of sustainability education (Diepolder et al., 2021).

The United Nations introduced the concept of Education for Sustainable Development (ESD) in Rio de Janeiro in 1992. It has since been internationally explored by many scholars and politically promoted. The establishment of the "UN Decade for ESD" from 2005 to 2014 has added strength to the issue (De Iorio, 2022). Agenda 21 emphasised the importance of education and sustainability in achieving sustainable development (Boarin et al., 2022), and the OECD Future of Education and Skills 2030 project is heading in that direction. While the first phase of the project was concerned with identifying transformative competencies, the second was concerned with determining how they could be acquired (Bianchi, 2020). This shifts the issue of education for sustainability from content selection to a paradigm shift in education.

There is an ambiguity in defining sustainable development competencies and key competencies in sustainability (Bianchi, 2020). Nevertheless, over the last few decades, the academic community has produced several definitions for the concept of "competence" (De LaTorre et al., 2022) and a growing body of literature on ESD and sustainability competencies.

The development of an appropriate competence typology is critical for integrating education and training, aligning both with labour market needs and promoting individual mobility (Le Deist & Winterton, 2005).

A *competence* implies knowing how to act responsibly and mobilise, integrate, and transfer knowledge, resources, and skills in each context; it is then more complex than observable behaviour because competencies emerge from non-observable psychological and social phenomena. *Sustainability competency* is a combination of cognitive skills, practical abilities, and ethical values and attitudes mobilised in a real-world situation or context related to

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sustainability (De LaTorre et al., 2022). Peiró et al. (2021) adds the definition of *competence* as a set of behaviours that aid in achieving desired outcomes. Furthermore, they are socially and future-oriented and linked to a specific context.

The concept of *competences* differs from capabilities, competencies, and skills. The term derives from the Latin word "Compete," which means "ability to do something." (Fodor et al., 2021, p. 3). *Competence* is a small-scale identifiable element, a demonstrable skill associated with completing a task that contributes to a capability. A capability can be considered a large-scale, integrated characteristic; a competency is acquiring contributing elements known as a skill or competence/competencies. Competence encompasses the development of both a skill and a competency. The degree of skill acquisition distinguishes competence from skills/competency (Holdsworth, 2021). Bianchi asserts that education typically thinks in terms of competencies; however, the labour market requires skills (Fodor et al., 2021). The connections between capability/attribute, competence, competencies, and skills are critical in the development and implementation of educational programs." (Holdsworth, 2021).

Researchers and practitioners in the competence field typically rely on Boyatzis' definition, classifying individual characteristics into three dimensions: **knowledge, skills, and attitudes/values (KSAs)** (De LaTorre et al., 2022). Put in another way, competences are a person's knowledge, skills, abilities, attitudes, and other characteristics that enable them to perform skillfully (making reasonable decisions and taking action) in complex and uncertain situations such as work, civic engagement, and personal life (Beagon, 2022). KSAs are defined as follows (De LaTorre et al., 2022):

- **Knowledge** is the "cognitive" aspect of competence; it refers to all of the topics and issues that people are familiar with or need to be familiar with to do their job. It is frequently associated with the "head";
- **Skills** are the "practical" or applied dimension of competence; this dimension refers to what people are capable of doing or what they need to do to do their job. It is frequently associated with "hands";
- **Attitudes** refer to the attitudes and values that people must have to do their jobs well. It's frequently associated with the "heart".

The literature examines green attitudes from the following angles (Cabral, 2021):

1. Attitudes formed as part of environmental education for environmental problems and solutions;
2. Attitudes toward environmental education and education for sustainable development;
3. Attitudes toward environmental protection ;
4. Attitudes toward sustainable development;
5. Attitude toward a commitment to ecological challenges; and
6. Attitude supported by a sense of responsibility for environmental issues, respect for nature and society, and assessment of socio-environmental conflicts.

Several studies delineate green behaviour as the following viewpoints (Cabral, 2021):

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1. Behaviour that demonstrates respect for the environment and engages in pro-environmental collective actions;
2. Preventive measures initiated to protect the natural environment and conserve energy;
3. Reusing and recycling natural resources;
4. Behaviour for environmental conservation;
5. Behaviour to achieve sustainability; and
6. Behaviour to produce green products, labelling the products as environmentally safe, recycling and receiving packages and developing products that cause the least harm to the environment.

Competence-based education focuses on students' learning outcomes rather than what teachers should be teaching. Competencies enable teachers to perform better and more effectively under various circumstances, frameworks, and conditions (Rieckmann et al., 2022). This way, competences cannot be taught; they must be developed. As a result, ESD necessitates a transformative, action-oriented pedagogy. This demands that educators have the competencies necessary to support learners' competence development (Rieckmann et al., 2022). As a consequence, it is necessary to distinguishing between content knowledge ("what to teach") and pedagogical content knowledge ("how to teach").

The shift from educational contribution to environmental awareness to sustainability competences is based on the idea of an active future citizen who must gain the competence and willingness to effectively implement sustainability principles and seek ways to intervene where they are being implemented (Mets et al, 2021). This has led researchers to hypothesise that sustainability could be taken as competence in itself, with its definition that could be a cross-competence to different education levels, and with its compliance and evaluation indicators (Membrillo-Hernández et al., 2021). Developing sustainability competencies at all levels of education is especially important for developing sustainability literacy and individuals becoming positive change agents in their workplaces and personal lives (Cebrian et al., 2020).

Bianchi (2020, p. 2) differentiates between "competences in sustainability and key competences in sustainability", defining the first as "the interlinked set of knowledge, skills, attitudes, and values that enable effectively, embodied action in the world, according to the context"; and key competences in sustainability as "several sustainability competences that functionally relate to each other. It facilitates achieving successful performance and a positive outcome that progresses sustainability while working on specific sustainability challenges and opportunities in various contexts.

The European Parliament and Council define social and civic competences as one of eight Reference Framework Key competence areas[1] (**Table 2**), which include, among other things, social participation and civic responsibility. The issues of sustainability and green transformation are likely to become transdisciplinary rather than disciplinary or interdisciplinary issues in the context of contemporary citizen competencies. Socio-scientific competencies are associated with various so-called soft skills and civic values. In addition to environmental and sustainability

[1] COUNCIL RECOMMENDATION of 22 May 2018 on key competences for lifelong learning.

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awareness in general education, students should acquire 'citizenship' competencies, including those involving a more collective realisation (Mets et al., 2021).

Table 3. Key competences for lifelong learning

Eight key competences
Literacy competence
Multilingual competence
Mathematical competence and competence in science, technology and engineering Competence includes an attitude of critical appreciation and curiosity, a concern for ethical issues and support for both safety and environmental sustainability, in particular as regards scientific and technological progress in relation to oneself, family, community, and global issues.
Digital competence
Personal, social and learning to learn competence
Citizenship competence Citizenship competence is the ability to act as responsible citizens and to fully participate in civic and social life, based on understanding of social, economic, legal and political concepts and structures, as well as global developments and sustainability.
Entrepreneurship competence
Cultural awareness and expression competence

Since the turn of the century, researchers have debated which competencies could promote sustainability in everyday life (Sanchez-Carrillo et al., 2021). Several studies have attempted to identify key competencies for promoting SD in education institutions and developed educational models. In addition, numerous studies have focused on integrating these competencies into various types of programs. These studies focus mainly on higher education. However, stakeholder perspectives, such as those of teachers and students, were also investigated, emphasising pedagogy and education methods for these competencies. Reviews on this topic have also been conducted in the last decade. These studies have identified a set of skills that should be taught. Some studies provided structured proposals based on models or frameworks, while others provided a list of competencies without a framing structure (Peiró et al., 2021).

Wiek, Withycombe, and Redman's (2011) work is the most frequently cited and debated key competencies framework in the academic literature on sustainability education (Beagon, 2022). As summarized by Wiek et al. (2011), critical competencies in sustainability include systems-thinking, anticipatory, normative, strategic skills, and interpersonal competence. Numerous studies used this framework as a basic theoretical foundation, resulting in some convergence in other studies (Bianchi, 2020). Rieckmann (2012) proposed expanding this framework with additional sustainability competencies emphasising critical thinking and integrated problem solving as skills required to improve sustainability. Wiek et al., expanded on their previous findings to include integrated problem solving (Beagon, 2022).

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Table 4. Abbreviated definitions of the key competencies in sustainability (Wiek et al. 2011, 2016)

Systems-thinking competency "ability to collectively analyze complex systems across different domains (society, environment, economy, etc.) and across different scales (local to global), thereby considering cascading effects, inertia, feedback loops and other systemic features related to sustainability issues and sustainability problem-solving frameworks." (Wiek et al. 2011, p. 207)	*Integrated problem-solving competency* is a meta-competency of meaningfully using and integrating the five key competencies [left] for solving sustainability problems and fostering sustainable development (Wiek et al. 2016, p. 243). It is the ability "to apply different problem-solving frameworks to complex sustainability problems and develop viable solution options" in order to "meaningfully integrate problem analysis, sustainability assessment, visioning and strategy building" (Wiek et al. 2016, p. 251)
Anticipatory/futures-thinking competency "ability to collectively analyze, evaluate, and craft rich "pictures'' of the future related to sustainability issues and sustainability problem-solving frameworks". (Wiek et al. 2011, pp. 208–209)	
Normative/values-thinking competency "ability to collectively map, specify, apply, reconcile, and negotiate sustainability values, principles, goals, and targets". (Wiek et al. 2011, p. 209)	
Strategic-thinking competency "ability to collectively design and implement interventions, transitions, and transformative governance strategies toward sustainability". (Wiek et al. 2011, p. 210)	
Interpersonal/collaborative competency "ability to motivate, enable, and facilitate collaborative and participatory sustainability research and problem solving". (Wiek et al. 2011, p. 211)	

Source: Brundiers et al., 2021.

Recently, a team of fourteen international experts in sustainability education conducted a Delphi study on Wiek et al. (2011, 2016) framework of key competencies in sustainability to build expert consensus (Brundiers et al., 2020). The experts agreed with the original framework and added two new competencies to it, namely intrapersonal and implementation competencies. **Table 5** contains the most recent updates to the framework's definitions of key competencies in sustainability.

Table 5. Definitions of key competences in sustainability in Brundiers et al. 2020.

Competences	**Definitions**
Systems thinking	As in Wiek et al., 2011, p. 207 (See Table 1)
Futures-thinking	To be able to iterate and continuously refine one's own futures thinking (visions, scenarios, etc.), in productive and explicit tension to the status quo; recognizing the implicitly held (and largely unrecognized) assumptions about how society works and how they influence the status quo and critically reflecting how they might influence futures thinking
Values-thinking	To be able to differentiate between intrinsic and extrinsic values in the social and natural world; to recognize normalized 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 practiced values.
Strategic-thinking	To be able to recognize the historical roots and embedded resilience of deliberate and unintended unsustainability and the barriers to change; to creatively plan innovative experiments to test strategies.
Interpersonal	To be able to apply the concepts and methods of each competency not merely as "technical skills," but in ways that truly engage and motivate diverse stakeholders and to empathically work with collaborators' and citizens' different ways of knowing and communication.
Integrated 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.
Implementation	The collective ability to realize a planned solution toward a sustainability-informed vision, to monitor and evaluate the realization process, and to address emerging challenges (adjustments), recognizing that sustainability problem-solving is a long-term, iterative process between planning, realization, and evaluation
Intra-personal or self-awareness	The ability to be aware of one's own emotions, desires, thoughts, behaviors, and personality, as well as to regulate, motivate, and continually improve oneself drawing on competences related to emotional intelligence and social and emotional learning

Source: Bianchi, 2020.

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A review of the learning outcomes and skills developed in sustainability leadership education consistently emphasises collaborative, experiential, and transformational learning. Collaborative skills and learning outcomes focus on effective communication, involving others in sustainability efforts, and working well in diverse groups. Experiential skills and learning outcomes revolve around students' communities' sustainability problems and incorporating informed decisions into their daily lives. Finally, transformative skills and learning outcomes frequently rely on students' ability to engage in self-criticism and self-development processes (Allen, 2021).

Many of the mentioned competencies focus on complex cognitive processes used to understand and analyse complex reality and context. Another well-known stumbling block is the one referring to attitudes and values. Furthermore, several competences are related to emotion management concerning oneself and interactions with others. The third set of competencies emphasises social aspects. Competencies mentioned here include social relationships, participation, collaboration, and appreciation and respect for cultural differences. To improve collective actions for SD, it is frequently necessary to stimulate others, promote shared views and goals, and use catalytic leadership. The fourth block focuses on more "behavioural" competences that are more closely related to the actions that characterise the competence, though their enactment will always be contextual. Another crucial component, though one that is often overlooked, is the orientation toward the future. Again, SD necessitates these skills because the concept is clearly oriented toward the future. This competency set includes visioning, anticipating, forecasting, foresight, strategizing, and visualising scenarios. Finally, it is worth noting the importance that several authors place on interdisciplinary work and, in some cases, research competencies (Peiró et al., 2021).

A pedagogy for Sustainability Competences

The distinction between education for sustainable development (ESD) and sustainability competencies is that competencies are concerned with the competencies that teachers and educators must implement in educational settings in order to promote sustainability competencies among their students (Cebrian et al., 2020). For this reason, recent studies have begun to investigate the most relevant pedagogies needed to shape the profile of students and future citizens and prepare them to produce the significant transformation required to achieve global sustainability goals (Boarin et al., 2022).

The existence of diverse perspectives on sustainability and diverse approaches to embedding ESD is seen as a positive factor in ensuring that new developments are culturally and locally relevant (Cebrian et al., 2022).

Education for sustainability is a comprehensive and transformative education that addresses learning content and outcomes, pedagogy, and the learning environment. Learning methodologies and teaching behaviours must be changed to make all students active agents and precursors of sustainable behaviours. A constructivist approach to learning may be better suited than a behaviourist approach. Sustainability education calls for an action-oriented, transformative pedagogy that promotes self-directed learning, participation and collaboration, problem-solving, inter-and transdisciplinarity, and the integration of formal and informal learning to develop key sustainability competencies (Cebrian et al., 2020).

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Other authors advocate a whole-school approach shifting from an add-on to existing subjects and curriculum to a transdisciplinary and holistic embedment. Students need to participate in meaningful and deep learning experiences that engage them in cognitive, psychomotor, and affective learning domains (Cebrian et al., 2022).

Currently, there is much emphasis on what students will be able to do at the end of their learning pathways and experiences and how well-developed curricula, instructions, reporting, and assessments foster this. This is commonly referenced as learning outcomes-based curricula (Fodor et al., 2021).

Some other emerging trends in the education for sustainability research literature are education on alternatives to the linear economic system or the broad area of digitalization. Research in this area has three categories (Diepolder et al., 2021):

- content-related (e.g., the effect and handling of fake news);
- medium-related (e.g., mobile learning, massive open online courses);
- interactive learning environments.

Another topic of discussion on education for sustainability is the assessment of competences. The competencies are acquired through learning-by-doing in a specific context while being supervised. As a result, context is an essential factor in determining whether or not behaviours are competent. It includes the physical environment and the social environment and its dynamic person-environment interaction over time. Thus, knowing the context is required for assessing a given competence, and it is taken into account to understand better and appraise the meaning and effectiveness of the behaviours (Peiró et al., 2021). Furthermore, competences come to the fore in terms of performance. Thus, assessing behavioural manifestations of competencies in a given context is the most direct way to measure them. Behaviours frequently produce outputs that we can analyse and evaluate as indirect but valid evidence of the competencies used in their production. Then, based on the behaviorally anchored report on how an actor dealt with the complex issue at hand, competences can be assessed (Peiró et al., 2021).

One of the challenges in achieving the SDGs through education for sustainability competences is their lack of specificity because they are presented in a framework that is too broad, inconsistent, and difficult to quantify and implement. They are also presented without clear priorities or a plan for achieving them (Baena-Morales & González-Víllora, 2022).

The importance of teachers and school leaders in embedding ESD in schools has been widely acknowledged. A large body of literature addresses the drivers and barriers to embedding ESD based on teachers' and educators' perceptions and perspectives. Because of their privileged decision-making position and ability to influence school organisational conditions, school principals are envisioned as crucial change agents embedding sustainability. However, there is a scarcity of research on the educational leadership qualities and processes required to build sustainable schools (Cebrian et al., 2022).

Another issue is that teachers are not adequately trained in general (Baena-Morales & González-Víllora, 2022). In contrast to the assumption that educators can intuitively navigate new pedagogical practices and educational design for sustainability, difficulties arise from a lack of

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planning time, difficulties developing sustainability content, and uncertainty about sustainability issues (Allen, 2021).

Given these challenges and the scarcity of prior research, a review outlining consistent and effective pedagogies, skills, and learning outcomes to guide educators in the facilitation of sustainability leadership education is required (Allen, 2021).

Finally, educational systems need to consider current challenges to delivering sustainability skills. The Covid-19 pandemic and the lockdowns in countries worldwide necessitated immediate and drastic measures to ensure teaching continuity and student retention. Although many schools provide learning through virtual classrooms, many students have limited access to the internet. Furthermore, successful teaching is dependent on the computer literacy of teachers, educational administrators, and parents. The World Economic Forum's report for 2021 outlines the major post-pandemic social issues (e.g., extreme weather, deaths from infections, climate action failure, environmental damage, digital gap, cyber failures, lifestyles in crisis). It emphasises the need to improve equity in access to technology (Boarin et al., 2022; González-Pérez et al., 2022).

Definition of the sustainability concept

Sustainable development was defined for the first time in 1987 when the United Nations established the World Commission on Environment and Development (WCED) to establish “A global agenda for change”. In its report *Our Common Future* (also known as the *Brundtland Report*), an explicit link was made between social, economic, cultural, and environmental issues. *Sustainable development* was defined as "development that meets the needs of the present without jeopardising future generations' ability to meet their own needs" (Cebrian et al., 2022). Furthermore, economic growth, environmental impacts, and social issues are framed as interconnected systems in the report, implying that economic development must be balanced with social justice and ecological wellbeing (Allen, 2021). However, as of 2021, some experts have included other domains that contribute to sustainable development: culture, technology, economics, and politics (Membrillo-Hernández et al., 2021).

These domains are also designated as dimensions of sustainability: environmental protection, economic vitality maintenance, and adherence to specific social considerations about human development (Mirčetić et al., 2022).

In 1992, through UNESCO's programme EDSGlobal, sustainability became a concept as a public policy that responds to an urgent need for action by the world's governments to care for the environment and society, promoted for the first time (Membrillo-Hernández et al., 2021).

International and national agencies' definitions of sustainable development or sustainability have frequently been criticised for being vague, abstract, ambiguous, contradictory, and non-operational. They do not clarify what methods and innovative processes are required to cultivate sustainable communities (Cebrian et al., 2022).

This has resulted in a diverse counter-discourse. A common critique is of the sufficiently vague definition promoted by the international mainstream, ambiguous enough to allow for consensus building but devoid of much substance. Nevertheless, by the mid-1990s, the concepts of

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sustainable development and sustainability had become widespread, making their way into academic literature and policy agendas worldwide (Purvis et al., 2018).

As a result, different perspectives and definitions coexist among various disciplines such as politics, economics, education, and environmental sciences (Cebrian et al., 2022), adding ambiguity to this concept. The term has experienced terminological dispersion, resulting in the emergence of over 300 conceptualizations (Baena-Morales & González-Víllora, 2022).

"Sustainable", "sustainability", and "sustainable development" are terms that have gained global relevance, initially associated with planet preservation issues but now more associated with human well-being and relationship with the planet for the well-being of future generations. These terms have had to be re-examined because society has used them ambiguously, conflating them on occasion with growth, progress, maturity, evolution, or wealth. However, the significance of sustainability is linked to the ethics that guide human conduct, reflecting the values of courage, prudence, and hope (Nogueiro et al., 2022).

The meaning of sustainability has evolved, with the most common being to associate it with something that lasts, is perennial, or by its nature remains present without consuming something that would be harmful externally. The term has gained popularity in policy-oriented research to express what public policies should achieve. The modern sciences of the twenty-first century have adopted the concept of sustainability as a requirement for the coexistence of the Earth's biosphere and human civilization (Membrillo-Hernández et al., 2021).

The 'three pillars' conceptualisation, environmental, economic, and social, has gained widespread traction. This is typically realised through the balancing of trade-offs between seemingly equally desirable goals within these three categories, though applications vary. However, one problematic aspect of this conceptualization is its lack of theoretical development; according to Purvis et al., (2018) there appears to be no original urtext from which it derives, instead appearing in the literature and commonly taken at face value. This approach was presented as a 'common view' of sustainable development as early as so common that it does not appear to require a reference. Although this theory became commonplace some works consider additional pillars such as institutional, cultural, and technical (Purvis et al., 2018).

Policy Frameworks for Sustainability

Policies for incorporating sustainability themes into education have been in place since the 1970s. However, their focus has shifted significantly since the beginning. Michelsen (2016) divides the evolution of education for sustainable development into **three key phases**: the orientation and experimental phase, from 1970 to 1990, with a focus on environmental issues; the transition phase, from 1990 to 2000, with the introduction of development-related themes; and the expansionary phase, since 2000 (Leicht et al., 2018).

International and European policy frameworks for sustainability

The United Nations Organization for Education and Culture (UNESCO) established the "**UN Decade of Education for Sustainable Development**" in 2005. This program's goal was to integrate the principles, values and practises of sustainable development all aspects of education and learning. In 2012 Rio+20 Earth Summit, world leaders initiated a process to

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develop a set of global goals known as Sustainable Development Goals (SDGs), to tackle new and emerging sustainability challenges globally, assess progress and analyse the gaps (Boarin, 2022).

The document **Education for Sustainable Development Goals - Learning Objectives** is an initiative of UNESCO. It tries to answer the challenge of ensuring that by 2030 all learners acquire knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non- violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development.

The publication intends to guide readers on how to use education, and in particular ESD, in achieving the SDGs. It identifies learning objectives, suggests topics and learning activities for each SDG, and describes implementation on different levels from course design to national strategies.

The document aims to support policymakers, curriculum developers and educators in designing strategies, curricula and courses to promote learning for the SDGs. The document is not prescriptive in any way but provides guidance and offers suggestions for learning topics and objectives that educators can select and adapt to it concrete learning contexts.

This framework identifies the following key competences for sustainability:

- **Systems thinking competency:** the abilities to recognize and understand relationships; to analyse complex systems; to think of how systems are embedded within different domains and different scales; and to deal with uncertainty.
- **Anticipatory competency:** the abilities to understand and evaluate multiple futures – possible, probable, and desirable; to create one's own visions for the future; to apply the precautionary principle; to assess the consequences of actions; and to deal with risks and changes.
- **Normative competency:** the abilities to understand and reflect on the norms and values that underlie one's actions; and to negotiate sustainability values, principles, goals, and targets, in a context of conflicts of interests and trade-offs, uncertain knowledge and contradictions.
- **Strategic competency:** the abilities to collectively develop and implement innovative actions that further sustainability at the local level and further ailed.
- **Collaboration competency**: the abilities to learn from others; to understand and respect the needs, perspectives, and actions of others (empathy); to understand, relate to and be sensitive to others (empathic leadership); to deal with conflicts in a group; and to facilitate collaborative and participatory problem solving.
- **Critical thinking competency**: the ability to question norms, practices, and opinions; to reflect on own one's values, perceptions and actions; and to take a position in the sustainability discourse.
- **Self-awareness competency**: the ability to reflect on one's own role in the local community and (global) society; to continually evaluate and further motivate one's actions; and to deal with one's feelings and desires.
- **Integrated problem-solving competency**: the overarching ability to apply different problem-solving frameworks to complex sustainability problems and

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develop viable, inclusive, and equitable solution options that promote sustainable development, integrating the above- mentioned competences.

Regarding climate change mitigation (**SDG 13: Climate Action.** Take urgent action to combat climate change and its impacts) the framework introduces the learning objectives presented in Table 6.

Table 6. Learning objectives for SDG 13 "Climate Action"

Cognitive learning objectives	1. The learner understands the greenhouse effect as a natural phenomenon caused by an insulating layer of greenhouse gases. 2. The learner understands the current climate change as an anthropogenic phenomenon resulting from the increased greenhouse gas emissions. 3. The learner knows which human activities – on a global, national, local and individual level – contribute most to climate change. 4. The learner knows about the main ecological, social, cultural and economic consequences of climate change locally, nationally and globally and understands how these can themselves become catalysing, reinforcing factors for climate change. 5. The learner knows about prevention, mitigation and adaptation strategies at different levels (global to individual) and for different contexts and their connections with disaster response and disaster risk reduction.
Socio-emotional learning objectives	1. The learner is able to explain ecosystem dynamics and the environmental, social, economic and ethical impact of climate change. 2. The learner is able to encourage others to protect the climate. 3. The learner is able to collaborate with others and to develop commonly agreed-upon strategies to deal with climate change. 4. The learner is able to understand their personal impact on the world's climate, from a local to a global perspective. 5. The learner is able to recognize that the protection of the global climate is an essential task for everyone and that we need to completely re-evaluate our worldview and everyday behaviours in light of this.
Behavioural learning objectives	1. The learner is able to evaluate whether their private and job activities are climate friendly and – where not – to revise them. 2. The learner is able to act in favour of people threatened by climate change. 3. The learner is able to anticipate, estimate and assess the impact of personal, local and national decisions or activities on other people and world regions. 4. The learner is able to promote climate-protecting public policies. 5. The learner is able to support climate-friendly economic activities.

More recently, the EU Council issued a **Proposal for Council Recommendation about learning for environmental sustainability**. The proposal presents the following statements:

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> "Like all sectors, education and training must take also action to respond to the climate emergency and planetary crisis – in terms of its own operations and, crucially, how it prepares learners for the future."
>
> "Learners of all ages need to be able to develop the knowledge, skills and attitudes to live more sustainably, change patterns of consumption and production, embrace healthier lifestyles and contribute – both individually and collectively – to the transformation of our societies. Achieving this requires a lifelong learning approach to learning for environmental sustainability with hands-on, engaging and action-based ways of learning that foster (i) knowledge, understanding and critical thinking (cognitive learning); (ii) practical skills development (applied learning); and (iii) empathy, solidarity and caring for nature (socio-emotional learning). Interdisciplinary approaches are needed to help learners understand the inter-connectedness of economic, social and natural systems."
>
> "Yet despite decades of effort and initiatives, **learning for environmental sustainability is not yet a systemic feature of policy and practice in the EU.**"
>
> "Few countries have made lifelong learning a guiding principle for sustainability in education and training. To develop its full potential, learning and teaching for environmental sustainability need to happen not only in schools and higher education but in all parts of the system (formal, non-formal, informal) and at all levels (from early childhood to adulthood into older age)."

The recommendations are:

> "Embedding environmental sustainability in all education and training policies, programmes and processes is vital to build the skills and competences needed for the green transition. Action is needed vertically, individual to institution to systems level, and also horizontally, meaning all stakeholders in education and training need to work together in synergy to ensure that sustainability is anchored firmly in the entire student learning experience."
>
> "Short-term measures need to be developed and continued to support institutions and educators and to help learners develop the skills and mindset needed for the green transition. In the medium and longer term, all reform efforts in education and training should support and align with the changes needed for a greener and more sustainable future."

The 2020 communication **Realizing the European Education Area by 2025** undertakes the commitment to consolidate ongoing efforts and develop the European Education Area around six dimensions one of them being the "Ecological and digital transitions". The rationale for this dimension is described as

> "The transition to an environmentally sustainable, circular and climate-neutral economy has important social and employment repercussions. Citizens expect governments to prioritize environmental protection when planning recovery measures are taken to

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> overcome the economic and social effects of the Covid-19 crisis, in order to promote the transition to a greener and more digital world25. Only with the right skills and education can Europe aspire to a sustained economic recovery geared towards the ecological and digital transitions, while taking global leadership by, for example, strengthening its global competitive position, and remaining faithful to its commitment to a just transition."

To materialize the transformative ambition:

> "It is necessary to promote a profound change in people's behaviour and skills, with educational systems and institutions as the catalysts for this change. Actions should be geared towards changing behaviours, strengthening skills for the green economy, promoting new sustainable education and training infrastructures and renovating existing buildings ("renovation wave"), thus creating spaces conducive to this change"

In addition, the ecological transition requires investments in education and training to increase the number of professionals working for a climate-neutral and resource-efficient economy and to integrate environmental sustainability perspectives into the natural and human sciences and supporting changes in skills, methods, processes and cultures.

The **EU Biodiversity Strategy for 2030 Bringing nature back into our lives** aims

> "To help integrate biodiversity and ecosystems into school, higher education and professional training, the Commission will propose a Council Recommendation on encouraging cooperation in education for environmental sustainability in 2021. This will provide guidance for schools and teachers on how to cooperate and exchange experiences across the Member States on biodiversity teaching. The Commission will also provide support materials and facilitate the exchange of good practices in EU networks of teacher-training programmes".

The **European Climate Pact** is an EU-wide initiative inviting people, communities, and organisations to participate in climate action and build a greener Europe. The Climate Pact provides a space for people across all walks of life to connect and collectively develop and implement climate solutions, big and small. By sharing ideas and best practices, we can multiply their impact. The priorities set in this policy are:

1. promoting and supporting green employment
2. addressing the skilling and reskilling of workers
3. anticipating changes in workplaces of the future

The Pact aims to promote the following strategies:

- Encourage businesses and organisations to get involved in the Pact for Skills to help up- and re-skill workers
- Spread good practices and success stories gathered across European programmes
- Help navigate the European Social Fund, which will enable training for five million people in green jobs and the green recovery
- Link up with Erasmus+ and other programmes providing opportunities to develop forward-looking skills and partnership projects

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- Encourage stakeholders, local authorities, and communities to make use of the Just Transition Mechanism to promote re-skilling and active inclusion of workers and job seekers, and help create new local jobs in the targeted regions
- Signpost to support programmes for higher education institutions seeking to develop and teach courses on environmental and climate impacts"

The **Council Resolution on a strategic framework for European cooperation in education and training towards the European Education Area and beyond (2021-2030)** sets the strategic priority (number 5) of supporting the green and digital transitions in and through education and training. The Union's agenda for the next decade is centred on green and digital transitions. Transitioning to an environmentally sustainable, circular, and climate-neutral economy, as well as moving to a more digital world, will have significant social, economic, and employment implications. To tackle these issues, the Council proposes:

- Mobilising expertise and resources for networking, and supporting creative approaches in green education, i.e. through the envisaged Education for Climate Coalition.
- Promoting environmental sustainability perspectives across education and training curricula, at all levels of education and within an inter-disciplinary approach, and promoting educational concepts, such as Education for Sustainable Development and Global Citizenship Education, in order to empower citizens to contribute to sustainable development.
- Fostering new sustainable education and training infrastructure and renovating existing buildings ('greening of education infrastructure')."

The document **Learning for the Future** is a document created by UNECE to establish a set of competences in Education for Sustainable Development for educators. They go beyond the competences that individual educators would have in order to provide a good quality education in their discipline. It is not intended to prescribe behavioural outcomes but to provide a framework for the professional development of educators and is of particular importance to individuals, groups and institutions that have a multiplier effect, such as educators of educators.

The Competences are based on the following rationale:

1. A holistic approach, which seeks integrative thinking and practice;
2. Envisioning change, which explores alternative futures, learns from the past and inspires engagement in the present; and
3. Achieving transformation, which serves to change in the way people learn and in the systems that support learning.

Table 7. The competences for educators in education for sustainable development

Learning to know	*Holistic approach* The basics of systems thinking ways in which natural, social, and economic systems function and how they may be interrelated The interdependent nature of relationships within the present generation and between generations, as well as those between rich and poor and between humans and nature

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	Their personal world view and cultural assumptions and seek to understand those of others The connection between sustainable futures and the way we think, live and work Their own thinking and action in relation to sustainable development
	Envisioning change The root causes of unsustainable development That sustainable development is an evolving concept The urgent need for change from unsustainable practices towards advancing quality of life, equity, solidarity, and environmental sustainability The importance of problem setting, critical reflection, visioning and creative thinking in planning the future and effecting change The importance of preparedness for the unforeseen and a precautionary approach The importance of scientific evidence in supporting sustainable development
	Active transformation Why there is a need to transform the education systems that support learning Why there is a need to transform the way we educate/learn Why it is important to prepare learners to meet new challenges The importance of building on the experience of learners as a basis for transformation How engagement in real-world issues enhances learning outcomes and helps learners to make a difference in practice
Learning to live together	*Holistic approach* Actively engage different groups across generations, cultures, places and disciplines
	Envisioning change Facilitate the emergence of new worldviews that address sustainable development Encourage negotiation of alternative futures
	Active transformation Challenge unsustainable practices across educational systems, including at the institutional level Help learners clarify their own and other worldviews through dialogue and recognize that alternative frameworks exist.
Learning to do	*Integrative thinking and practice* Create opportunities for sharing ideas and experiences from different disciplines/places/cultures/generations without prejudice and preconceptions Work with different perspectives on dilemmas, issues, tensions, and conflicts Connect the learner to their local and global spheres of influence
	Envisioning change

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	Critically assess processes of change in society and envision sustainable futures Communicate a sense of urgency for change and inspire hope Facilitate the evaluation of potential consequences of different decisions and actions Use the natural, social, and built environment, including their own institution, as a context and source of learning
	Achieve transformation Why there is a need to transform the education systems that support learning Why there is a need to transform the way we educate/learn Why it is important to prepare learners to meet new challenges The importance of building on the experience of learners as a basis for transformation How engagement in real-world issues enhances learning outcomes and helps learners to make a difference in practice
Learning to be	*Holistic approach* Is inclusive of different disciplines, cultures, and perspectives, including indigenous knowledge and worldviews
	Envisioning change Is motivated to make a positive contribution to other people and their social and natural environment, locally and globally Is willing to take considered action even in situations of uncertainty
	Achieve transformation Is willing to challenge assumptions underlying unsustainable practice Is a facilitator and participant in the learning process Is a critically reflective practitioner Inspires creativity and innovation Engages with learners in ways that build positive relationships

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National/Regional Policies about Sustainability competences in Education and Training

Finland

Sustainability and green skills in relevant educational policies

The care for the environment and concerns with sustainability are regarded as a subject field among many others and a piece of background information rather than a concrete action plan. However, sustainability seems to rise to the agenda in the educational policy documents. In those documents where sustainability is mentioned, it is said to be crucial for a sustainable future, but executive decisions remain unspecified (Mykrä, 2021).

Most of the acts and degrees on education do not mention sustainable development concerns. That is the case of the **Basic Education** Act (628/1998), the Basic Education Decree (852/1998), Act on General Upper Secondary Education (2018/714), **Act on Vocational Education and Training** (531/2017), **Universities of Applied Sciences Act** (2014/932) and **Universities Act** (2009/558), **Government Decree on Universities of Applied Sciences** (2014/1129), and **Government Decree on Universities** (2009/770). Another example is that the Finnish National Agency for Education does not mention sustainability or ecological aspects when describing the agency's mission, vision, or objectives[2].

The Decree on the national goals of education and distribution of lesson hours in basic education states that the basis of the teaching must be the respect for life, nature, and human rights. The goal is to gain capabilities to promote sustainable development. The **Decree on General Upper Secondary Education** (2018/714) states that the goal of upper secondary education is to promote life, human rights, sustainable development and respect for biodiversity and cultural diversity. It also mentions equal rights, democracy, responsibility, and active citizenship locally and globally as desirable outcomes.

Finnish government affirms the National Core Curriculums for basic school, general upper secondary school and vocational education, and the more specific competencies are defined by them. There are no common curricula for Universities of Applied Sciences or Universities. Universities have autonomy: they have freedom for research, art and teaching, and they define their curricula themselves.

There is, however, a set of educational guidelines and legislation that address the issues of sustainability and environmental concerns. For instance, the **Sustainable Development Policy of the Ministry of Education and Culture** and its administrative branch (2020)[3] states that "Stronger education and competence are prerequisites for achieving the goals of the 2030 Agenda". Some of the policies of the Ministry of Education and Culture that address Goal 4 - Quality of education and that mention sustainability are the following:

[2] https://www.oph.fi/en/about-us/organisation-finnish-national-agency-education

[3] https://julkaisut.valtioneuvosto.fi/handle/10024/16218

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encouraging early childhood education and care providers and education providers to integrate sustainable development perspectives into their education;

stressing the importance of addressing the sustainable development perspectives in teacher education and supports the strengthening of sustainable development in in-service training of teachers;

promoting competence in sustainable development by strengthening cooperation between formal, non-formal and informal education;

promoting sustainable development activities, which with their links to continuous learning comprehensively extend to different areas of life and enhances the transfer of knowledge to the activities and from plans to practice.

The document, however, does not define competencies accurately. The policy says: "The special responsibility of the Ministry's administrative branch lies in promoting goals related to social sustainability", but also: "the Ministry's administrative branch can promote a cultural change, which is a prerequisite for a change towards comprehensive sustainable development." Environmentally sustainable policies include only the themes of construction and maintenance and the use of the existing building stock. So, social sustainability is emphasised in the document.

The **Ministry of Education and Culture Strategy 2030** (2019)[4] introduces the areas on which the Ministry, its agencies and branch of government should focus over several government terms. It mentions: "The Ministry and our branch of government also share responsibility for helping mitigate climate change." The promise to commit to sustainable development is tied to concrete actions only to the economy and sustainable growth. Actions include monitoring the sustainable development indicators for the sector (described in section b), which has elements of environmental sustainability.

The **National youth work and youth policy programme VANUPO 2020–2023**[5] named "Aiming to ensure a meaningful life and social inclusion for all young people" (2020) is a statutory cross-administrative programme adopted by the Government every four years to improve how young people live and grow. In this programme, the Government defines its youth policy objectives and the measures for attaining them. The programme is adopted as a government resolution and includes three main targets:

Young people will have the prerequisites for smoothly running daily lives – Social exclusion will be reduced;

Young people will have the means and skills for participation and exerting influence (including that a) Tools that will facilitate young people's civic participation will be developed; b) Democracy and human rights education at schools and educational institutions will be enhanced, and c) Young people's voices will be heard in the climate change debate);

[4] https://julkaisut.valtioneuvosto.fi/handle/10024/161562

[5] https://okm.fi/julkaisu?pubid=URN:ISBN:978-952-263-887-8

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> Young people will have trust in society – Non-discrimination and security will be strengthened.

Ecological sustainability is included only in target 2C – "Young people's voices will be heard in the climate change debate". This target refers to the government's commitment to supporting young people's opportunities to participate in the debate on climate change and the planning and implementation of climate change mitigation actions. The measures established to accomplish this were:

> In particular, young people's opportunities to participate in the preparation and implementation of the climate policy planning system referred to in the Climate Act will be promoted. The planning system will pay particular attention to young people's viewpoints (including consumption, the transport sector).

As the **Climate Act reform** was drafted, new tools for consultation specifically intended for young people were piloted, as VANUPO stated. Spring 2022, the Climate act is in approval process in Government.

The provision of correct climate information will be stepped up. As part of the Municipal Climate Solutions programme, the planning of a materials package on operating models for climate change mitigation and adaptation in municipalities will be launched. Young people will be taken into consideration as a specific group in its procurement.

In 2020, proposals on reducing the carbon footprint, especially those put forward by young people, will be promoted on the Kokeilun paikka ("Place to Experiment") platform funded by the Ministry of the Environment.

Young people's representation in the **Global Roundtable on Climate Change** will be secured. The idea behind the Roundtable is to ensure society's broad-based involvement in climate actions and the commitment of various stakeholders in society to shared climate targets. The Global Roundtable on Climate Change provides stakeholders with a channel for taking part in the national preparation of climate actions.

A dialogue will be supported by those working with young people on how young people's agency in climate matters can be promoted and reinforced through existing participation mechanisms, including municipal youth and education services and the web service[6].

Possibilities for emission-free mobility, such as walking and cycling, will be supported and promoted among young people. The coordination of transport and land use, sustainable urban planning will be promoted, especially in urban subregions (for example, through the MAL agreements between the central government and municipalities on land use, housing and transport).

The entire educational system and, in particular, the possibilities provided by curricula and qualification requirements, will be used to guarantee each learner of any age up-to-date and justified information on climate change and its impacts. Teachers will be offered in-service training on this topic area.

[6] nuortenideat.fi

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Education providers will be encouraged to follow the principles of sustainable development and set an example for how educational institutions can take ecological, economic and social sustainability perspectives into account in their continuous operation. Good practices related to sustainable development will be shared nationally.

The **National Forum for Skills Anticipation Report**[7] (2019) highlights changes in competencies and skills needed in 2035. The National Forum for Skills Anticipation works under the Finnish National Agency for Education. The forum states that "Knowledge of sustainable development will be an important basic skill in the future, especially in industrial sectors. Such skills will become more important if societal development towards a more ecological direction continues." Despite that, the cards based on the skills of the Skills Anticipation Report[8] do not mention sustainability or environmental matters as needs for the education and training.

With the **Impact Programme on Climate Responsibility** (2019)[9], The Finnish National Agency for Education wants to support climate change education in educational settings. Therefore, various stakeholders took part in the open crowdsourcing process. The result was four goals for climate change education:

- In educational settings, there is competence to strengthen climate responsibility;
- Climate education is based on knowledge, involving and empowering learners;
- Climate responsibility is embedded in the culture of the educational organisations, and
- Competencies for climate responsibility, as well as learning practices fostering them, are developed in networks of relevant actors, and outputs are widely distributed.

Each goal has several concrete steps. The programme results remain incomplete - responsibilities for the implementation were not given to any organisation, but "everyone can be responsible in implementing the programme, following their roles, and acting towards the vision and goals in everyday life."

The **Sustainable future – The online guide to developing learning, organisational culture and everyday practices in education** (2021)[10] was composed by The Finnish National Agency for Education to provide information and support in the field of education and training - from early childhood education to secondary education. The guide contains advice, materials and case studies that can be used in educational work. Altogether, 26 articles are written by 35 professionals in each field. The topics are divided into four themes: 1) Why now and not later; 2) Enablers of sustainable development; 3) paths to sustainable future in curricula, and 4) Missing the concepts or practices? This guide is wide-ranging and appears to be a welcome and helpful tool for educators, including theoretical backgrounds and practical examples. However, it is unclear how well this document is known among schools and teachers.

[7] https://www.oph.fi/fi/tilastot-ja-julkaisut/julkaisut/osaaminen-2035 (in Finnish)
https://www.cedefop.europa.eu/en/news/finland-skills-2035 (some facts in English)
[8] https://www.oph.fi/sites/default/files/documents/koulutustarvekortit-verkkoversio-en_0_0.pdf (in English)
[9] https://www.oph.fi/fi/ilmastovastuu-koulutuksessa-vaikutusohjelma
[10] https://www.oph.fi/fi/kestava-tulevaisuus

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In November 2021, the Finnish National Agency for Education started the **Development project for sustainability education 2021-2023**[11]. Its goal is to provide support to early childhood education and basic education in sustainability education. In addition, the project promotes lifelong learning so that learners gain knowledge, skills, and attitudes in line with ecological sustainability[12].

Relevant policies for the implementation of sustainability

In Finland, the actors in the environmental field are eager to have education as one tool to implement environmental policy. Several environmental policy documents mention education and schools. Nevertheless, these statements stay pretty abstract. The environmental sector does not have power over the education sector on the action plan level, so the implementation and steering of the education sector come only from the education administration.

The prime Minister's Office leads the work towards sustainability in Finland; it organises **The Finnish National Commission on Sustainable Development**[13]**.** The Commission's main task is to accelerate the implementation of the global Agenda for Sustainable Development, Agenda 2030, and make it an integral part of the national work for sustainable development. Furthermore, the Commission promotes cooperation to achieve SDG and strives to integrate the strategic objectives of sustainable development into the national policy, administration and social practices.

The **Society's Commitment to sustainable development**[14] is the primary tool for sustainability in Finland. In the society's commitment, actors from different sectors of the society are committed to promoting sustainable development in their work with concrete actions. It is meant to be a tool for administration, citizens, and private entrepreneurs and businesses. Both the Ministry of Education and Culture[15] and The Finnish National Agency for Education[16] have promised to include sustainable development systematically in the national goals of education, steer and support municipalities to changes according to sustainability goals in curriculum, strengthen abilities to build a sustainable future in schooling and implement sustainability in their strategies. However, when analysed more closely the promises have been over-optimistic (Mykrä, 2022). Schools were also asked to fill in their operational commitments, but only a few per cent of schools did so. Over half of the commitments exposed concentrate on refuse, mostly on reducing biowaste in school lunchrooms. Schools present only a few more challenging and essential topics, like increasing environmental awareness, monitoring education, and developing competence[17].

[11] https://www.oph.fi/fi/kehittaminen/kestavyyskasvatuksen-kehittamishanke

[12] This project is connected to the Civil Society Case example Finland: Sustainable School Program presented later in this paper. The project cooperates with the Finnish ECF4CLIM-team: the projects share similar objectives in some respects, and some of the research data will be acquired together.

[13] https://kestavakehitys.fi/en/commission

[14] https://kestavakehitys.fi/en/commitment2050

[15] https://sitoumus2050.fi/en/toimenpidesitoumukset#//details/554C5EB4F826C3CC7421EA14

[16] https://sitoumus2050.fi/fi_FI/toimenpidesitoumukset#//details/5746D2F588FC8A014BA8EE5C

[17] See https://sitoumus2050.fi/en/toimenpidesitoumukset#/, choose filter CREATOR: school/educational institution.

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The state of sustainable development in Finland is monitored based on the Society's Commitment to Sustainable Development. Progress toward the target state is monitored using ten indicator baskets linked to the commitment[18] agreed upon in the National Sustainable Development Monitor[19]. Its indicators are:

- The number of day-care centres, schools and educational institutions with a focus on sustainable development
- Life-long learning and participation in training
- Research and development costs, the share of GDP

However, these indicators do not describe the state of sustainability in everyday life of educational organisations like schools.

The **Biodiversity Action Plan**[20] introduced "Communication and education" as a cross-cutting theme. Three of the four proposed actions are related to education: "Teacher education", "Biodiversity in the national curriculum", and "Cooperation in biodiversity education". The first two of these have been accomplished, but the last one still needs a boost – there have been cutbacks in funding that have hindered the environmental education work.

The **National Forest Strategy 2025**[21] (updated in 2019) states that know-how requirements in the forest sector will demand the development of education at all levels. Therefore, one area of strategic projects is know-how and education. The goal is that people's understanding of sustainable forest management, forest-based products and services, water protection, forest biodiversity and other environmental benefits will increase.

The **Report on the Implementation of the 2030 Agenda for Sustainable Development. Voluntary National Review 2020**[22], Finland describes actions and progress in 2016–2020 regarding all sustainable development goals and targets. Chapter 5.6.9, "Incorporation of the 2030 Agenda into the Education system at all levels" (pp. 61-65 and p. 112), gives quite a rosy impression about the state of education in Finland. Very little about actions towards ecological sustainability in education is mentioned – mainly, the report discusses social sustainability.

The document states that "sustainable development is already effectively captured in learning contents within documents such as the National Core Curricula for early childhood education and care, basic education and vocational education and training." We could question the preciseness of the word "effectively" since sustainability has a significant role in the general part of curricula but only in the subject's less visible part. On the other hand, the document admits: "However, there is still work to do to encourage more widespread adoption of a holistic organisational culture, among other things." – so there is some critical view in this document, too.

[18] https://kestavakehitys.fi/en/indicator-baskets
[19] https://kestavakehitys.fi/en/education-and-development-of-competence
[20] https://www.biodiversity.fi/actionplan/home
[21] https://mmm.fi/en/nfs
[22] https://julkaisut.valtioneuvosto.fi/handle/10024/162268

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Case Study of Policy Level Measures Facilitating Delivery of Sustainability Skills in Finland: The Green Flag certificate, Certificate on Sustainable Development and the UN Schools Network.

The national administration does not measure sustainability education comprehensively[23]. The most accurate measurements are connected to the society's commitment to sustainable development, and its monitoring described earlier. The latest monitoring process of the indicator basket "Education and development of competence" did not include sustainability education. There were some measures about that area in 2019, but not comprehensively. As we can read in the report: "At present, there is no comprehensive data available on work by schools to promote sustainable development. Neither does the indicator contain information on the work carried out by higher education institutions."

The number of sustainable development certificates in day-care centres, schools and educational institutions has grown slowly.

The indicator monitors the number of day-care centres, schools and educational institutions committed to certificates related to sustainable development or part of the UN school network. The Green Flag/Eco Schools[24] is an international programme and environmental label for sustainable development in day-care centres, schools and educational institutions. The sustainable development certification for educational institutions is available for schools, vocational education and training institutes, and liberal adult education institutions. The network of UN schools is an open support and cooperation network for all schools and educational institutions for highlighting UN themes, human rights, the themes of peace and security and the themes of sustainable development visible as part of the schools' teaching and operating culture. The indicator relates to activities at schools that promote young people's relationship with nature, eco-social education and positive attitudes towards sustainable choices, and an objective according to which all learners will attain the knowledge and skills needed to promote sustainable development by 2030.

The number of day-care centres, schools and educational institutions that at the end of 2018 had the right to use the Green Flag of Eco Schools or the Sustainable development certificate of educational establishments or had joined the network of UN schools[25]:

In 2018, 267 organisations used the Green Flag of Eco Schools, 80 organisations had a Certificate on Education for Sustainable Development, and 134 organisations were members of the UN Schools network. In Finland, 5.4% of primary, secondary and upper secondary schools have the right to use the Green Flag, and 4.6% are members of the UN Schools network. Sustainable development certificates for educational establishments are most common in intermediate vocational training institutes. Internationally comparable information is available on the number

[23] https://kestavakehitys.fi/en/-/young-people-increasingly-concerned-about-climate-change-and-interested-in-politics

[24] https://www.ecoschools.global/ (in Finland we call the Eco School -program a Green Flag -program)

[25] Sources: Foundation for Environmental Education FEE Suomi, the OKKA Foundation, the UN Association of Finland.

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of Eco Schools, and this comparison also includes the number of secondary vocational institutions. Finnish Green Flag /Eco Schools account for 5.3% of all schools in these statistics. The share for the other Nordic countries is as follows: 11.7% in Sweden, 13.9% in Norway, 19.9% in Iceland and 2.2% in Denmark. The European country with the largest share of Green Flag schools is Ireland, where 80.1% of all schools have the right to use the badge.

There is no valid national target for the number of certified day-care centres, schools and educational institutions in Finland. However, in 2006, the Education and Training Division of the Finnish National Commission on Sustainable Development set a target of 15%, which should be attained by 2014. The number of certified organisations has grown relatively slowly. However, the number within the scope of certification has likely grown more quickly as educational institutions have merged over the years to form larger units. The growth of impact could thus be more significant than the organisation-based examination would suggest.

The indicator does not include the sustainable development work carried out in day-care centres, schools and educational institutions independently or in networks other than those examined by the indicator. This may have increased with the newest curricula for basic education and upper secondary schools, as sustainable development and eco-social education play a key role in their national core curricula. However, there is no comprehensive data available on work by schools to promote sustainable development. Neither does the indicator contain information on the work carried out by higher education institutions.

Hungary

In Hungary, schools and kindergartens are established and maintained by the state, local governments, minority local governments, legal entities (foundations, churches, etc.) as well as natural persons. The Ministry of Human Resources, which is also responsible for culture, social affairs, health care, youth, and sport, has overall responsibility for the educational system.

Environmental education and education for sustainability policies in Hungary are heirs of century-long traditions of outdoor learning emphasizing harmony with nature. In the past 40 years, however, the country went through a transition from a systemic emphasis on environmental education towards that of education for sustainable development. Thus, in the early 1980s, environmental issues had a special relevance in public life in Hungary and initiatives supporting ecological consciousness were “tolerated” by the communist government, but not considered critical. This resulted in a relatively large number of civil gatherings connected to ecological movements that made their way into education. Only during the late 1990s did the idea of education for sustainable development find a place at the core of the agenda of educational development.

Since 2005, after EU membership, Hungary has adopted international recommendations and strategies (e.g., the UNECE Strategy for ESD in 2005) and Hungarian NGOs have participated in international and EU projects. Although this did not result in significant changes in political initiatives, the public understanding of sustainable development and the awareness of the integration of the social and economic aspects of sustainability have resulted in efforts to include these themes in the educational programmes. This period of transition is described by Reti et al. (2014).

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Currently, the concepts of green competencies and green jobs have not spread in Hungary and are hardly present in educational and environmental legislation. However, according to the research report "The Real Thing. Environmental learning situation in Hungary" this concern is addressed by other well-functioning of educational instruments such as the Green Kindergarten Program and Network, the National Eco-School Program and Network and the Forestry Kindergarten and Forestry Schools programs. These cover kindergarten and elementary school programmes for the age groups from 3 to 14 years, providing a strong background to the students. Through ecological projects, students have the opportunity to try and develop their various career skills and green skills. Despite the positive impact of these programmes, their benefits are restricted to the students in participating educational institutions.

In recent years, Hungary has adopted educational policies aimed at promoting education for sustainability, as well as environmental and climate change mitigation policies that refer to the education of young people. These, however, still have a limited scope of impact, not building on each other and not reflecting a comprehensive approach to the necessary changes for the promotion of green competencies.

Sustainability and green skills in relevant educational policies

The current foundational document on the Hungarian educational system is **Act on Public Education[26].** This legislation mentions sustainability only once, at the general aims of the ordinance, even though the document itself is 100 pages long. In clause one, the objectives and principles of the law are identified, as follows:

> **1.** Public education is a public service, which creates the conditions for the long-term development of Hungarian society in the interests of the rising generation, and the general framework and guarantees which are provided by the state. Public education as a whole is defined by the moral and spiritual values of knowledge, justice, order, freedom, equity, solidarity, equal treatment and education for **sustainable development** and healthy lifestyles. Public education is a universal service of the common good and the individual with respect for the rights of others.

The **National Environmental Education Strategy[27]** was published in 2010 by the Hungarian Society for Environmental Education to give to assist the "environmental educators" with communication- and attitude-forming tools. The **Strategy** intends to go beyond the "awareness-raising" approach and consists of the following five parts (**Table 8**):

Table 8. Parts and themes recommended by the National Environmental Education Strategy.

PARTS	THEMES
Pedagogy of sustainability	Values and principles
	Pedagogical background of environmental education
	Quality assurance in environmental education

[26] Act CXC of 2011 (https://njt.hu/jogszabaly/2011-190-00-00).
[27] http://mkne.hu/NKNS_uj/layout/NKNS_layout.pdf

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Private life	Material culture
	Family, Household, Lifestyle
	Health Promotion
	Leisure, tourism
Social environment	Traditions; Arts
	Science; Religion; Economy
	Law; Local Government
	Civil public life; Environmental information
	Communication, media
	Financing environmental education
	International cooperation
Institutional environmental education	Specificities of the ages
	Environmental education before school age
	Class, subject
	Extracurricular environmental education
	Renewal curricula
	Non-school environment
Towards the realisation of the Strategy	The tools of environmental education
	For the implementation of the strategy

Efforts to renew the strategy date back to 2019, when it was a document named the **National Environmental Education Strategy Basis** was published. This theoretical document states that environmentally friendly, value-based, and sustainable behaviour based on knowledge and love of nature and the environment needs to be considered decisive for students. Institutions must prepare them to exercise their civic duties and rights concerning the environment, including the awareness of the economic and social processes.

The **Strategy** goes beyond the defence of environmental education and presents a reflection on the educational policies and experiences in Hungary, as well as considerations about the curricular designs, strategies, and activities most suitable for this purpose. Thus, it defends that the "curricula" that encourage the learning of sustainability differ significantly from the more traditional curricula that serve the function of regulation and that a shift between cognitive-

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dominated learning theory to a more experiential (empirical) conception of learning is necessary:

> "Environmental education has never been able to accept that students acquire knowledge from texts, in a receptive way, essentially passively. It has always been part of the *ars poetica* of environmental education that the child must discover the connections on his or her own, that active learning is needed, and that actions must be taken in a motivating way to the general abilities that operate on all kinds of content."

Some suggestions are made to help educators continuously innovate in environmental education, such as: resorting to the use of IT tools; promoting attitude-forming activities and educational innovations that challenge the economic paradigm; targeting different groups of learners and even individuals with special educational needs or disadvantages; keeping consistency between the position expressed or suggested by the educator and the content of his teachings; and, finally, spending time outdoors in a natural environment.

In December 2016, the Hungarian Government published a **Concept for Global Responsibility Education in Formal and Non-Formal Education in Hungary** which focuses on a shift concerning both formal and non-formal education. According to this publication,

> "Education for global responsibility aims to prepare citizens to be able to cope with the understanding of the world around them, the challenges of the world of interdependencies, and to become active actors in shaping their immediate and wider world, to stand up to the idea of **environmental protection**, global solidarity, social justice, thinking systematically for the whole globe, for the Earth and all their fellow human beings."

The document identifies a set of specific competencies needed in global responsibility education that simultaneously encompass a range of knowledge, skills, attitudes, values, and identities. In this list, there is only one reference to sustainability (environment-socio-economy) classified as a value to be promoted in formal and non-formal education.

Relevant policies for the implementation of sustainability

The **National Framework Strategy for Sustainable Development** (NFSSD) for 2012–2024 was established by the Hungarian Parliament in March 2013, defining the objectives of the national government and municipalities, and placing sustainability targets in a Hungarian context. The National Council for Sustainable Development developed the strategy through a variety of public participation methods and created a mechanism for systematic analysis and evaluation. The protection and enhancement of national resources, which may be classified as human, social, environmental, and economic, is the primary challenge for the creation of a sustainable society, according to the Strategy. The systematic analysis of the **Strategy** carried out after the adoption of the 2030 Agenda set out in a monitoring report that the four priorities of the Framework Strategy, i.e., the human, social, environmental, and economic resources, followed the 17 SDGs.

The **Climate Change Action Plan,** up to 2020, also placed education among the tasks for the project implementation. It determines the following priorities:

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- Development of proposals for the prevention and adaptation of climate change integration of knowledge and practices;
- Mainstreaming the national strategic aspect of sustainability in education;
- Further promotion of the Sustainability Theme Week and the World's Largest Lesson programs among Hungarian primary and secondary schools to expand students' broad knowledge of sustainability;
- Organizing optional classes on climate protection and sustainability beyond class;
- Preparation of technical assistance, online interface, and training for environmental engineers and those involved in the environmental impact assessment procedure.

The Hungarian **National Energy Strategy 2030** establishes the educational measures needed to implement to achieve its objectives related to energy and climate awareness. The recommendation is as follows:

> "The development of an energy- and climate-conscious approach should begin in kindergarten with the playful transfer of the right level of information. As part of the project, it must be ensured that the right amount and quality of systematic information is available, together with the necessary aids. In addition, it must be ensured that there is a sufficient number of professionals/teachers available for the development of environmentally conscious education and their appropriate further training."

The **National Energy and Climate Plan** mentions educational awareness-raising measures for younger generations served by the **programme aimed at establishing an energy and climate literate society**, based on energy and climate literacy enhancing campaigns targeting different age groups and educational awareness-raising measures focusing on younger generations."

The document also addresses the need to update the VET system:

> "To improve the labour market in the energy sector **it is necessary to raise the standard of specialized education and to better exploit opportunities offered by the dual education system.** Following the survey of educational needs and identification of skills shortages, the number of students pursuing studies in the field of energy should be increased with support from career guidance programmes."

The Hungarian Parliament passed Act LX of 2007 Kyoto Protocol Implementation Framework. The Act mandated that the Hungarian Parliament develop a **National Climate Change Strategy**[28] and amend it at regular intervals. The **Second National Climate Change Strategy** for 2014-2025 (NCCS II) was approved by Parliament in 2013, however, it was withdrawn in 2015, just before the Paris Agreement, to be amended considering the new strategy outlined in the final Agreement. In May 2017, the Government approved the newly updated NCCS II for **2017-2030**.

According to **NCCS II**, issues of sustainability are particularly important in creating awareness through education. The curriculum should include information that calls attention and teaches

[28] Decree No. 29 of 2008.

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conscious thinking about sustainable development. Future professionals who are committed to environmental conservation will need to execute concepts that examine the environmental consequences of their actions.

The **Strategy** establishes the need for a Partnership for Climate Action Plan to involve a wide range of stakeholders to integrate climate awareness and sustainability into planning, decision-making and action at all levels of society. In this line of thought, it considers that one of the most important horizontal strategies to promote sustainability and climate change mitigation in practice is the formulation of attitudes and practical action in education.

It defines more concrete actions to integrate climate change prevention and adaptation aspects into education and training such as offering knowledge that attracts attention and teaches how to think consciously about sustainable development and shape attitudes; this knowledge needs to be incorporated into the curriculum and presented in an integrated way, not in isolation. To do this, the **Strategy** offers some suggestions for short-, mid- and long-term public education where "green" competencies are firstly mentioned:

- Raising awareness of the economic and social side of the ecological crisis;
- Demonstrating options for action on climate change mitigation and adaptation;
- The approach to sustainability should permeate all professional work in kindergartens and schools;
- Students should look for answers to real problems;
- The framework curricula and all their subjects must be reviewed and constantly updated so that schools can respond to current problems with reality-based learning;
- New learning methodological procedures and techniques should be made a significant element of teacher training, with a special focus on the acquisition of "green" competencies;
- Opportunities for teachers and pedagogical students to gain domestic and international experience should be promoted so that they can apply good practices in sustainability education in their future work.

NCCS II is divided into three sub-strategies that correspond to the three pillars of climate policy: the National Decarbonization Roadmap for climate change mitigation, the National Adaptation Strategy, and the Climate Change Awareness Raising Action Plan for public awareness.

The **Second National Climate Change Strategy** is thus the most ambitious Hungarian political document concerning sustainability, mentioning for the first time the need for "green" competencies and the articulation of educational practices with teacher training and curricula updates. However, the document remains at the level of intentions and not prescriptions.

The 4th **National Environmental Program** identified the environmental objectives, tasks and instruments required for their achievement in the period between **2015 and 2020** in consistency with the Environmental Action Plan of the European Union. It declared that environmental

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education in Hungary is an integral part of public education and public education tasks. It had the purpose of encouraging environmentally conscious behaviour based on knowledge and love of the environment and nature in all areas of education and awareness-raising and the media. To achieve this goal, it sets a list of directions for action and educational tasks:

- Strengthening the environmentally conscious approach and practice in the operation of public education institutions;
- Strengthening the knowledge of environmental phenomena and processes in all types of public education institutions and the whole process of education and upbringing;
- Teaching subjects about their social and economic contexts, developing knowledge-based on practical experience;
- Implementing additional pedagogies for environmental purposes, strengthening experiential pedagogical elements;
- Taking advantage of the opportunities provided by external demonstration sites (national parks, collection gardens, forest kindergartens);
- Environmental training and methodological preparation for teachers;
- Strengthening the role of social organizations in environmental education and in-service teacher training.

The draft version of the 5th **National Environment Programme** for the period 2021-2026 is being prepared. Its overall aim is to contribute to the insurance of the environmental conditions for sustainable development.

Case Study of Policy Level Measures Facilitating Delivery of Sustainability Skills in Hungary: Eco-School Network Programme in Elementary Schools

Description of the case (what skills were delivered and how)

The Eco-School Network Programme is the largest and the most successful programme for environmental and sustainability education in Hungary. The Eco-School label is awarded every year through competition among schools. The competition aims to recognize those institutions that address sustainability in a wide way, contributing to the sustainability principles to become a natural part of everyday life. The principles of sustainability should not only be present in the pedagogical practice of the schools but also all fields of school life addressing local environmental issues. The institution must submit an application and the institutions awarded the title can use the “Eco-school (Öko-Iskola)” or “Perpetual Eco-school (Örökös Öko-Iskola)” labels in recognition of their activities.

Civic education and participatory democracy are important components of the Eco-school philosophy (Széplaki & Varga, 2015). Since 2015, the eco-school criteria have included community service, which should empower teenagers to transform themselves as well as the community in which they live. The program also promotes sustainable economic entrepreneurship and encourages students to consider starting and running sustainable

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businesses. The program should help to make school maintenance more environmentally friendly by supporting energy-saving and nature-friendly activities and infrastructure developments, such as organizing energy-patrol activities or creating natural habitats in schoolyards. In 2017, education for global responsibility was added to the system as a new pedagogical aspect of eco-schools (Gan et al., 2020).

The winning schools receive support to join the network of eco-schools. The Network provides them professional support by recommending useful pedagogical tools, studies, books and teaching packages, and keeping its members informed about newly published tools through the Eco-School Newsletter and/or the website. Besides this, eco-schools have opportunities to present and share their projects, exchange professional experience, network, and participate in national and international training. Practically, the implicit criteria of the membership mean permanent participation in the activity of the Network (e.g., meetings, in-service training, conferences, tenders) (Széplaki & Varga, 2015).

For example, The Dózsa György Primary School in Debrecen was awarded the Perpetual Eco-School title in the Summer of 2020, having previously been successful in 2014 and for the second time in 2017. Based on an interview with the director of the institution[29] a concrete example is described below:

> Apart from the fact that the principles of the environment and sustainability are discussed in the classroom, they are present in every aspect of school life. From the way the school is managed to the way the children are fed and to the extra-curricular activities and camps organized. The preservation of local environmental and cultural values is part of the school's work, which is why the school is in close contact with the local community. Eco-schools are innovative not only at the pedagogical level but also at the organizational, technical, and economic levels. In their pedagogical practice, for example, eco-schools favour the treatment of problems that are close to real life. Knowledge is acquired through active creativity, action for the local environment, teamwork, and collaborative partnerships.
>
> Energy-efficient operation is also important: Eco-schools have an energy patrol service, school gardens, local nature trails, and mapping of natural and community assets in the area. Emphasis is also placed on developing rules for the institutional community with the responsible participation of pupils. For example, in some cases, they run green student councils or participate in the creation of building green rules.
>
> From a technical and economic point of view, they also try to use energy resources sparingly, reduce waste, make the school's indoor and outdoor environment aesthetically pleasing and sustainable, and create conditions for healthy catering. They may also create opportunities for the sale of local organic vegetables, fruit and produce.

Who/how initiated? (drivers and enablers)

Since 2000 the Institute for Educational Research and Development runs the Eco-School Network Programme, originally based on the international Environment and School Initiatives

[29] https://magyarnemzet.hu/belfold/2021/02/csaknem-negyszazezer-gyermek-jar-mar-magyarorszagon-okoiskolaba

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programme (ENSI), a network under the umbrella of OECD. The network is financed by the Ministry of Education. The initial driving force of the network was the Centre for Program and Curriculum Development but, gradually, the initiatives are more and more shifted from top-down to horizontal ones, starting from the participating schools (Széplaki & Varga, 2005).

The evaluation committee that revises and operates the application system is led by the Ministry of Education and supported by the Ministry for Environment. It also includes non-governmental and academic representatives of education for sustainable development. The eco-school certifications are issued by the two-state secretaries of the two ministries (Gan et al., 2020).

Schools, educational authorities, teacher trainers, educational research institutions, and other stakeholders are all involved in the ECO-Schools program. According to Gan et al. (2020), one of the program's most innovative features is that it constantly encourages all school stakeholders to actively participate in school development processes.

Strengths of the practice

Eco-school systems, according to Gan et al. (2020), have been a useful tool for implementing education for sustainable development through continuous innovation and collective learning. One of the strengths of the programme is that it became very appealing to decision-makers. In some cases, they have even changed policymakers' attitudes towards education for sustainable development from a very complex issue into manageable official processes producing quantitative and easily communicable results, demonstrating governments' commitment to ESD at the international level. Besides this, the eco-school programme contributes to raising the profile of sustainability in education from the classroom to international policy (Gan et al., 2020).

Limitations of the practice

The impacts of the Eco-Schools programme may be restricted to the participating schools' which still exclude almost half of the students in compulsory education. The participation of the schools may depend on its teachers' motivation and commitment to school activities and interest in sustainability issues; on a supporting management team that can facilitate the resources and time for the application, and on the existing relationship between the school and the local community. Since the application depends on school initiatives, the programme may prevent many students from acquiring and developing sustainability skills and attitudes.

Results achieved including their assessment/evaluation

Today, the Hungarian Eco-Schools Network has grown to almost 1100 institutions. The leaders of the schools participating in the programme consider the title of Eco-school or perpetual Eco-school as an honour, as well as a great responsibility. This sum includes 511 Perpetual Eco-Schools and 582 Eco-School, and the total number of students attending these institutions approaches 380.000; this number corresponds to more than 50% of the students enrolled in elementary school. This means that more than half of the primary school education pupils are continuously receiving significant environmental education.

In addition to these numbers, international organizations have recognized the positive impact of the programme: in December 2020 four Member States presented their good practices, including the Eco-Schools Network of Hungary at the UNESCO event on the Sustainability Action Plan.

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The program's monitoring reveals that certified eco-schools are constantly transforming themselves into social centres for sustainable development, where all stakeholders have a voice and can actively collaborate with local society. Eco-schools contribute to preparing students for active citizenship in this way (Gan2020).

Challenges and barriers faced

In 2005, a study by Széplaki & Varga for the OECD identified two main barriers to the concretization of the objectives of the Eco-Schools Programme. The first one was the uncertainty and limitation of financial support: the programme funding is not guaranteed, and it depends on political will; consequently, the network of schools needs to invest time, efforts and resources into lobbying for support almost on an ongoing basis.

The second one was the lack of technical management considered to be an obstacle to the professional management of the network. Although there was some technical assistance available based on short-term contracts for major events, the uncertainty and low level of support made it impossible to oversee the daily operations of the Network as well as its development.

More recently, Gan et al. (2020) have also identified the risk of having schools following the central guidelines without reinterpreting the concept, which could lead to a superficial adaptation of the eco-school concept and a lack of motivation for the deep implementation of sustainability principles.

Transferability and scalability

A recent study by Gan et al. (2020) has recommended a critical review of eco-school certification processes and criteria to expand the programme results to more contexts. This critical review should concentrate on strengthening elements of eco-school movements that can contribute to significant organizational change in schools.

The authors also suggest that to achieve deep organizational change, each school must have a person, a "change agent," who is dedicated to the whole-school approach of ESD. These principals or committed teachers are the "cornerstone" of the change in their schools, and the Ministry of Education or regional educational authority is assisting these change agents.

Key takeaways

Although Hungary's environmental and education policy does not address sustainability issues broadly and exhaustively, school practices relating to sustainability can cover this gap.

The Eco-Schools program certifies and supports schools with relevant projects in the field of sustainability. These projects make environmental and sustainability issues part of students' daily lives in their school life. It is therefore an impactful project in terms of raising awareness on climate issues and the adoption of individual behaviours with potential impacts on the school, families, and the local community.

This initiative is based on traditional Hungarian pedagogical practices such as outdoor learning and action learning, as well as current pedagogical practices that place the student at the centre of the educational process.

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However, to be effective in training children and young people for sustainability, it is important that:

- the initiative involves more schools;
- teachers are encouraged and supported in the preparation of projects and the application process;
- teachers are made aware of the environmental issues in their pre- and on-service training; and
- an evaluation program is set with explicit criteria and goals to be achieved as well as a framework of sustainability competencies that should be delivered.

Portugal

Sustainability and green skills in relevant educational policies

The **Students' Profile by the End of Compulsory Schooling** (Perfil dos Alunos à Saída da Escolaridade Obrigatória) (2017) is a guiding document that describes the principles, vision, values and competencies the country wishes Portuguese students to have by the time they finish compulsory schooling. It states that basic and secondary education must promote skills for adopting behaviours that respond to the global challenges of the environment and build a sustainable future. Thus, students should be able to:

- (i) adopt behaviours that promote health and well-being, namely in daily habits, food, consumption, physical exercise, sexuality and their relationships with the environment and society;
- (ii) understand the balances and weaknesses of the natural world in the adoption of behaviours that respond to the great global challenges of the environment;
- (iii) manifest environmental and social awareness and responsibility, working collaboratively for the common good, intending to build a sustainable future.

The competencies for sustainability are part of the **Citizenship and Development** subject, one of the national curriculum components that is taught in schools using three complementary approaches: transdisciplinary nature in the first cycle of basic education, autonomous subject in the second and third cycles of basic education, and curriculum component developed transversally with the contribution of all subjects and training components in secondary education. In this sense, all curriculum subjects' programs integrate the development of transversal competencies in various aspects of citizenship education, specifically environmental education for sustainability.

The **National Education Strategy for Citizenship (ENEC – Estratégia Nacional para a Cidadania)** includes a set of skills that must be provided by the citizenship education of Portuguese children and young people, such as those linked to sustainable development and environmental

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education. In addition, the Strategy states that each school must implement and coordinate an **Education Strategy for Citizenship at School** (EECE).

The **National Environmental Education Strategy 2020** (ENEA – Estratégia Nacional de Educação Ambiental 2020) currently encourages and finances educational actions aimed at schools, municipalities, public administration, and the corporate sector to serve the three central pillars of environmental policy: decarbonizing society, circularizing the economy and valuing the territory.

Relevant policies for the implementation of sustainability

Portugal has been implementing climate change policies that have successfully ensured compliance with the goals set out in various international commitments. The country was a pioneer at the European level in adopting a National Strategy for Adaptation to Climate Change (ENAAC) and innovated in the establishment of the Portuguese Carbon Fund (FPC) as a financial instrument of the State to act in the area of climate change[30].

It is also worth noting the relevant role played by local authorities in the implementation of the 2030 Agenda in their territories through a set of initiatives that, while respecting the autonomy of local authorities, contribute decisively, through proximity and concrete action, to the implementation at the national level. At the end of 2020, the number of municipalities covered by climate change adaptation plans or strategies corresponded to 88% of Portuguese municipalities[31].

Considering strategies for promoting green skills in national environmental and industrial policies, Portugal has developed roadmaps and action plans for a Circular Economy in line with the ambitions of the European Commission. The document **Leading the Transition: Action Plan for the Circular Economy in Portugal (PAEC)** establishes a commitment to the construction of environmental literacy and the education of citizens for environmentally conscious choices.

The **National Programme for Climate Change (PNAC 2020/2030)**, approved in 2015[32], established the vision and objectives of the first national climate policy until 2030. It identified policy options to address the need to promote an economy resilient to the effects of climate change. It identified the following goals: (i) to increase resilience and national adaptation capacities; (ii) to involve society in the challenges of climate change, increasing individual and collective action; and (iii) to ensure adequate governance conditions and climate integration. In addition, the Plan established guidelines for sectoral policies and advocated for dynamic planning.

The **National Adaptation to Climate Change Strategy (ENAAC 2020)** focused on improving articulation between domains (particularly those of a transversal nature), integration in sectoral policies, and adaptation measure implementation. **ENAAC 2020** proposes increasing awareness of climate change, promoting climate adaptation into various public policies and operationalization instruments, and emphasizing the implementation of adaptation measures.

[30] National report on the implementation of the 2030 Agenda for Sustainable Development, 2017.
[31] https://climate-adapt.eea.europa.eu/countries-regions/countries/portugal
[32] Approved by Council of Ministers Resolution No. 56/2015 on July 30.

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The document promotes, through working groups and thematic areas, the coherent vertical integration of the various scales required for climate adaptation, from international to local, and prioritizes its mainstreaming in different sectoral policies and adaptation measures, which are based on technical and scientific knowledge and acceptable practices that are being developed.

The **ENAAC 2020** resulted in the "Raising awareness and education on climate change, which was part of a project with 30 schools across the country, with the general objective of communicating, training and raising awareness among the school community on how to prevent the effects of climate change and implement adaptation measures, as well as the availability of the Climate Portal, which constitutes a platform for general access with functions for the dissemination of climate indicators for specific sectors in Portugal, in historical series and climate scenarios at the regional level."[33]

The **Action Plan for Climate Change Adaptation** (P-3AC)[34] focuses on implementing the adaptation measures. It aimed to achieve the second objective of ENAAC 2020 — the implementation of adaptation measures —essentially identifying physical interventions with a direct impact on the territory. To this end, it established the lines of action and priority adaptation measures, identifying the entities involved, monitoring indicators, and potential funding sources. **P-3AC** chooses eight direct intervention lines in the territory and infrastructures, supplemented by a series of transversal lines, to respond to Portugal's significant impacts and vulnerabilities. Without prejudice to the guidelines contained in the national strategy, the lines of action and measures to reduce vulnerabilities to climate change recorded in the Plan serve as the benchmark for national action on climate change adaptation and for the preparation of financing instruments to be developed under the Multiannual Financial Framework 2021-2027.

In 2021, the **National Energy and Climate Plan 2030 (PNEC 2030)** was approved[35]. **PNEC 2030** is the primary national energy and climate policy instrument for the coming decade. The Ministerial Commission for Climate Action is in charge of overseeing and monitoring the implementation of PNEC 2030 and achieving the established targets. The Plan establishes objectives of promoting new aspects of training specialized technicians for the energy efficiency and renewable energies sector and promoting training for technicians and specialists in the construction and NZEB (nearly zero-energy buildings) buildings area. It also intends to include and anticipate training and professional requalification to guarantee a fair transition and foster capacity building (education and training) in climate change mitigation.

Finally, the Portuguese long-term vision was established in the **Carbon Neutrality Roadmap 2050 (RNC2050)**, which served as the Portuguese Long-Term Strategy submitted to the European Commission and the United Nations Framework Convention on Climate Change (UNFCCC). The strategic vision of this document is based on eight premises, including contributing to national resilience and capacity to adapt to vulnerabilities and impacts of climate change.

[33] Action Program for Adaptation to Climate Change (P-3AC).
[34] Approved by Council of Ministers Resolution No. 130/2019 on August 2.
[35] Approved by Council of Ministers Resolution No. 53/2020, on July 10.

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The **National Youth Plan**[36] (2018-2021) established a commitment to invest in youth, focusing on inter-ministerial articulation with guardianships and programs that have an impact on the lives of young people, namely concerning education, employment and entrepreneurship, higher education, housing, birth rates, health, quality of life, sport, culture, the environment, agriculture, transport, the sustainability of social security, the fight against poverty, equality, inclusion and migration. In addition, one of the Plan's objectives was to promote youth volunteering practices within the scope of the preservation of nature, forests and respective ecosystems.

Case Study of Policy Level Measures Facilitating Delivery of Sustainability Skills in Portugal: The National Strategy for Environmental Education

Description of the case (what skills delivered and how)

National Environmental Education Strategy 2020[37] (ENEA 2020) foresees 16 measures framed by three strategic objectives: Environmental Education + Transversal, Environmental Education + Open and Environmental Education + Participated. These objectives serve three central pillars of environmental policy: decarbonizing society, making the economy circular and valuing the territory.

Who/how initiated? (drivers and enablers)

The ENEA 2020 is an initiative created by the Minister of Education and the Minister of the Environment. It resulted from a unique process of debate and public participation. The implementation of this Strategy favours a thematic and transversal work capable of guaranteeing the national and international commitments assumed by Portugal in the field of sustainability. Among these, the Paris Agreement and the United Nations' Sustainable Development Goals - Agenda 2020 stand out.

Within the scope of Public Participation, with the aim of promoting greater involvement of all interested public and providing clarifications regarding the process of drawing up the Strategy, several clarification sessions were held.

Strengths of the practice

The strategy involves different stakeholders such as Direct, indirect and autonomous administration, State and Local Business Sector, educational establishments, Universities and Polytechnic Institutes, Research Centers, Companies regardless of their legal form, Associations and Foundations, Environmental Non-Governmental Organizations and Similar and other organizations working in the issues of decarbonizing society, making the economy circular and enhancing the territory.

Thus, the actions provided for in ENEA 2020 contribute to active citizenship in the field of sustainable development and to the construction of a fair, inclusive and low-carbon society, rational and efficient in the use of its resources, which combines equity between generations, citizens' quality of life and economic development.

[36] Approved by Council of Ministers Resolution No. 114-A/2018, on September 4.
[37] https://enea.apambiente.pt

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Limitations of the practice

Financial support is provided by European funds through the Environmental Fund agency. The projects are submitted to public tenders in which some will be selected. This strategy may leave out organizations without the necessary resources to prepare the application or whose activities are not covered by the open competition notices.

Results achieved incl. assessment/evaluation

According to the Evaluation Report[38], until 2021, 10+3 notices had been published (3 already in 2021) focused on different themes, however always comprehensive and focused on the most pressing environmental issues. The themes were sufficiently assertive in the environmental issues defined internationally and that most concern society and current politics: from climate, air, noise to energy efficiency, spatial planning, sustainable mobility, dematerialization, collaborative economy and sustainable consumption, product design and efficient use of resources, land use planning, waste recovery, sea and coast, water and natural values.

The entities applying for the different notices of ENEA 2020 showed differentiated and representative profiles of society: NGOs, Companies, Central and Local Administration, Associations/Foundations, among others. It was thus possible to materialize different projects reflecting different perspectives.

Challenges and barriers faced

The continuity of the Strategy depends on European funds and their availability and calendarization. Political issues and public administration protocols and timing may affect the allocation of verbs.

Transferability and Scalability

The use of financing projects to allow the realization of environmental education activities can lead to the results obtained disappearing at the end of the project execution period. To ensure transferability and scalability, it is necessary for the agents involved to create communication and sharing strategies so that the results and good practices are appropriate. However, the high number of stakeholders involved in the Strategy and the variety of entities present may contribute to this dissemination.

Key takeaways

The National Strategy for Environmental Education places the problem of sustainability as a social problem that needs to be addressed collectively and considering local and specific contexts with partnerships and consortiums.

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https://apambiente.pt/sites/default/files/_SNIAMB_A_APA/Cidadania_ambiental/EducacaoAmbiental/ENEA/Relatorio_ENEA_2021.pdf

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Romania

Sustainability and green skills in relevant educational policies

The **National Education Law** (2021) has been amended to include environmental competencies among the key competencies. For example, art.4 stipulates "cultivating sensitivity to human issues, moral and civic values and respect for nature and environment..." In addition, art. 329 states, "the main aims of lifelong learning are the full development of the person and the sustainable development of society."

Romania has adopted the Education for Sustainable Development Strategy (UNECE, 2005). Furthermore, in 2015, Romania adopted the Agenda for Sustainable Development 2030, assuming the obligation to ensure that by 2030 "all students acquire the knowledge and skills needed to promote sustainable development, including, among other things, through education for sustainable development and sustainable lifestyles."

As essential decisions, it should be mentioned that in 2017 the Department for Sustainable Development was established at the level of the Government, under the direct subordination of the Prime Minister. It plays the role of implementation coordinator for the 17 sustainable development objectives (SDOs). The addressed key topics on sustainable development include, but are not limited to, poverty reduction, civic duty, peace, ethics, responsibility in the local and global context, democracy and governance, justice, security, human rights, health, gender equality, cultural diversity, development rural and urban areas, the economy, production and consumption patterns, civic responsibility, environmental protection, natural resource management and biodiversity and nature. In addition, Education for Sustainable Development is carried out formally and informally through the numerous partnerships that the Ministry of Education has with central and local public authorities, economic operators and NGOs. Regarding pre-university education, the themes of these partnerships are poverty reduction, civil rights and social responsibilities at the local/regional/global level, children's rights, equality and diversity, tolerance and respect, rural and urban development, and environmental protection, resource management natural.

The Ministry of Education supported training courses for pre-university teachers, addressing the following topics: environmental education, experiential learning, education for the sustainable development of society, environmental protection as part of the national curriculum, sustainable and innovative development, skills for sustainable development.

Universities have also started introducing elements of sustainable development and new disciplines in the compulsory or optional curriculum, depending on the study programs. For example, topics like climate change, managing social and economic change, environmental economics, public policy and environmental management, alternative energy, wastewater, pollution reduction, and green technologies are now part of over 240 undergraduate and master's degree programs.

Through education, Romania is committed to increasing the population's awareness of climate change and environmental issues. Therefore, it should be noted the interest for the education approaching the environment, climate and sustainability expressed by the current Government

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Program (GovProgr 2021): "facilitating environmental education to promote environmental protection and address climate change issues in and out of schools".

Romania has committed to developing a national strategy for **Climate Action Empowerment** (CAE) in the following years. This strategy includes integrating climate change in the school curriculum, implementing the six elements of CAE (education, training, awareness, public participation, access to information, international cooperation), and the support of all stakeholders in the implementation of climate actions.

Relevant policies for the implementation of sustainability

The most pertinent laws and strategic documents considering the policies and the legal framework for education for sustainability in Romania are

1. The **National Strategy on Climate Change and Economic Growth through Low Carbon** (NSCCEG, 2013) and its **Action Plan** (in the process of updating) (NPCC, 2013);
2. The **National Strategy for Sustainable Development of Romania 2030** (NSSDR, 2013);
3. The **National Energy and Climate Plan** (NECP, 2020).

In the **NSCCEG**, formal and continuous education and participation in climate actions are considered to have maximum importance for preventing, mitigating, and adapting to climate changes. The document highlights the need to introduce specific competencies in the formal education curricula, the training programmes, and the continuous education of the adults. Understanding phenomena, the complexity of the impacts and interconnections, and the capacity to plan and implement climate actions are priorities. The national and local authorities are in charge of introducing appropriate measures to stimulate the partnerships for climate actions involving different stakeholders.

On the other hand, awareness campaigns on the climate changes (*NSCCEG, Action 5, Develop and implement a campaign to raise awareness of all actors, especially of the general public*), together with the extensive promotion of climate actions, are considered valuable measures to stimulate suitable changes in attitudes and behaviours. A broad spectrum of stakeholders is involved in the awareness actions, focusing on the decentralisation of the responsibilities, from national agencies and ministers to the local administrations, local councils, local/regional environment agencies, NGOs, and economic units. The NSCCEG strongly recommends practical climate actions and significant participation in society.

The **Action Plan** includes a list of specific actions for implementing **NSCCEG**. Among them, the measures related to education for sustainability and climate changes are:

1. Development of the climate change curriculum for pre-university education;
2. Completing the university and post-university curriculum with topics/modules on climate change;
3. Development of lifelong learning programs on climate change

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4. Introduction of new occupations in the classification of occupations in Romania to cover sustainability and climate change specificities;

5. Supporting partnerships between universities and the public sector to facilitate the transition from education to employment through a system of internships in climate change or related fields (e.g., renewable energy, waste management, biofuel production);

6. Information and awareness campaigns for various target groups: farmers, entrepreneurs, teachers, pupils, and students, carried out by civil society organisations on the impact of climate change, reducing greenhouse gas emissions and adapting to climate change;

7. Media campaigns to inform the general public about the climate change;

8. Partnerships and working groups between public authorities and civil society organisations to raise awareness and inform citizens.

The **National Strategy for Sustainable Development of Romania 2030** defines measures to develop skills that help individuals reflect on their actions, considering their current and future social, cultural, economic and environmental impacts. This education has to become an integral part of lifelong learning. Two targets set for 2030 express the country's commitment to the development of sustainability competencies:

1. all students will acquire the knowledge and skills needed to promote sustainable development, sustainable lifestyles, human rights, gender equality, promoting a culture of peace and non-violence, appreciation of cultural diversity and contribution culture for sustainable development;

2. extending the role of education for sustainable development in university programmes and emphasising the role of interdisciplinary research in the development of a sustainable society.

In the **National Energy and Climate Plan**, the main measures are oriented to stimulate the decarbonisation of energy production. In addition, the steps devoted to research, development and innovation and the development of the educational resources for climate change prevention, mitigation, and adaptation are briefly mentioned.

Case Study of Policy Level Measures Facilitating Delivery of Sustainability Skills in Romania: Education on Climate Change and the Environment

In 2021, Romanian Presidential Administration launched the initiative "E**ducation on Climate Change and the Environment**" (ECCE, 2021). A Working Group (WG) was set up, bringing together representatives of the Presidential Administration, the Ministry of Education, the Ministry of Environment, Water and Forests, educational institutions, students, teachers, parents, and relevant NGOs. In January 2022, the report "**Education on Climate Change and the Environment in Sustainable Schools**" (WG Report, 2022), produced by the WG, was launched into public debate.

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The main objective of the ECCE is to improve the quality of climate change education and environmental education by developing a national climate education program.

The report includes a set of proposed actions such as

1. The introduction of the green week in the structure of the annual school year;
2. The updating of the Biology curricula to create the main competencies for the environment and climate change;
3. The introduction of optional courses for climate change and the environment;
4. The development of dedicated manuals in digital and print format;
5. The building of a dedicated web platform;
6. The development of training programmes for teachers and dedicated materials for students;
7. The development of user-friendly applications and experimental kits for students to assess the quality of the environment;
8. Promoting good practices and cooperation between educational communities.

The process is considered a good case example of increasing the delivery of sustainability skills by education in Romania. Furthermore, the initiative continues the proposed reform for the education entitled "Educated Romania", largely debated in the society from 2016 to 2020. The ECCE will deliver knowledge and skills with a clear orientation to action and changes based on three dimensions:

1. culture of complexity;
2. the capacity of action;
3. co-responsibility for the environment.

Since 2015, some new competencies have been introduced in the national curriculum concerning the environment (ISE,2015): the use of data about the environment; the capacity for environmental investigation; understanding of the relation health-environment; healthy lifestyle; and critical reflection on changes in human activity in relation with the environment.

In 2022, the educational objectives for the climate change and the environment consist of the development of competencies (knowledge, skills and attitudes) to enable individuals to contribute to

1. actions relevant to preventing climate change and mitigating its impacts;
2. actions to adapt to climate change and ensure resilience to climate change;
3. protecting, restoring and promoting the sustainable use of terrestrial ecosystems, running water, lakes, seas and marine resources and maintaining the biodiversity;

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4. ensuring sustainable consumption and production models (WG Report, 2022).

The process will be oriented to develop students' ability to:

1. understand and use basic notions about the environment (how the environment works and what they receive from the nature) and climate change (awareness of the sources of the problems; causes, effects and measures; how to approach the prevention and mitigation);

2. develop systemic thinking on a global scale and understand global climate change and the connections between different processes and areas such as green energy, exploitation of natural resources, pollution, the food industry, the extractive industry, the energy industry, social justice, food waste, and natural disasters;

3. investigate the environment and understand the relation environment-living factors;

4. making decisions, acting daily, reporting on the impact on the planet, adopting protective behaviour to the quality of the environment;

5. adapting to extreme weather events and responding to potential natural disasters;

6. understanding environmental legislation, the complexity of actors and roles in the environmental protection and how to initiate relevant personal actions;

7. participating in the future development of public policies on climate change and the environment and the development of adequate new technologies.

The knowledge, skills and behaviours detailed in the report are about climate change, terrestrial life, underwater life, responsible consumption and responsible production. The educational process will adopt action-oriented and participatory pedagogy (e.g., learning based on nature, project, locations or phenomena) and interdisciplinary and transdisciplinary perspectives in the classroom on the issue of global climate change and its local manifestations.

The report proposes a digital ecosystem for climate and environmental education, including integrated digital platforms and applications. A web platform dedicated to centralising and accessibility of key resources for students and teachers is suggested, also acting as support and stimulation for the student's participation in environmental protection and climate actions. Five distinct content areas are proposed:

1. environmental events or actions to be undertaken at the local or national level, where each school/teacher can enrol a group of students;

2. a digital library that centralises open educational resources: examples of lesson plans, exercises, presentations and activities (detailed by specific thematic areas), guides for teachers and students, questionnaires, checklists, links to documentaries with free access;

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3. funding sources for climate / environmental education/awareness activities, teacher training courses, increasing the sustainability of schools and reducing the carbon footprint;
4. partnership opportunities;
5. databases with recommended locations and actors available for different outdoor activities.

Greece

Sustainability and green skills in relevant educational policies

Environmental Education (EE) was introduced into the Greek educational system in 1987[39] as a pilot stage for secondary school students. Secondary and primary education were subject to EE legislation from 1990 to 1991. Environmental education is implemented in schools through educational projects supported by specialised officials (Environmental Education Officers). Science Education (SE) curricula also support EE at various age levels.

The Hellenic Ministry of Education has developed a new holistic plan for implementing ESD that is in line with UNESCO requirements and the Mediterranean Action Plan's priority axes[40].

A new legislative framework for education for sustainable development has been designed, integrating all related thematic areas (Environmental Education, Health Education, and Cultural Issues) into a common sustainable whole-school approach to provide an overall unified framework equally applied to all sectors of education, under which any specific activity can be carried out in a concerted manner.

Furthermore, in 2018, the Hellenic Ministry of Education established a new Directorate responsible for "Support of School Programs and Education for Sustainability," with the goal of better coordinating related activities at all levels and supporting the concept of ESD in Greece.

This was also the year of the establishment of the new law for "Centres for Education of Sustainability" as an evolution of the previously existing "Centres of Environmental Education," thus covering all aspects of sustainable development rather than just the environmental dimension. With this change, the previously separate and frequently overlapping strands of "Environmental Education, Health Education, and Cultural Issues Coordinators" and "Centres of Environmental Education" are now merged into a single agency, the new unified "Centres of Education for Sustainability" (CES). The CES must assist schools in developing and implementing strategic plans, providing teacher training, promoting collaboration with the local community, developing local, sustainable development initiatives, and promoting research and collaboration with universities and research centres. To expedite the process, new "Coordinators for Sustainability" have been appointed to support the work of CES.

[39] https://enec-cost.eu/country-report-greece/
[40] Implementation of the UNECE Strategy for Education for Sustainable Development (2017–2019).

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Over the last two decades, there has been a shift from Environmental Education to Education for Sustainable Development, with Environmental Education Centres in particular implementing Life-Long Learning Programmes (LLP) and Citizenship Education (CE).

Relevant policies for the implementation of sustainability

Greek authorities declare placing a high priority on achieving sustainable development and committing to implementing the 2030 Agenda for Sustainable Development and its 17 Sustainable Development Goals (SDGs), which provide an ambitious, visionary, and transformative framework for a new, equitable, and sustainable development path. The prolonged economic crisis placed education at the centre of priorities for Greece.

The **Greek National Growth Strategy**[41], adopted in May 2018 is consistent with the overall themes and provisions of the SDGs, including SDG 4 and, in particular, SDG 4.7 on Education for Sustainable Development (ESD), as well as other education-related SDGs, such as SDG 12.8.

Greece presented its first **Voluntary National Review** (VNR)[42] in July 2018 at the 2018 United Nations High-Level Political Forum on Sustainable Development (HLPF). This VNR report covers all 17 SDGs via eight National Priorities for adapting the SDGs to national needs and circumstances, as well as the aforementioned National Growth Strategy. Following the completion of the VNR comprehensive report, a process for developing a National Implementation Plan for the SDGs is underway. This National Implementation Plan is expected to be aligned with the provisions of the National Growth Strategy and aims to promote cross-sectoral approaches and actions in Greece, at all levels and in all forms, through collaboration between the Hellenic Ministry of Education, Research, and Religious Affairs and other sectorial line Ministries.

The UNESCO Global Action Plan on ESD (GAP) serves as the overall framework for ESD implementation in Greece, connecting policies and activities to the UNECE Strategy for ESD, as well as the Mediterranean Strategy for ESD and its endorsed Work Plan.

In this context, the Hellenic Ministry of Education promotes policies and measures at all educational levels for the integration of basic principles of sustainable development in accordance with the overall national education policy and is implementing concrete interventions at all educational levels, backed up by several laws and Ministerial Acts.

Case Study of Policy Level Measures Facilitating Delivery of Sustainability Skills in Greece: Education for Environmental Citizenship

Education for Environmental Citizenship focuses on and highlights relationships between society, economy, politics and governance mostly in environmental issues. Environmental Education (EE) was introduced into the Greek educational system in 1987 as a pilot programme in secondary schools in 20 prefectures. Secondary and primary education were subject to EE legislation from 1990 to 1991. Environmental education in schools is implemented through

[41] http://www.mindev.gov.gr/greece-a-growth-strategy-for-the-future/
[42] https://sustainabledevelopment.un.org/content/documents/19378Greece VNR Greece 2018 pdf FINAL 140618.pdf

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educational projects supported by specialised officials (Environmental Education Officers) in each Prefecture (Farangitakis & Sbarounis, 2019).

Science Education (SE) curricula also support EE at various age levels. Since 1993, the Ministry of Education has established Environmental Education Centres (EECs) throughout the country in collaboration with municipalities and the National Youth Institution (Farangitakis, 2010). EECs are made up of highly qualified teachers from primary and secondary schools. They offer educational programmes for primary and secondary schools about the local environment, teacher training seminars, regional, national, and international networks, and educational material production (Farangitakis & Sbarounis, 2019).

Education for Environmental Citizenship is a comprehensive approach encompassing all aspects of EE (social, economic, political, and governance). Furthermore, it prepares students to act as citizens rather than consumers. Education for Environmental Citizenship empowers people to take responsibility for and make decisions about their environment. It has environmental and social benefits, such as raising environmental awareness and taking responsible action to improve the environment and strengthen communities (Farangitakis & Sbarounis, 2019).

Spain

Sustainability and green skills in relevant educational policies

This section analyses the mentions of sustainability and green skills in Spanish educational legislation and policies. We focus on the two fundamental laws, such as the Spanish Educational Law regarding primary and high school and the University Education Law, as well as the guidelines elaborated by the Conference of Rectors of Spanish Universities.

The primary Spanish educational law for non-university education is **LOMLOE** (2020)[43]. It establishes in its preamble that

> "the educational system cannot be oblivious to the challenges posed by climate change on the planet, educational centres must become a place of custody and care of our environment. For this reason, they must promote a culture of environmental sustainability, social cooperation, developing sustainable lifestyle programs and promoting recycling and contact with green spaces".

Nine articles of the document have references to sustainability. Article 1 recognises "Education for the ecological transition with criteria of social justice as a contribution to environmental, social and economic sustainability" as one of its principles. Besides, article 2 establishes the objective of "the acquisition of values that promote respect for living beings and the rights of animals and the environment, particularly the value of forest spaces and sustainable development."

The subject of "Education in Civic and Ethical Values" is one of the areas of knowledge to be developed and taught, which includes, among other things, "education for sustainable development and world citizenship" (art. 18 and art. 25.7). This subject is part of primary

[43] Organic Law 3/2020, of December 29, which modifies Organic Law 2/2006, of May 3, on Education.

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education and compulsory high school (secondary education). However, the reference to sustainability seems very relative and scattered in this case. Besides this, "education for sustainability" is contemplated as a transversal competence introduced during the 4th year (art. 25.6) of high school.

Among the objectives of the Baccalaureate (non-compulsory high school) is the contribution to developing the students' capacities that allow them to "foster a responsible and committed attitude in the fight against climate change and defence of sustainable development" (article 33). Vocational Training also includes promoting "the commitment to sustainable development and the prevention of occupational and environmental risks" among its goals (art. 42).

It is worth noting that Article 110 on "Accessibility, sustainability and relations with the environment (of the Educational Centres)" establishes that

> "To promote a culture of environmental sustainability and social cooperation to protect our biodiversity, the Educational Administrations will favour, in coordination with surrounding institutions and organisations, the centres' sustainability, their relationship with the natural environment and their adaptation to the consequences of climate change. Likewise, it will guarantee safe school routes and promote sustainable displacement in the different territorial areas, as a source of experience and vital learning."

Finally, it should be noted that the sixth additional provision (Education for sustainable development and global citizenship) of this law addresses the fourth Sustainable Development Goal and the 2030 Agenda. The SDG determines education for sustainable development and global citizenship to be part of teacher training and regulation of access to the profession. Therefore, according to the above, by 2022, the knowledge, skills and attitudes related to education for sustainable development and global citizenship should be incorporated into the system of access to the teaching function. Likewise, in 2025 all teaching staff must have received qualifications in the goals established in the 2030 Agenda.

At the non-university educational level in Spain and the education law at the state level, some Autonomous Communities have drawn their regional education laws. To date, six (of the seventeen) of the Communities have published their educational legislation; in chronological order, they are **Andalusia**[44], **Cantabria**[45], **Catalonia**[46] , **Castilla-La Mancha**[47], **Extremadura**[48] and the **Canary Islands**[49]. Although there are references to sustainability within these laws, they are always framed by state law.

The primary law regulating university education in **LOU (2007)**[50]. In this document, only two articles appear related to sustainability. The first one is article 41, on "Promotion of research,

[44] Law 17/2007 of December 10.
[45] Law 6/2008 of December 26.
[46] Law 12/2009 of July 10.
[47] Law 7/2010 of July 20.
[48] Law 4/2011 of March 7.
[49] Law 6/2014 of July 25.
[50] Organic Law of Universities 6/2001; modified by the Organic Law of Universities 4/2007.

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scientific development and technological innovation in the University", that in section 1 establishes that

> "The University will develop quality research and effective management of the transfer of knowledge and technology, with the objectives of contributing to (...) a responsible, equitable and sustainable development (...)".

The other one is article 92, on "International cooperation and solidarity"; it establishes that

> "Universities (...) will promote activities and initiatives contributing to the promotion of the culture of peace, sustainable development and respect for the environment, as essential elements for solidary progress."

It is also worth mentioning the guidelines issued by the **Conference of Rectors of Spanish Universities (CRUE)** in the university sphere. This non-profit entity brings together 76 Spanish universities and acts as an interlocutor between the university sector and the government, playing a key role in all regulatory developments affecting higher education. In September 2002, the CRUE approved the creation of the "Working Group on Environmental Quality and Sustainable Development in Spanish Universities". Some guidelines for Curriculum Sustainability have emerged from the Working Group with recommendations to guarantee

A. A comprehensive review of the curriculum from the perspective of Sustainable Development ensuring the inclusion of basic cross-cutting content on sustainability in all degrees in order to acquire the necessary professional, academic and disciplinary skills; and

B. The inclusion of sustainability criteria in university quality evaluation systems.

In 2011, the **CRUE Sustainability Assessment Working Group** defined a series of indicators to assess the integration of environmental sustainability at the institutional level. A study was carried out to assess compliance in 31 participating universities (Geli et al., 2019). Since March 2019, the CRUE has had a Commission for the coordination of joint actions ensuring compliance with the SDGs and, in turn, promoting awareness of the environment by the university community.

Relevant policies for the implementation of sustainability

This section looks at how education is addressed in various policies and laws related to sustainability and environmental issues. In recent years, a set of legislation for this area was endorsed, including the **Action Plan for Environmental Education for Sustainability**, promulgated by the Ministry for Ecological Transition. In addition, the Spanish **Law 7/2021**, of May 20, on climate change and energy transition, a fundamental law for environmental regulation in Spain, as well as several important National Plans and Strategies, such as the **National Plan of Integrated Energy and Climate (PNIEC) 2021-2030**, the **Long-term Decarbonisation Strategy 2050**, or the **roadmaps for hydrogen and biogas** were also adopted.

The Spanish regulatory framework includes the **Action Plan for Environmental Education for Sustainability**[51] established for 2021-2025. In addition, there are annual publications that mark

[51] Government of Spain - Ministry for the Ecological Transition and the Demographic Challenge, 2021.

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the work program[52]. This relevant plan renews the guidelines and action plans established years ago in the **Spanish White Paper on Environmental Education[53]**. It considers that education and training are critical elements for our societies and economies to progress towards more sustainable development models.

The Action Plan establishes a consensual framework in which six operational axes and 61 key actions are to be developed by the General State Administration within five years from its approval and work guidelines and proposals for action for other sectors and agents involved.

The confluence of different factors has favoured the launch of a new process of strategic reflection, which culminated in the **Action Plan for Environmental Education for Sustainability (PAEAS)**. The Action Plan establishes a consensual framework in which six operational axes and 61 key actions are expected to be developed by the General State Administration within five years from its approval and work guidelines and proposals for action for other sectors and agents involved. The goal of PAEAS is to promote an adequate response to socio-environmental challenges in a coordinated and participatory manner and with institutional and social co-responsibility. It also complies with the commitment of the Government of Spain contained in the **Declaration on the Climate and Environmental Emergency in Spain** (Government of Spain, 2020).

The national regulatory framework considers that training and education programs are the key enablers for environmentally and socially sustainable energy production and consumption. In addition, training and education can also contribute to the rational use of natural resources, promoting the protection of biodiversity and ecosystems, the minimisation of waste, its reuse and recycling. Moreover, they can promote a diet that allows respecting the planet's ecological limits and promotes respect for the people who produce them (García-González et al., 2021).

Furthermore, the **work program for the year 2022[54]** addresses the tremendous pending challenges in Spain to mainstream sustainability in the curricular programs of regulated education. It collects the main proposals of the different groups that work on it in Spain and some of the existing experiences in Spain and other countries in which the educational community collaborates with municipalities and other institutions. These collaborations are fundamental for the implementation of sustainability politics. They can take the form of developing new educational materials that incorporate sustainability in a transversal way, initiatives that promote dialogue between students, teachers, parents and institutions to identify measures at the local level or projects that allow "greening" the educational centres themselves. These actions can significantly improve biodiversity, the use of clean energy, sustainable mobility or responsible consumption.

One of the most interesting goals of the action plan is to promote educational centres as organizations that reinforce educational interventions and disseminate good practices under education for sustainable development (ESD) and environmental education for sustainability (EAS) (Government of Spain - Ministry of education and vocational training, 2021).

[52] Government of Spain - Ministry for the Ecological Transition and the Demographic Challenge, 2022.
[53] Government of Spain - Ministry of the Environment, 1999.
[54] Government of Spain - Ministry for the Ecological Transition and the Demographic Challenge, 2022.

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The Spanish Law 7/2021, of May 20, on **climate change and energy transition**[55] aims to meet the Paris Agreement objectives by decarbonising the Spanish economy, promoting ways to adapt to the impact of climate change and implementing a sustainable development model that generates employment. Section VIII of the Law, titled "Education, Research and Innovation in the fight against climate change and the energy transition", addresses two essential issues for the involvement of Spanish society in responses to climate change and the promotion of the energy transition: education and training for sustainable development with particular emphasis on climate change; and research, development and innovation. Furthermore, article 35, on "Education and training against climate change", explains the philosophy regarding the educational actions to be carried out to fight climate change at all educational stages and in-job training.

Other sections of the documents announce the compromises the Government must reach to tackle climate change issues. Section 1 states that the Spanish educational system will promote the involvement of society, reinforcing knowledge about climate change and its implications, training for a low-carbon and resilient technical and professional activity and acquiring the necessary personal and social responsibility. Section 2 specifies that the Government will review the basic education curriculum to ensure these issues are part of the Educational System in a transversal way. Likewise, the Government will promote actions guaranteeing adequate teacher training. In addition, section 3 states that the Government will also review and update the National Catalogue of Professional Qualifications promoting job profiles related to environmental sustainability, climate change and energy transition.

In section 4, it is mentioned that the Government will promote an accreditation process of professional competences acquired through work experience and non-formal training, promoting education and training to advance in coping with climate change and energy transition. Finally, in section 5, the Government will use informal, formal and non-formal education to carry out awareness campaigns for citizens on the effects of climate change and the impact human activity has on them. Public Administrations will recognise and provide the necessary means and resources to carry out non-formal education activities that promote the involvement of especially vulnerable groups, childhood and youth, in the fight against climate change.

Besides the Climate Change and Energy Transition Law, an Agreement issued by the Council of Ministers on March 16, 2021, adopted the final version of the **2021-2030 National Integrated Energy and Climate Plan**[56] ("**PNIEC**" by its Spanish acronym), which aims to have 100% renewable electricity by 2050. The PNIEC 2021-2030 identifies objectives and adopts measures in the five dimensions of the Energy Union: decarbonisation, including renewable energies; energy efficiency; energy security; the internal energy market and research, innovation and competitiveness. By 2030, the PINIEC is trying to achieve the following objectives: 23% reduction in greenhouse gas (GHG) emissions compared to 1990; increase up to 42% of renewables on the final use of energy; improved energy efficiency by 39.5%; increase up to 74% of renewable energy in electricity generation. Regarding education, the only mention is the training of

[55] https://www.boe.es/boe/dias/2021/05/21/pdfs/BOE-A-2021-8447.pdf
[56] https://www.boe.es/boe/dias/2021/03/31/pdfs/BOE-A-2021-5106.pdf

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professionals in the renewable energy sector (measure 1.17) and the energy efficiency sector (measure 2.14), which focus on acquiring technical knowledge.

The **Long-term Decarbonisation Strategy 2050**[57] highlights the importance of education, professional training and continuous learning, dedicating section 7.5 to point 7 "cross-cutting factors in climate neutrality". One of the main conclusions of the study "Educational and training gaps in the renewable energy sector" published in 2018 is that the lack of qualified professionals could be a barrier to progress in developing renewable technologies in Spain. Therefore, the following actions are proposed to avoid a future shortage of qualified professionals:

- Adaptation of the training offers to fill these gaps and make it more flexible to adapt to the development pace of the renewable sectors.
- The integration of subjects related to climate neutrality and sustainable development in formal education at all levels, bearing in mind the complexity of this task and the need to maintain the effort in a sustained manner in the long term.
- Implementation of quality standards in training, in close cooperation with the industry in the short-term perspective.
- Both training media and educational materials must be adapted and improved by incorporating online training and digitisation.
- These training actions also cover professional training to identify new qualification needs, especially those related to climate neutrality, defining the new competence standards, which allow identifying the priority sectors that will be the country's economic engine. The National Catalogue of Professional Qualifications, the Catalogue of Vocational Training Degrees and Specialisation Courses, and the National Directory of Professional Certificates are currently being reviewed and updated.

The **Hydrogen roadmap: A bet for the renewable H2**[58] aims to identify the challenges and opportunities for fully developing renewable hydrogen in Spain. Educational concerns are only briefly mentioned in annexe 1 in two financing instruments for renewable hydrogen projects:

- Within the Clean Hydrogen Alliance, education is one of the three horizontal pillars.
- Likewise, in the European Fund for Strategic Investments, education is cited with research and innovation, renewable energy and energy efficiency.

Concerning the training of qualified professionals, the document refers to the need to adapt the profiles and technical inspections to deal with tasks related to hydrogen technologies. This will impact the training of firefighters, roadside assistants, and workshop technicians and demand the update of the guides and manuals regarding these tasks.

[57] https://ec.europa.eu/clima/sites/lts/lts_es_es.pdf
[58] https://energia.gob.es/es-es/Novedades/Documents/hoja_de_ruta_del_hidrogeno.pdf

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Finally, the **Biogas roadmap**[59] addresses the biogas sector, which is very underdeveloped in Spain, and emphasises the need for adequate training of technicians from local entities with competencies in the collection and treatment of waste. The goal is to optimise the resources of the entities and properly integrate all processes related to waste. For this, campaigns will be carried out to publicise the economic, social and environmental benefits of generating and consuming biogas, including training plans and social awareness activities. Furthermore, the study of biogas technologies will be included in the educational plans in the existing degrees related to the thematic.

Case Study of Policy Level Measures Facilitating Delivery of Sustainability Skills in Spain: Guiding documents for environmental education centres

Spain, like many other countries, has a significant number of EECs working to raise environmental awareness and encourage people to value their surroundings' natural and cultural heritage. These EECs are classified according to their origins, environment, funding sources, and level of development over time. Interpretation centres, nature centres, school farms, museums, and eco-museums are some examples of natural spaces with varying degrees of protection. One of their management tools is a guiding document, which is regarded as one of the three sustaining pillars of EECs by most Spanish authors: Facilities and resources (i), the guiding document (ii), and the pedagogical working team (iii).

It is widely accepted that any educational organisation must have explicit goals while also demonstrating its involvement and commitment to achieving them. These objectives, as well as the guidelines for action and reviews of the pedagogical task, are typically documented in what is known in Spain as the *Proyecto Educativo de Centro*, abbreviated PEC (a guiding document that literally translated into English would be an 'Educational Project for Educational Institutions,' as Centro in Spanish and in this context refers to an educational institution, e.g., a school).

A study by Medir et al. (2014) collected and analysed several of these PEC and concluded that they highlight areas for improvement and identify local problems and socially participatory approaches for their solution. Besides this, they promote consensus and clarification about the understanding of sustainability.

Organisational initiatives about Sustainability competences for Civil Society

Finland

The Society's Commitment to sustainable development is civil society's main governmental organisational initiative. In addition, many non-governmental organisations (NGOs) operate in sustainability themes and sustainable schools. All stakeholders (NGOs, some researchers, and some governmental administrative officers) working with sustainability and environmental education in Finland meet at Round Table regularly. The president of the round table is FEE

[59] https://energia.gob.es/es-es/Participacion/Paginas/DetalleParticipacionPublica.aspx?k=437

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Finland, part of the international Foundation for Environmental Education. The Round Table processes are joint initiatives for sustainability education and influence the preparation of policy documents in this field. One of these is described below in the Case Example Sustainable School Programme section.

NGOs also organise together the major outdoor learning and environmental education event, ULOS-UT-OUT[60] , coordinated by the Finnish Association of Nature and Environment Schools [61]. In the summer of 2021, there were eight co-organisers and over a hundred program producers from different organisations – both NGOs and governmental actors.

The Finnish Association of Nature and Environment Schools[62] is also the administrator of MAPPA. This portal includes environmental, sustainability and outdoor education materials, services, and a calendar for further training/happenings. Currently, there are already over 300 registered organisations or private actors. All the stakeholders in the sustainability education field, both NGOs and governmental actors, can register at the portal and upload and update their information and contents to MAPPA. The goal is that teachers and educators can find help for their teaching activities. MAPPA is funded by the Ministry of Education and Culture and the Ministry of the Environment.

Case Study: Sustainable School Program

Description of the case (what skills delivered and how)

For many decades, several non-governmental organizations involved in sustainability education have been worried that environmental/ sustainability education falls between the scope of responsibilities of the Ministry of Education and Culture and the Ministry of the Environment – neither of them taking responsibility for this issue. In the Round Table of Environmental Education, this topic was frequently discussed, and the idea of the Sustainable School Program[63] came up as a solution. The idea was to have some governmental bodies promote sustainability education with the help of NGOs. The idea of the Sustainable School Program is to collect all the relevant sustainability education information in one place and request resources for schools and other educational settings for sustainability issues – both education and practices. Over twenty different Finnish NGOs have signed this initiative.

Who/how initiated?

In 2019, a group of NGO representatives met with the ministers of education and environment to introduce the idea of the Sustainable School Program. The project was well accepted, and the Minister of Education asked NGOs to make a draft of what this program should include. As a result, the Round Table of Environment Education founded a working group for Sustainable School Program. In 2020-2021 the working group presented their ideas widely to the national education and environment administration and the Members of the Parliament.

[60] https://ulosutout.fi/en/home-en/
[61] https://www.luontokoulut.fi/?lang=en
[62] https://www.luontokoulut.fi/?lang=en
[63] https://www.luontokoulut.fi/kestavakoulu

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Strengths of the practice

NGOs have a wide range of professionals. Their cooperation brings Finnish sustainability competence together and makes it possible to develop ideas further. In Finland also, contacts and cooperation with governmental administration are possible.

Limitations of the practice

NGOs have limited resources.

Results achieved incl. assessment/evaluation

In 2021, the Ministry of Education and Culture ordered the Finnish National Agency for Education to organise a project to promote environmental sustainability education. NGOs have been invited to the coordination group. The Finnish National Agency for Education grants some resources for schools to develop sustainability in everyday school life. Government officers have said that this project and these resources are due to NGO initiatives for Sustainable School Programme.

Challenges and barriers faced

Resources for sustainability education are scarce. It is hard to make changes in the ongoing practices in administration, although there is political will for change. The Finnish National Agency for Education project is a fixed-term project rather than continuous practice. However, it may lead to long-term administrative practices further down the line.

Transferability and Scalability

Sustainable School Programme plans from NGOs can be developed further. MAPPA.fi is a "mini-sustainable-school-platform". The ideas from this programme are delivered to MAPPA on a small scale – but resources for educational organisations are needed for more extensive implementation.

Key takeaways

In sustainability education, cooperation between NGOs, researchers and administration is possible and fruitful. Moreover, civil society can initiate changes in national governmental policies.

Hungary

Following the international trends, Hungarian companies, banks, and organizations are also producing their Corporate Social Responsibility policies and projects and regard them as of high importance. These projects differ from providing financial support to a community for a specified purpose to voluntary activities e.g., painting the walls of a hospital. The areas under CSR scope go beyond environmental issues and target all various problems of the society: supporting children or families in need, assisting health care for those in need, providing funds for community places like a park in the neighbourhood, or supporting diversity through inclusion of people with challenges (e.g., physically or mentally disabled), to mention a few examples. The CSR activities are often tied to environmental or sustainability topics, and public CSR events frequently have an environmentally conscious or sustainability-related aspect. Sustainability competencies are nowadays an issue receiving support from private companies and institutions.

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The development of the NGO sector in Hungary can be dated back to the change of regime in Hungary, with the official legal creation of foundations and associations from the late 1980s onwards. Environmental protection has been one of the first and most prominent areas of the Hungarian non-profit sector from the very beginning. Among the organizations dealing with environmental protection, many community organizations focused on local issues.

Amongst them, there are several umbrella organizations, such as the National Society of Conservationists - Friends of the Earth Hungary[64] or Humus Association[65]. The Hungarian groups of large international environmental organizations, such as Greenpeace[66] and WWF[67] can also be found in the Hungarian NGO community; they play an important role on account of their knowledge, know-how, financial means and international background.

In the 1990's environmental educators, in some cases committed teachers, usually started with a group of children, and then broadened their activities and scope to include the whole school and the local community. These teachers have strengthened links with many environmental education and nature conservation NGOs to get professional support, find partners to work with and share their knowledge and experiences. Several NGOs support environmental educators and the established Eco-Schools' network with jointly produced or adapted methodological and other professional materials.

Besides the environmental education work of teachers, local NGOs have a key role in transferring sustainability competencies to the local community for those adults who are already out of the formal education system and could be reached through informal or non-formal education.

Case Study: EnergySaving Communities Programme / E.ON EnergyCommunities

Description of the case (what skills were delivered and how)

The E.ON EnergyCommunities programme[68] is focused on raising awareness of the responsibility of households in the context of the climate crisis and providing tools and advice for their actions. The participating communities can learn how to achieve significant energy savings in their homes without investment. The programme supports the development of small communities working together to save energy and money.

EnergyCommunities provides practical information and everyday tools for action against the climate crisis and also provides tips on sustainable eating, mobility, and free-time activities in creative ways (e.g., finding out a climate-friendly menu or holiday plan). It is an opportunity for beginners, advanced learners and people living in energy poverty to make a difference.

[64] https://mtvsz.hu/en/about-us
[65] https://humusz.hu
[66] https://www.greenpeace.org/hungary
[67] https://wwf.hu/en/kezdooldal
[68] http://www.energiakozossegek.hu/

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Who/how initiated? (drivers and enablers)

The Energy Communities programme was first implemented in 16 countries in 2011/12 and 2012/13 with EU support, and the GreenDependent Institute[69] was the only Hungarian partner at that time. After the first two rounds, the programme continued in Hungary, in partnership with E.ON, under the name E.ON EnergyCommunities, and keeps running continuously since then. The first two seasons were carried out with the financial support of the Intelligent Energy Europe Programme of the European Union. Following the end of its funding, the programme became financed by E.ON in Hungary, as one of the company's CSR activities, and is complemented by the resources GreenDependent (e.g. in providing gifts).

The programme involves "Energy Communities" of 5-10 households, each led by a volunteer climate coordinator. The coordinators are responsible for organizing and managing their communities. They are supported by GreenDependent experts with theoretical and practical training, professional materials, and ongoing contacts.

Strengths of the practice

For the Energy Communities programme to achieve its goals in Hungary, it was important to work with the teams to identify personal priorities, so the advice used was diverse and took full account of the individual situations and goals and opportunities of the families involved. The sense of community and competition between neighbourhoods that emerged during the collaborative process was an important factor in achieving lasting behaviour change. The success of the EnergyCommunities campaigns stemmed from a participatory and diverse approach to meeting the needs of households in Hungary. Promoting different pathways to a lower footprint lifestyle broadened the audience and facilitated engagement. The community also ensures mutual learning and facilitates change.

Limitations of the practice

One possible limitation of the programme can be the excessive accountability of citizens for environmental problems. If behaviour change is necessary, it is also important to identify life and consumption patterns that must be changed at a global and collective level. Some citizens may feel disconnected from the values of the project.

Results achieved incl. assessment/evaluation

In the 10 completed seasons of the programme, participants have always managed to save energy, even during the 2020 pandemic. The biggest saving achieved by a community was 55%, and the average saving is about 6-7%. As for the communities involved, more than 200 communities from all over the country have participated, reaching around 1070 households. In 8 years, GreenDependent has trained nearly 230 volunteer climate coordinators, who were the engine of the 5-10 household communities.

Challenges and barriers faced

Vadovics & Boza-Kiss (2013) have identified two major challenges faced by this type of initiative and how the programme has surpassed them. The first one relates to the focus on individual behaviour and individual households in behavioural change programs aimed at reducing energy

[69] http://www.intezet.greendependent.org

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consumption and the carbon intensity of our lifestyles. They fail to recognize the socially grounded nature of human behaviour and that energy consumption occurs in a multi-layered context. Groups can assist in removing barriers to sustainable energy use behaviour.

The second challenge relates to the motivations of the participants. Although savings are an important motivating factor for people to join behaviour change programmes, many of them mention other reasons as wanting to do something positive for the environment or their neighbourhood. Community events and developing a strong 'small footprint' group identity can also help incorporate these motivators into climate change and energy efficiency-related programmes.

Transferability and Scalability

The adoption of energy-efficient practices requires the active participation of end-users and citizens. Energy communities can make an enormous contribution in this regard. They can identify the citizens' motivations, engage them in these behaviours and increase their level of awareness of sustainability while giving them the bonus of money-saving.

The project has a strong potential for transferability and scalability since these needs and motivators are common in Europe and it works with a simple structure easy to implement.

Key takeaways

The programme can promote learning and awareness of sustainability and suggest individual and collective behaviours than contribute to the mitigation of climate changes. It consists of an only benefits program since, besides the main goal of saving energy, it also favours a sense of belonging and a sense of active participation in civic life.

Portugal

Portugal has low civil society participation in social movements (Franco, 2015). Besides this, it is among the countries in Europe that introduced CSR policies the latest (Castelo Branco & Delgado, 2016).

Until the mid-1980s, the Portuguese environmental movement had difficulty establishing itself in the national space, owing to a public opinion still preoccupied with other issues like consolidating democracy and combating poverty. The «Os Verdes» Ecologist Party, founded in 1982 as the Portuguese Ecologist Movement – «Os Verdes» Party, aims to raise the ecological awareness of Portuguese society (Franco, 2015).

When Portugal entered the then-European Economic Community (1986), there was a significant increase in associations and cooperatives. The new organizations covered various fields of intervention, such as environmental defence, consumer rights, women's rights, teaching and special education, elderly care, and drug addiction, alongside more traditional forms of organization, such as sports and recreational associations, voluntary firefighters' associations, and so on. In this context, Private Institutions of Social Solidarity (IPSS), formerly known as Assistance Institutions and mostly canon law associations, began to see significant quantitative growth. As a result, they now play a vital role in social action (Franco, 2015).

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Despite the disappearance of some structures established in the preceding decade, some Portuguese NGOs (Quercus, League for the Protection of Nature, Geota) were able to influence the national environmental agenda during the 1990s. According to the study by Franco (2015), this influence was due to the staff's level of training and preparation mainly recruited from the urban elite. In addition, good legal preparation of dossiers, a media dissemination network, and autonomy in the face of competing interests contributed to this evolution.

The Law 35/98 of 18 July introduced the non-governmental environmental organization (ONGA) concept in the legal system replacing the previous concept of association for the protection of the environment, responding to the evolution verified in international law and giving renewed effective action of associations in their communities.

Besides this, there are several non-governmental organizations dedicated to CSR. For example, the Rede Nacional de Responsabilidade Social (RSO PT) is a network of public institutions, corporations, higher education institutions, and non-governmental organizations whose primary goal is to promote social responsibility in Portuguese organizations. Another example is Grace - Grupo de Reflexo e Apoio à Cidadania Empresarial, founded in 2000 by a group of primarily multinational corporations as one of the first NGOs in Portugal to promote CSR (Castelo Branco & Delgado, 2016).

Currently, REDE RSO PT is a member of the Alliance for Sustainable Development Goals and aims to contribute to achieving the Sustainable Development Objectives and the National Action Plan for the Circular Economy. Its primary goal is to promote the various dimensions of Social Responsibility and contribute to implementing policies and practices sustained in the management of organizations, regardless of activity, size, or location.

Case Study: Share with Energy (EDP)

Description of the case (what skills were delivered and how)

The **Sharing with Energy programme**[70] encourages three days of exchange between schools in areas of the country where EDP operates energy production plants. Secondary school teachers and students (aged 15 to 19) are challenged to define and plan a series of activities that promote their region, its potential, spaces, and activities. With the assistance of EDP, the participating teams are responsible for all exchange planning, contacts and partnerships with local entities, budget management, and logistical issues.

This innovative program promotes the development of social and relational skills in young people in secondary and professional education, also fostering the feeling of belonging to the territory where exchanges take place.

Sharing with Energy is part of EDP's social responsibility strategy, promoting the involvement of the communities where the company develops its energy production activity.

The delivered skills are:

- developing entrepreneurship, active citizenship, and social responsibility skills in participants

[70] https://portugal.edp.com/pt-pt/partilha-com-energia

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- promoting the spirit of initiative and ability to execute in the youngest
- knowing the potential and existing resources in each of the territories covered by the program
- promoting a sense of identity, belonging and connection to the territory in young people from these regions

Who/how initiated? (drivers and enablers)

The programme was initiated by EDP, Portuguese electric utilities company, headquartered in Lisbon. It was founded in 1976 through the merger of 14 nationalised electricity companies.

Strengths of the practice

In the 2018/19 school year, schools close to the EDP Production Centres (CP) in Cávado-Lima, Douro, Tejo-Mondego, Lares, Ribatejo and Sines participate in the Sharing with Energy. This promotes the delivery of green skills outside the major urban centres.

Trough the challenges and adventure, students can discover more about their local territory, its characteristics and resources. At the same time, they will be in contact with colleagues from other regions who will also be participating in this initiative.

Share with energy is an educational program in the area of citizenship that promotes behaviours, attitudes and skills that will help students to understand better social interactions, opportunities and constraints of the environment.

Limitations of the practice

The programme is limited to areas where EDP Production Center exist.

Results achieved incl. assessment/evaluation

The programme as involved six production centres, 240 students, ten municipalities, 42 teachers, eleven schools, 20 teams, ten exchanges and four challenges. According to the last survey carried out, the young participants highlighted adaptability, planning, friendliness, team spirit and responsibility as the five valences that were most valued with this experience.

Challenges and barriers faced

The participation in the programme depends on schools, teachers and students' initiative. More traditional schools and internal problems may prevent students from applying for the programme.

Transferability and scalability

The programme offers a student guide describing all the steps necessary to create the experience. Although the activities are restricted to specific areas of the country, the concept can be adapted to other contexts and organizations. The programme adopts a holistic approach to competences of citizenship and several training areas will be impacted.

Key takeaways

The Share with Energy programme allows students to develop social and relational skills and create a sense of identity, reinforcing attitudes of active and solidary citizenship. Students state

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that they “discovered a lot” about their territories and even gained more “self-confidence” and “spirit of initiative”.

Romania

The **National Strategy for the Promotion of Social Responsibility** (CSR, 2011) was approved by the Romanian Government in 2011. The strategy aims to "increase awareness of the importance and benefits of applying social responsibility and increase the involvement of the public sector, companies, and civil society in applying social responsibility in Romania" (CSR, 2011). Three significant areas of intervention are identified:

1. The creation of a favourable framework for CSR development by the public authorities, both at the central and local level;
2. Promoting the application of social responsibility at the level of Romanian organisations;
3. The active involvement of the public sector in CSR initiatives.

CSR concept is gradually becoming more and more present in the Romanian market. In the beginning, the main driver was the multinational companies transferring their organisational culture to Romania. In the first stage, the concept spread as a "cool tendency" "and then an awareness of the actual needs. In an immature economy and young democracy, social responsibility was considered especially for its commercial values than the ethical ones. During the last decade, companies discovered the potential of CSR, especially in the construction of the public image and consolidation of the reputation as a premise of commercial success.

Nowadays, more and more companies are determined to build responsible businesses introducing a balance between economic and environmental factors in Romania. The developed solutions show the care for the staff, clients, collaborators, community, and environment. The CSR strategy has three main directions: Environment, Education and Social. Some strategies frequently used by companies are

1. the modernisation of the processes using new technologies;
2. energy efficiency actions;
3. reduction of the emissions and elimination/limitation of the use of environmentally hazardous materials and chemicals;
4. creating a proper work environment for the staff.

Companies are supporting actions aimed a sustainable development of the communities, such as promoting waste saving and recycling, participating in environmental protection programs, participating in partnerships with educational organisations offering the students annual internship sessions and chances of employment, supporting local initiatives, including the small infrastructure development, and support for cultural and sportive actions.

Other efforts are focused on social difficulties, such as combating poverty and the lack of workforce in some sectors. The National Strategy on Social Inclusion and Poverty Reduction

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(NSSIPR, 2015) was approved in 2015. Actual participation of the companies in different partnerships is expected to decrease the number of affected people. Poverty is also an obstacle to employment. In the context of a significant loss of active labour (Romania, last decade), due to the ageing of the population and migration, it is vital to mobilise human resources from vulnerable people groups. Another approach is needed to ensure access to opportunity, employment, social entrepreneurship, social services, health care and education for these families to become active contributors to society. Special attention is dedicated to the disadvantaged groups, including a particular focus on Roma communities (a different strategy for the inclusion of the Romanian citizens belonging to the Roma minority was approved in 2015 (SRoma, 2015)). Measures to eliminate poverty and social exclusion through targeted education, employment, healthcare and housing policies are included.

In Romania, Social Innovation is considered a key concept for the policies on economic development and social cohesion. The implementation may produce social changes with economic competitiveness, sustainability, and social solidarity benefits. Social entrepreneurship is intended to bring the business world closer to the people. There are many examples of social entrepreneurship in Romana; some of them may be found on SocialEntrep (2022). The actions and projects may be grouped into five categories (InnovSoc, 2022):

1. businesses reducing their impact on the environment;
2. businesses bringing social innovation (social enterprises, cooperatives);
3. businesses creating new job opportunities (development of a social business by socially disadvantaged people or by the development of new markets for sustainable products);
4. businesses financing innovation (crowdfunding platform);
5. businesses promoting collaborative consumption.

Case Study: The Embassy of Sustainability in Romania (ESR), an initiative of the Sustainable Romania Coalition Association (SRCA)

Description of the case (what skills were delivered and how)

Sustainable Romania Coalition Association (SRCA) mission is to promote an economic model based on partnerships to find solutions for social and environmental problems without sacrificing economic efficiency. The **Embassady of Sustainability in Romania** (ESR, 2022) activity started in 2018. It aimed to bring together the companies and NGOs to become a sustainability community and work together as sustainability ambassadors in Romania. The proclaimed values of ESR are responsibility, honesty and transparency, collaboration for the common interest, and leadership.

The actions of the Embassady envisage environmental protection, care for society, and corporate governance. The main focus is to build skills for sustainability actions for the managers of the companies based on online activities (webinars, workshops, debates). Each week is dedicated to a topic from the 17 Sustainable Development Goals sphere. The participants benefit from the presence of specialists in sustainability.

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Who/how initiated? (drivers and enablers)

The Embassy is a program of the Sustainable Romania Coalition Association, initiated by an idea of The CSR Agency team. The program is funded by the Founding Partners: Kaufland Romania, HeidelbergCement Romania, and Lidl Romania. In addition, the Dutch Embassy, the German Embassy and the Romanian Government through the Department for Sustainable Development subscribed to the initiative. From the media, the Europa FM (radio), Radio Romania Actualitati (radio), Forbes Romania (news agency) and The CSR Report (sustainable reporting magazine), and IAA (International Advertising Association) are also partners.

Strengths of the practice

The main strengths of this programme are the high level of representation, the ample access to media, the invitation of top sustainability experts, the promotion of good practices of large companies and relevant investors, the participation of business managers and decision-makers with significant influence in the economy and society, and a good knowledge transfer.

Limitations of the practice

Some limitations of this programme are the limited participation of the general public and the lack of public awareness of sustainability issues. Besides this, the initiative has trouble reaching small and medium companies since it does not address their needs and is seen as a selective club out of reach.

Results achieved incl. assessment/evaluation

The activities facilitated the knowledge transfer on sustainability between the members of the Sustainable Romania Coalition and participants from different organisations in the private, public and non-profit sectors. As a result, some approaches, methods and tools were implemented and improved in the current practice: (1) Sustainability Talks, (2) SustainAbility School, (3) Sustainability Toolkit, (4) Business for the Future, (5) Community Meetups.

The Sustainability Talks are monthly debate sessions (90 minutes), followed by questions and answers (30 minutes), on sustainability topics to debate the public policies and align them with the principles and objectives of sustainable development. The guests are high-level representatives of public institutions, businesses, academia and NGOs. Past editions include "Climate change: the impact and effects on the economy", "Do we compete or collaborate for sustainability?", "The air has no political colour", "Early education - timely investment or national emergency."

The SustainAbility School is an education and training program in sustainable management dedicated to all employees of organisations that collaborate at the Embassy of Sustainability in Romania. The main area is the transition to a sustainable business model, and the SustainAbility School helped the participants be prepared for such a change.

Sustainability Toolkit represents briefing, training & coaching sessions on general or specific sustainability topics dedicated to companies. Business for the Future brings together business managers, investors, policymakers, and representatives of society to discuss the industry's future from the perspective of sustainable issues. Eight editions were organised in the last two years. The fundamental questions of the debates are: are business leaders prepared for the

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changes? What is to do to have a healthy natural environment, clean air, and access to quality education?

Community Meetups consist of community meetings created around the initiative discussing the future actions, enlarging the participation by new partners, and exchanging experiences and ideas to build partnerships in the sustainability area.

Challenges and barriers faced

The main challenges the initiative is currently facing are the need to enlarge the participation of the general public and the transfer of the model of debate and knowledge to other groups/companies/ initiatives. Furthermore, in an immature economy and young democracy, social responsibility is mainly considered for its commercial value, the ethical ones having marginal values. Finally, the crisis (pandemic, energetic) highly influenced the efforts since companies are confronted with substantial pressures to maintain their economic performances.

Transferability and scalability

The approach is directly transferable to the large companies having good economic performances and interest in consolidating their social position; the scalability seems to be feasible in both directions (up and down) from the point of view of the used approach (the main issue consists of the availability of the resources).

Key takeaways

The knowledge transfer model is based on the interests of the participants to create a balance between economic and sustainability performances, the type of events developed and the pragmatic approach very well adapted to the business environment.

Greece

Several stakeholders and NGOs in Greece are acting in the promotion of sustainability and environmental education. For instance, The Museum of the Natural History of Lesvos[71] (management body of Lesvos Island UNESCO Global Geopark) offers educational programmes on topics such as “Climate change: The energetically efficient building of Natural History Museum of the Lesvos Petrified Forest”; The program provides knowledge, skills and values required for the management of energy issues.

The **Mediterranean Information Office for Environment, Culture and Sustainable Development** (MIO-ECSDE) participates in the European project “Shared Green Deal”[72] is to enable the substantial systemic change the European Green Deal requires through research implementation on societal practices and the behavioural change of individuals, communities, and private and public organisations. The project address behavioural change on the core elements of the European Green Deal cross cutting priorities such as civil society, democracy, gender, energy, environment, circular economy and innovation with an aim to share actions, understandings, evidence, insights, responsibilities and benefits across stakeholders, including

[71] https://www.lesvosmuseum.gr/en
[72] https://mio-ecsde.org/project/shared-green-deal/

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policymakers and civil society. Issues of inclusivity and diversity are at the heart of the project to particularly account for disadvantaged and vulnerable social groups.

The Hellenic Society for the Protection of Nature (HSPN) is the oldest national environmental NGO in Greece, operating continuously since 1951 throughout the country for the protection of nature. From its very inception it has been at the forefront of efforts to establish national parks, to protect habitats and threatened species of fauna and flora, and to modernise and implement environmental legislation. Today the HSPN is active in 4 main areas: Environmental Intervention; Conservation and Nature Protection; Environmental Education; Sustainable Management and Public Awareness Raising.

It provides Environmental awareness raising and education is absolutely necessary today to ensure the quality of our life and that of future generations. Each Programme is addressed to a specific group (according to their age, place of residence, and interests). All the various topics which may be targeted (such as energy, waste, water, agriculture, sustainable development, coasts, transport etc.) have their own intrinsic interest and value.

Currently it is the national operator for three International Programmes implemented by Foundation for Environmental Education (FEE):

1. Eco Schools
2. Young Reporters for the Environment
3. Learning About Forests

It also operates two national Programmes:

1. Nature Without Garbage
2. Green Corners of My Neighbourhood

Case Study: The Hellenic Society for the Protection of Nature (HSPN)

Description of the case (what skills delivered and how)

The HSPN[73] is active along five axes: i) environmental interventions, constantly trying to counter serious threats to the natural environment of Greece, and participating in important actions, resulting in formal complaints to the European Commission or legal action at the Greek Council of State; ii) nature conservation through a variety of national and cross-border projects; iii) general public awareness raising through a variety of informative activities; iv) environmental education, with five national and international programmes (Eco-Schools, Young Reporters for the Environment, Garbage-free Nature, Green Neighbourhoods, Learning about Forests), implemented in 1,600 schools country-wide, in cooperation with the Ministry of Education and the local municipalities; v) sustainable management in the tourism sector, as national operator of the international eco-labels “Blue Flag” for beaches and marinas and “Green Key” for tourism facilities.

[73] https://eepf.gr/en/

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The educational programmes include:

- Eco-Schools
- Young Reporters for the Environment
- Learning about Forests
- Nature without garbage
- Green Corners of my neighbourhood

Who/how initiated? (drivers and enablers)

The Hellenic Society for the Protection of Nature (HSPN) is the oldest environmental organisation in Greece, founded in 1951, and functions as a non-profit society.

Strengths of the practice

Each Programme is addressed to a specific group (according to their age, place of residence, and interests). All the various topics which may be targeted (such as energy, waste, water, agriculture, sustainable development, coasts, transport etc.) have their own intrinsic interest and value.

Limitations of the practice

The activities may be more appealing to people already interested in ecology and sustainability.

Results achieved incl. assessment/evaluation

Since 1995 the HSPN coordinates five Environmental Education Networks, approved by the Greek Ministry of Education. During the past years, more than 1,500 schools (at kindergarten, primary and secondary levels) have participated in these networks, with thousands of students and teachers taking part throughout the country. Active cooperation with the local communities is required in these programmes, and the students through their “hands-on” activities learn how to interact with and how to influence adults and officials of their communities. The HSPN produces the appropriate educational material for all its programmes, with the voluntary

assistance of experienced teachers specialised in Environmental Education and distributes this free of charge to all the participating schools. It also organizes training sessions for the teachers involved.

Challenges and barriers faced

The activities of the Society depend on the contribution of sponsors and funding.

Transferability and Scalability

The Society participates in the creation of Networks for Environmental Education, in which, with the help of modern communication tools like the Internet, the experiences of many people can easily be communicated.

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Key takeaways

The Helenic Society for the Protection of Nature has a long history of activities related nature and ecology aiming to raise the awareness for environmental problems. Today, these activities are in 5 main areas:

1. Environmental Interventions,

2. Nature Conservation,

3. Environmental Education,

4. Sustainable Management in the Tourism Sector,

5. Public Awareness Raising.

Spain

The level of sustainability competencies among the population in general or specific sectors has been analysed through the activities and principles of two types of entities that carry out educational and public awareness assessments: the Spanish network for sustainable development and the State Council for Corporate Social Responsibility.

The **Spanish Network for Sustainable Development (REDS)**[74] was born in 2015 as a chapter of the global SDSN network in Spain. Since then, it has established a benchmark multi-stakeholder network that brings together universities, public administrations, companies, and civil society to support the dissemination and implementation of the 2030 Agenda and the Sustainable Development Goals (SDG). The REDS promotes a culture of sustainability in all areas, focusing on the academic community to collect, generate, and use knowledge to connect it with other spheres. REDS tries to activate different stakeholders to integrate and implement the SDGs in their respective sectors through various initiatives and actions. These have four priority areas for Spain: energy, water, biodiversity and gender. REDS is part of the Permanent Committee of the Sustainable Development Council, a pivotal position in promoting the Sustainable Development Strategy at the national level.

The **Spanish Strategy for Corporate Social Responsibility has a State Council for Corporate Social Responsibility** (Consejo Estatal de Responsabilidad Social de las Empresas - CERSE), an advisory and consultative body with powers in public policies for promoting social responsibility among Spanish companies, currently attached to the Ministry of Employment and Social Economy. It was created to bring together representatives of the various groups linked to Corporate Social Responsibility and create a forum for debate between employers, trade unions, institutions in Corporate Social, and various Public Administrations. One of its objectives is the search for greater standardisation in the reports on social responsibility and sustainability that companies and organisations voluntarily publish.

[74] https://reds-sdsn.es/

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Sustainability is one of the principles of the Spanish Strategy for CSR. It is said that "CSR serves as a tool for building up organisations aware of their important role in achieving sustainable human, economic and environmental development for the societies to which they belong. Equitable, responsible evolution towards a more competitive economy may lead to sustainable development and social progress" (MEYSS 2015: 27). The objective is to extend CSR culture to society as a whole through actions such as promoting its principles and international recommendations and disseminating good practices in this field. It is assumed that CSR can be a driver of sustainability, equal opportunities and social cohesion.

Case Study 1: The Program for the Recovery and Educational Use of Abandoned Towns (PRUEPA)[75]

Description of the case (what skills delivered and how)

PRUEPA is an educational project complementary to classroom teaching promoted by the Ministry for Ecological Transition and Demographic Challenge, the Ministry of Transport, Mobility and Urban Agenda and the Ministry of Education and Vocational Training, with the collaboration of the Departments of Education of the Autonomous Communities of Castilla-La Mancha, Extremadura and Aragon. It seeks an approach to the rural life of young people who, for the most part, live in the urban world, offering them the possibility of understanding the need for a change in attitudes to ensure the future balance of man with his environment.

It contemplates work in different areas: environmental, health, animation and coexistence, cultural and physical recovery, with special emphasis on environmental education and recognition of the important role that the environment plays in people's lives and in the development of society, as well as the need to make decisions and act to prevent its deterioration.

It takes place in three abandoned towns: Umbralejo (Guadalajara) and Granadilla (Cáceres), which the Ministry for Ecological Transition has assigned within the framework of its powers in the Autonomous Organism for National Parks which is in charge of its management and conservation; and Búbal (Huesca) attached to the Government of Aragon.

Who/how initiated? (drivers and enablers)

The project began in 1984 through an agreement between the Ministry of Education and Science, the Ministry of Public Works and the Institute for the Conservation of Nature (ICONA), belonging to the Ministry of Agriculture, which was the one who then had the competences in environmental education, currently assumed partially by the Autonomous Organism for National Parks. The activity was aimed at secondary school, high school, professional training and university levels. The main idea was the participation of the students in the rehabilitation of abandoned towns and that they benefited at the same time from an educational training.

Strengths of the practice

1) Environmental coherence in the program and the available equipment that allow capturing agro-ecological management criteria and the management and protection of life. 2) Alternatives to the mass

[75] https://www.miteco.gob.es/es/ceneam/centro-de-documentacion-ceneam/fototeca/fototeca-ceneam.aspx
To see the photo library, please enter the name of the abandoned town (Umbralejo, Granadilla, or Bubal) in the box.

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production model are shown. 3) Group work favours learning and joint decision-making. 3) Generation of a feeling about the contribution to the improvement of an abandoned town in an altruistic way. 4) It allows the coexistence of students of different ages, different geographical origins and with different languages, promoting respect for the rural environment and other cultures. 5) It enables integration in the rural environment and reconnection with nature. PRUEPA has a team of educators with many years of experience in educational activities, group dynamics and practical activities (educational workshops), and with an exceptional natural environment in which it has been possible to combine education in sustainability and values with the preservation of nature and knowledge of rural culture.

The PRUEPA work teams are autonomous, preparing the programs themselves to develop in the three abandoned towns. The methodology, therefore, is bottom-up, providing great coherence to the skills to be developed in the program and allowing an evolution according to the change of times in non-formal education to favour a real change in support of sustainability in the daily lives of the participants.

Limitations of the practice

The abandoned towns program has presented an active coordination between all the agents involved in its development, throughout all these years of operation. The experience has been very positive in this sense, although it will always be possible to improve (monitoring the skills, knowledge and values learned between the teachers and the work teams of the three abandoned villages).

It would even be very convenient to facilitate a subsequent visit (years later) by the participants to share their experiences and see how it influenced them in their daily lives and what was the progress made in their sustainable practices and protection of nature and cultural heritage. However, the challenge of opening up assistance for the active participation of citizens in general and other social agents, in order to take advantage of existing resources, should be done under the name of another activity or program, as long as compatibility with the PRUEPA development.

Results achieved incl. assessment/evaluation

The program has a long history, having been in operation since 1984. The number of students who have participated in the program of the three abandoned towns is very extensive: 65,000 students in Granadilla (Cáceres province), 40,000 students in Umbralejo (Guadalajara) and 40,000 students in Bubal (Huesca) and 8,000 accompanying teachers in the three sites. The participation of educational centres in the program is done through the granting of scholarships from the Ministry of Education. The teachers prepare an educational project for their centre to be developed jointly with the planned activities in the abandoned towns programme. The objectives of the PRUEPA program focus on: fostering attitudes of respect and tolerance through participation in group activities; collaborate in the educational process of the students so that they appreciate the richness and variety of the natural, social and cultural heritage, respecting its plurality; deepen the knowledge of the human body in order to develop healthy lifestyle habits both individually and collectively; know the different possibilities of using free time.

The design and methodology of the PRUEPA programme is based on four large areas of activities: 1) Cultural recovery and maintenance of the towns, 2) Environmental education for sustainable development, 3) Health and 4) Animation and coexistence. For the development of these areas, there are workshops on environmental education (agroecology, climate change, nature knowledge…), animation, anthropology, carpentry, ceramics, corporal expression, health, recycling and transformations, etc. In addition, the towns generally have the following spaces: student and teacher houses, dining room and projection room, museums, mini-sports centre, library, open-air auditorium, greenhouse, etc.

Within the development framework of this Program, each participating centre has a period of time of between 7 and 10 hours per week to put into practice its participation project, which must also reflect

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the previous activities that the teaching staff has carried out with the group, as well as the possible activities that will be carried out after the stay in the town.

On the last day of the activity in the abandoned town, an evaluation of the activities is carried out with the participating students. At the internal level of the program, an annual evaluation of the functioning of the activities programmed by the PRUEPA project is carried out.

Challenges and barriers faced

Among the future challenges, it would be convenient to carry out a formal evaluation of the educational project of PRUEPA, not carried out globally until now. A greater dissemination of PRUEPA in scientific and social circles such as participation in congresses and conferences would also be necessary. Likewise, the spectrum of participants should be opened up, making room for families, town councils, local action groups through proposals for multifunctionality of uses and users. At the educational level, a curricular adaptation towards the contents of sustainability in relation to the SDG objectives it is considered essential, so this incorporation is currently being carried out. As well as taking into consideration the recently approved Action Plan for Environmental Education for Sustainability (PAEAS).

Among the barriers, the administrative ones are sometimes limiting: lack of budget to advance more in the sustainability of the towns, for example, to install solar panels to replace diesel generators in these abandoned towns. The follow-up of the work done in PRUEPA, once the students and teachers return to their school, should also be improved. It would be very convenient to be able to collect feedback from the participants in order to make the adequate improvements. Once they return to their classrooms, the lack of time prevents an adequate evaluation.

Transferability and Scalability

The approach is directly transferable at three levels: 1) Recovery of any physical location applicable to different environments, for example a schoolyard, an orchard in the urban environment, etc. 2) The project is also transferable to any educational program in any environmental education approach both in areas or urban areas. 3) It is transferable to any abandoned town that is the object of recovery in rural environments. Besides, it can be transferred to any educational stage and to society in general, adapting the educational content to the possible audience.

Key takeaways

The project has a cross-sectional character, working in groups on different aspects: cultural and architectural recovery, environmental education for sustainable development, health, coexistence, gender equality and education for peace. It allows a global learning, where the emotional aspects of creating links with the landscape, space, classmates and teachers make this a unique experience fondly remembered many years later.

Case Study 2: Zero Residue Recreation Program (Teachers for Future Spain)

Description of the case (what skills delivered and how)

The **Zero Residue Recreation Program (RRO)** is an educational program currently being developed in more than 1,000 educational centres throughout Spain. The RRO is included in the

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"28,000 for the Climate Program"[76] by Teachers for Future Spain (TFFS). TFFS is a teacher's non-profit organisation, working with educational centres to become the engine of change towards the sustainable society we need. More than 10,000 teachers and more than 2,000 educational centres are currently involved in their learning campaigns.

The program is devoted to reducing waste and food waste in student lunches and snacks. Fruit consumption, reusable containers and the composting of organic waste are highly encouraged. It is being developed in all school years with students of all ages and educational degrees. Many support materials have been created, available openly and free of charge on the Teachers for Future Spain website. The intended objective is the involvement of the entire educational community in reducing the centre's environmental footprint. As a complement, many posters and educational resources have been created.

Who/how initiated? (drivers and enablers)

The previous experience, which was the germ of the program, was developed in the 2018-2019 academic year within the "Cooltureco project", a blog where Miriam Leirós and other teachers shared their experiences prior to the creation of TFFS. It was carried out with sixth-grade students, reaching zero residues[77]. In 2019, the creation of TFFS was formalized, and more than 400 educational centres were added. Subsequently, despite the covid pandemic, the project has continued to grow to more than 1.000 centres today.

Strengths of the practice

The excellent practical results in improving educational centres' sustainability are undeniable. The school is the first and foremost socializing centre for boys and girls learning many habits and routines that will accompany them throughout their adolescent and adult lives. In addition, those habits and routines are better learned by being part of a group. Besides, those sustainable habits and routines that children learn are easily transferred to their homes, encouraging and involving parents, grandparents and other relatives to modify their behaviour by moving to a more sustainable way of life.

With the RRO program, the some of the 17 SDGs (Agenda 2030) are directly applied; such is the case of Goals 4, 12, 13 and also 11, 14 and 15:

> Objective 4. "Quality education."
>
> Target 4.7: "Ensure that all students acquire the knowledge and skills necessary to promote sustainable development, including education for sustainable development and sustainable lifestyles (…)
>
> Objective 12. "Responsible Production and Consumption."
>
> Target: 12.3. Halve food waste (…)
>
> Target: 12.5. Reduce the generation of waste through prevention, reduction (...)

[76] https://drive.google.com/file/d/1mg0Kb2IVjfe1e3V-OgWbosECt9vEvIpP/view

[77] http://cooltureco.blogspot.com/2019/06/residuo-cero-datos.html

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Target: 12.8. Ensure that information and knowledge relevant to sustainable development and lifestyles in harmony with nature are available.

Objective 13. "Climate Action"

Target 13.3: "Improve education, awareness, and human and institutional capacity regarding climate change mitigation (…)"

Considering where much single-use packaging ends up, we could also include 14 "Life Below Water" and 15 "Terrestrial Ecosystems" as well as the 11 "Sustainable cities and communities."

Limitations of the practice

The most significant difficulty is taking information about the program to schools. TFFS is a network of teachers expanding; however, it has limited communication capacity, which prevents it from moving forward as quickly as necessary, given the urgency of the climate change emergency.

Results achieved incl. assessment/evaluation

The great success of this campaign is visible thanks to a large number of participating centres in the campaign[78]. Many of them have already managed the program successfully to reach zero waste. The University of Salamanca (Area of Didactics of Mathematics and Experimental Sciences) is carrying out a detailed programme evaluation. An app was developed to measure the impact of the programme, both in primary and secondary schools, related to the following items: 1) Quantify (using an app) the reduction of plastics in lunches produced in the educative centres; 2) Collect information about the students' snacks to observe the progression of consumption habits and quantify the magnitude of the change.

Challenges and barriers faced

The great challenge is to reach 28.000 educational centres throughout Spain during the 2022-2023 academic years. Unfortunately, despite the excellent reception of the project, it has been challenging to expand the program due to the covid health crisis. The next challenge is to get public institutions to become actively involved in disseminating the programme among all the educational centres under their jurisdiction.

Transferability and Scalability

The approach is easily transferable to other entities such as 1) Universities and adult education centres, 2) Libraries and socio-cultural centres, 3) Student residences, and 4) Public institutions and companies. As for the scalability, rapid growth is expected once the health crisis is overcome, and educational centres return to normal functioning. Besides the objective mentioned above of reaching all educational centres in Spain in the 2022-2023 academic year, the programme aims to expand to other countries, and synergies are currently being created between teaching groups with similar characteristics.

78 https://www.google.com/maps/d/embed?mid=1jhSQ3kOhSKufMSibnW_PmwliFQbrGT7o&hl=es&ehbc=2E312F

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Key takeaways

The Spanish Ministry of Ecological Transition in the 2019/2020 academic year and the Spanish Ministry of Education and Vocational Training in the 2020/2021 academic year have recognized the work carried out by the centres within the RRO programme by awarding them a diploma. The simplicity of the approach and the low economic cost of its implementation makes it easily replicable. In addition, once the centres join the RRO program, the progression is swift and excellent results are achieved. These results in an optimistic perspective of the vast potential educational centres have to become "the key point" that transforms our society.

National Curricula Analysis

Finland

Curriculum analysis

In Finland, compulsory education reaches from the preschool (grade 0) and then from the 1st grade (usually seven years old) to 9th grade (usually 15 years old) in comprehensive school (called in Finland Basic school, which means primary education and lower secondary education). And, according to recent legislation, to upper secondary education in either general or vocational secondary education (usually -> 18 years old). All of these have national curriculum of their own. These curriculums are directives that guide the activities of every school in Finland.

If we search for the word sustainability in Finland's National Core Curriculum for Basic Education (2014), we will notice that it appears 50 times. In addition to that, Finnish curriculum contains many themes that are closely connected to sustainability.

We face a country whose curriculum reaches approximately 500 pages, many of them with concerns focused on education in terms of sustainability. In other words, not only does Finland have a considerable curriculum volume, which may indicate a high prescriptive character, but sustainability also seems to be a relevant topic for the country.

Thus, the structure of the Finnish National Core Curriculum for Basic Education includes multiple parts linked to sustainability, namely:

- Section "Underlying values of basic education" include a chapter "Necessity of a sustainable way of living",
- Section "Aiming for transversal competence" includes a chapter "Participation, involvement and building a sustainable future",
- Section "Principles that guide the development of the school culture" includes chapters "Participation and democratic action", "Equity and equality", and "Environmental responsibility and sustainable future orientation".

In addition, all transversal competence areas are linked to every object of instruction in the subject part of the curriculum. This way, sustainability is one of the key concepts, as more than 15% of the curriculum pages include the concept of sustainability. It also uses familiar

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nomenclatures to sustainability, namely, concepts of eco-social knowledge and ability, sustainable development, sustainable future, sustainable way of living, environment, environmental awareness, and relationship with nature."

Therefore, it is crucial to present and analyse some evidence expressed in Finland's National Core Curriculum for Basic Education related to Education for sustainability.

So, based on Finland's National Core Curriculum for Basic Education (2014), Environmental studies on grades 1-6 is an integrated subject which mainly comprises the fields of knowledge of biology, geography, physics, chemistry, and health education and includes the perspective of sustainable development (On grades 7-9 these subjects are studied separately and have their own lessons.) In this sense, the general objective that organizes learning in this matter is "to guide the pupils in knowing and understanding nature and the built environment, the related phenomena, themselves, and other people as well as the importance of health and well-being".

This way, essentially inspired by Finland's National Core Curriculum for Basic Education (2014), we created the following table that seeks to combine the broader learning objectives related to Education for sustainability for each field of knowledge mentioned.

Table 9. Education for Sustainability on Finland's National Core Curriculum for Basic Education (2014)

Subjects	Global Learning Goals
Biology	Understand the natural environment, humans, life as well as its development and its preconditions on Earth.
Geography	Explore the pupils' local environment and understand different areas of the globe, the phenomena that occur in them, and the lives of the people living in them.
Physics	Understand and explain the basic structures and phenomena of nature, also using information obtained through research conducted by the pupils
Chemistry	Observe different substances in the environment and examine, describe, and explain their properties, structures, and changes that take place in them.
Health Education	Understand factors in the environment and in human activities that support and protect health and to promote the development of competence that supports health, well-being, and safety.

Source: Finland's National Core Curriculum for Basic Education, 2014.

Finland's National Core Curriculum for Basic Education (2014) is also structured around 7 core transversal competences. Sustainability is a pillar of them, but it also has the right to reserve a specific competence guideline - the seventh.

Here are the 7 transversal competences we are talking about:

1. Thinking and learning to learn (TC1)
2. Cultural competence, interaction and self-expression (TC2)

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3. Taking care of oneself and managing daily life (TC3)
4. Multiliteracy (TC4)
5. ICT Competence (TC5)
6. Working life competence and entrepreneurship (TC6)
7. Participation, involvement and building a sustainable future (TC7)

Furthermore, we highlight some considerations prescribed in the mentioned document, in which we place particular relevance with regard to the matter of Education for Sustainability:

Necessity of a sustainable way of living
Humans are part of nature and completely dependent on the vitality of ecosystems. Understanding this plays a key role in growth as a human being. Basic education acknowledges the necessity of sustainable development and eco-social knowledge and ability, follows their principles and guides the pupils in adopting a sustainable way of living. Sustainable development and ways of living comprise an ecological and economic dimension as well as a social and cultural dimension. The leading idea of eco-social knowledge and ability is creating ways of living and a culture that foster the inviolability of human dignity and the diversity and ability for renewal of ecosystems while building a competence base for a circular economy underpinned by sustainable use of natural resources. Eco-social knowledge and ability means that the pupils understand the seriousness of climate change, in particular; and strive for sustainability.

Source: Finland's National Core Curriculum for Basic Education, 2014.

Participation, involvement and building a sustainable future
Participating in civic activity is a basic precondition for an effective democracy. Skills in participation and involvement as well as a responsible attitude towards the future may only be learned by practicing. The school environment offers a safe setting for this, while basic education also lays a foundation of competence for the pupils' growth into active citizens who use their democratic rights and freedoms responsibly. The mission of the school is to reinforce the participation of each pupil. Basic education creates the bases for the pupils' interest in the school community and society. The school respects their right to participate in decision-making as indicated by their age and level of development. The pupils take part in planning, implementing, assessing and evaluating their own learning, joint schoolwork and the learning environment. They gather knowledge and experiences of the systems and methods for participation and involvement in civic society and communal work outside the school. The pupils understand the significance of protecting the environment through their personal relationship with nature. They learn to assess the impacts of media and to exploit the potential it offers. By experience, the pupils learn about involvement, decision-making and responsibility. They also learn to understand the significance of rules, agreements and trust. Through participation both at school and outside it, the pupils learn to express their views constructively. They learn to work together and are offered opportunities to practice negotiation skills, arbitration and conflict resolution as well as critical examination of issues. The pupils are encouraged to consider proposals from the perspectives of equality of the different parties, fair treatment and a sustainable way of living. During their years in basic education, the pupils consider the links between the past, the present and the future and reflect on various alternative futures. They are guided to understand the significance of their choices, way of living and actions not only to themselves but also to their local environment, society and

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nature. The pupils develop capabilities for evaluating both their own and their communities' and society's operating methods and structures and for changing them so that they contribute to a sustainable future.

(Adapted from Finland's National Core Curriculum for Basic Education, 2014)

Environmental responsibility and sustainable future orientation
A learning community accounts for the necessity of a sustainable way of living in all of its activities. The school demonstrates its responsible attitude towards the environment by its everyday choices and activities. Material choices and operating methods that waste raw materials, energy and biodiversity are replaced by sustainable ones. The role that immaterial factors of a sustainable way of living plays in well-being is highlighted, and time is set aside and visibility is given for these factors in everyday school work. The pupils are involved in planning and implementing sustainable everyday life. A learning community inspires hope of a good future by laying a foundation for eco-social knowledge and ability. A realistic and practical attitude towards shaping the preconditions for a good future reinforces the pupils' growth into responsible community members, municipal residents and citizens. It encourages the pupils to encounter the world's diversity with an open mind and curiosity and to act for a more just and sustainable future.

Source: Finland's National Core Curriculum for Basic Education, 2014.

On the other hand, it also seems pertinent to us present to an example of the key content areas:

Biology	**Key content area: Towards a sustainable future (C6)**
7th-9th Grade	The contents include the preservation of biodiversity, climate change, sustainable use of natural resources, and changes in the surroundings. The pupils reflect on the ecological, social, economic, and ethical principles of using natural resources, as well as sustainable food production and animal welfare. The opportunities provided by bioeconomy and ecosystem services for a sustainable future are discussed. The pupils get acquainted with the goals, approaches, and accomplishments of nature conservation.

Source: Finland's National Core Curriculum for Basic Education, 2014.

This analysis would not be complete without considering concrete examples of learning objectives associated with sustainability in different subjects:

Objectives of instruction in ethics in grades 3–6 (pupils study either religion or ethics)	
Objective 4	Guide the pupil to take responsibility for himself or herself as well as for other people and the environment.
Objectives of instruction in visual arts in 3rd – 6th grades	

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Objective 11	Encourage the pupil to take cultural diversity and sustainable development into account when selecting contents and working practices for visual production.
Objectives of instruction in home economics in 7th – 9th grades	
Objective 13	Guide the pupil to adopt a sustainable way of living by paying attention to environmentally conscious and cost-conscious daily-life choices.

Source Finland's National Core Curriculum for Basic Education, 2014.

Finally, it is imperative to cumulatively emphasize that every objective has a final assessment criterion for good knowledge and skills at the conclusion of the syllabus.

This way, is time to illustrate an example from geography subject:

Objective of instruction	**Assessment targets in the subject**	**Knowledge and skills for the 8th grade: good knowledge and skills**
(O12) - Support the pupil in becoming an active citizen who acts responsibly and is committed to a sustainable way of living.	Promoting sustainable development.	The pupil is able to explain how to act responsibly in and outside of school. The pupil is able to take a position on questions of sustainable development and to provide examples of how to act in line with a sustainable way of living.

Source: Finland's National Core Curriculum for Basic Education, 2014.

By way of final considerations, we can see that Finland's National Core Curriculum for Basic Education is truly broad and comprehensive, with Education for Sustainability appearing quite prominent. In Finland, teachers have considerable autonomy, and implementation of curriculum depends on a teacher. The statements in the syllabus of subjects are concentrated on social sustainability, and ecological viewpoints outside STEM subjects are in many cases weak (although, according to general part of the curriculum, every subject has the responsibility to enhance also ecological sustainability from their own point of view). In any case, we are facing a country that seems to bet heavily on Education and Education for sustainability.

Case Study: Multidisciplinary learning modules in the curriculum

Description of the case (what skills were delivered)

The curriculum includes a chapter "Integrative instruction and multidisciplinary learning modules". It means that phenomena or themes of the natural world are examined as wholes in each subject, especially in multidisciplinary studies.

The description of this chapter is as follows:

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"4.4 Integrative instruction and multidisciplinary learning modules

Integrative instruction is a vital part of a school culture that supports comprehensive basic education. The purpose of integrative instruction is to enable the pupils to see the relationships and interdependencies between the phenomena to be studied. It helps the pupils link knowledge of and skills in various fields and, in interaction with others, structure them as meaningful entities. Examination of wholes and exploratory work periods that link different fields of knowledge guide the pupils to apply their knowledge and produce experiences of participation in the communal building of knowledge. This allows the pupils to perceive the significance of topics they learn at school for their own lives, community, society, and humankind. In the learning process, pupils are supported to expand and structure their worldview.

A precondition for integrative instruction is a pedagogical approach to both the content of instruction and working methods where phenomena or themes of the real world are examined as wholes in each subject and, especially, in multidisciplinary studies. The manner and duration of integrative instruction may vary depending on the pupils' needs and the objectives of the instruction.

For example, integrative instruction may take place by:

- parallel study, that is studying a single theme in two or more subjects simultaneously
- sequencing, that is organising topics related to the same theme into a sequence
- functional activities, including theme days, events, campaigns, study visits and school camps
- longer multidisciplinary learning modules, which are planned and implemented in cooperation between several subjects and which may contain some of the aforementioned integrative instruction techniques
- selecting content from different subjects and shaping it into integrated modules;
- holistic, integrated instruction where all instruction is provided in an integrated form similarly to pre-primary education.

In order to safeguard every pupil's possibility of examining wholes and engaging in exploratory work that is of interest to the pupils, the education provider shall ensure that the pupils' studies include at least one multidisciplinary learning module every school year. The objectives, contents and implementation methods of multidisciplinary learning modules are decided in the local curriculum and specified in the school's annual plans. The duration of the modules must be long enough to give the pupils time to focus on the contents of the module and to work in a goal-oriented and versatile manner over longer term. The local curriculum and annual plan may also contain other forms of integrative instruction.

Multidisciplinary learning modules promote the achievement of the goals set for basic education and, in particular, the development of transversal competences. The topics of the modules are

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planned locally to reflect the principles of school culture described in section 4.2. [in the curriculum document].

Local resources and opportunities are exploited in the planning and implementation of the multidisciplinary learning modules. The modules offer excellent opportunities for cooperation between the school and the society around it. The local and topical nature of the contents to be covered and their societal significance improve the motivation of teachers and pupils alike. It is vital that the pupils take part in the planning of the modules. The purpose of the learning modules is to approach functionally issues that are part of the pupils' world of experience and that expand it with the aim of

- strengthening the pupils' participation and offering opportunities for involvement in the planning of the objectives, contents and working methods of the studies;
- bringing up issues that the pupils find meaningful and creating opportunities for discussing and working on them;
- providing additional opportunities for studying in different groups and with pupils of various ages and for working with several different adults;
- offering opportunities for combining what the pupil has learnt outside the school with school work;
- giving space for intellectual curiosity, experiences and creativity and challenging the pupils to engage in many types of interaction and language use situations;
- reinforcing the application of knowledge and skills in practice and practising agency that is consistent with a sustainable way of living;
- inspiring the pupils to act in a manner that contributes to the community and the society.

To plan and implement multidisciplinary learning modules, cooperation is required between subjects that represent different approaches, and the school's other activities need to be exploited. All subjects are in turn involved in implementing the learning modules as required by the current topic. Themes that are in keeping with the principles of the school culture, interesting to the pupils, and suitable for cooperation between subjects and teachers are sought to be used as contents of the learning modules. The approaches, concepts and methods typical of each subject are used to study these modules.

The pupils are given feedback on their work during learning modules, and the competence demonstrated by the pupil is taken into account when composing a verbal assessment or giving a grade for the subject."

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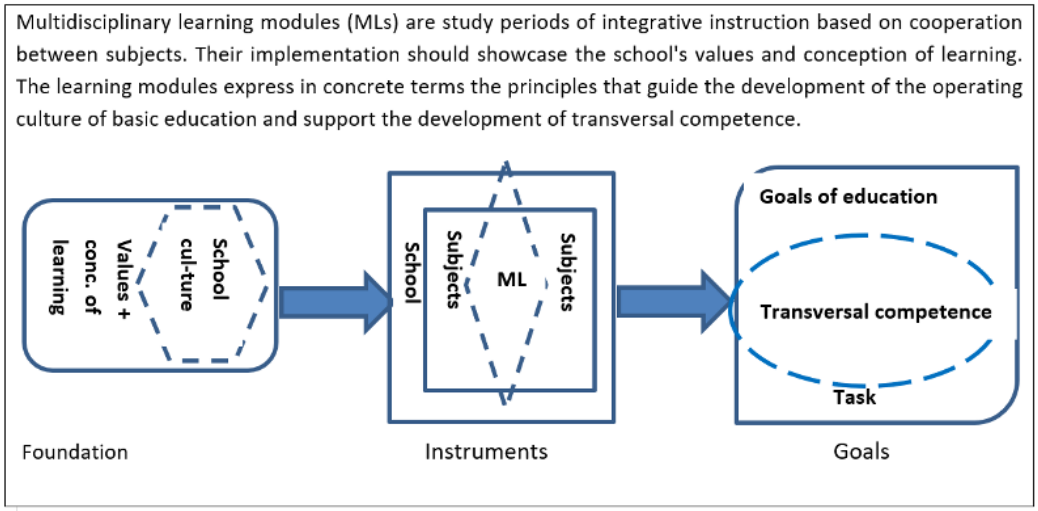

Who/how initiated (drivers and enablers)

The effort to develop teaching in a multidisciplinary and integrative direction has been a fundamental goal in Finnish schools for decades. In this curriculum, multidisciplinary work has been set obligatory: every school must have at least one multidisciplinary module every year for every student.

Strengths of the practice

Schools can autonomously define the themes for their multidisciplinary learning modules. Sustainability is a typical example of a multidisciplinary and complex set of phenomena, so it is a very appropriate theme for a multidisciplinary learning module.

Limitations of the practice

Many teachers are unfamiliar with and might not have the necessary competencies for multidisciplinary and participatory teaching. Moreover, cooperative planning lessons with other teachers take much time, which the Finnish salary system of teachers does not compensate for.

Results achieved inc. their assessment/evaluation, if available

The Finnish Education Evaluation Centre[79] conducted a survey in 2017 about multidisciplinary learning modules. About 80 % of schools, which answered the survey (n = 410), evaluated that multidisciplinary learning modules have significantly increased cooperation between teachers. Also, multidisciplinary learning modules created strengthened the school culture of the community, made different working methods possible and engaged students in a new way. However, 15 % of schools take the skills learnt during multidisciplinary learning modules into account only a little or not at all when assessing the pupils' competencies. Despite that, 44 % of schools estimate that multidisciplinary learning modules have added understanding of the subject matter.

[79] www.karvi.fi

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The Finnish Education Evaluation Centre concluded, in their assessment report[80], that the importance and objectives of transversal competence and multidisciplinary learning modules must be clarified in pre-primary education units and schools. The authors of the report concluded that:

> **"The importance and objectives of transversal competence and multidisciplinary learning modules must be clarified in pre-primary education units and schools.**
>
> The development and implementation of transversal competence and multidisciplinary learning modules has started well in pre-primary education units and schools. However, the shared understanding of their objectives and importance varies. Transversal competence is an objective that should be taken into consideration in all their activities by pre-primary education units and schools. This can be promoted by recurrent shared discussions about its importance. If planned and implemented in cooperation, multidisciplinary learning modules increase participation and develop a communal operating culture. According to the national core curriculum for pre-primary education, pre-primary education as a whole should integratively consist of multidisciplinary learning modules. According to the evaluation results, this aim has not been fully realised as yet. Both pre-primary education units and schools should therefore pay attention to the implementation of the objectives of multidisciplinary learning modules".

Challenges and barriers faced

Traditionally in Finland, teachers are used to working autonomously and might prefer doing so. Sometimes schools plan these modules so that one subject is the "core" subject of the module and others are just colouring the theme; the objectives of every subject are not brought to the module. For example, if the theme is The Finnish Forest, it could include plenty of objectives for environmental studies. However, when visual arts do exercises for the module, for example, making paintings in the forest – and forget the true objectives of visual art in the curriculum. In these cases, subject teachers could see these multidisciplinary modules as something extra that is not part of the real learning. Besides, it might be challenging for teachers to strengthen the pupils' participation and offer opportunities for involvement in planning the objectives, contents and working methods of the studies, and simultaneously mentor and ensure high-quality learning processes.

Transferability and Scalability

Some people believe that all the teaching should be multidisciplinary because the world is not divided into fragments. Some schools have adapted transdisciplinary education as their primary way of educating. For sustainability, it is essential to recognise how everything is connected. Systems thinking is essential to understand complex sustainability problems and their evolution to make the activities more sustainable.

[80] "Perspectives from curriculum work – Evaluation of the implementation of the national core curricula for pre-primary and basic education", 2014. https://karvi.fi/publication/nakymia-ops-matkan-varrelta-esi-ja-perusopetuksen-opetussuunnitelmien-perusteiden-2014-toimeenpanon-arviointi/

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Key takeaways

Teachers need training for multidisciplinary teaching. Given that the lack of time for cooperation, planning and teaching is a perceived problem in schools, it is justified to design especially 7th-9th grade school timetables to provide better opportunities for teacher collaboration.

Hungary

There are no references to "green" competencies in the set of documents underpinning Hungary's obligatory education curriculum. Besides this, environmental issues are part of a topic dedicated solely to their study but there is little time given to it.

The concern with education for sustainability takes two different forms in the curricular grade. The first, limited to the first years of schooling, allocate a reduced number of hours to promoting favourable attitudes toward sustainability as part of the student's ethical training. This is complemented in the third and fourth grades by the subject of environmental education, a precursor to scientific areas aimed at raising awareness and changing individual and family behaviour.

The second form, which begins in the fifth grade and lasts through upper secondary education, focuses on sustainability education through STEM skills. In the social sciences, the topic of sustainability education and its environmental dimension is less evident. Authors like Reti et al. (2014) consider that the science curriculum is incapable of demonstrating the social causes of the crisis or preparing students to solve environmental problems. Furthermore, the history of education for sustainable development in Hungary is strongly interconnected with that of civil movements which would predict a strong emphasis on the promotion of social skills and student autonomy, the authors state, instead of a technicist approach.

Curriculum analysis

In Hungary, schooling comprises primary and lower secondary education and upper secondary. Schooling is mandatory between the ages of three and 16 and 10 years plus three years of kindergarten education is compulsory.

The Hungarian National Core Curriculum[81] (NCC) underwent significant changes in 2020[82]. The spirit of the new legislation is to present a flexible framework for the education and training of students through a content guideline for the preparation of a local curriculum in schools. This leaves ample space for pedagogical independence for schools and teachers to prepare the annual curriculum for their subjects and groups of students, in line with the other documents such as the Textbooks and the Basic Lessons by Study Area.

At the core of the NCC 2020 are seven general competencies, based on the key competencies recommended by the European Union, as follows:

1. Learning competencies

[81] https://www.petroczigabor.hu/cikkek/igazgato_kollegaknak/modositott_nat_bevezetese.html
[82] Decree No. 5/2020 published in the 17th issue of the Hungarian Gazette. (I.31.)

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2. Communication competencies (mother tongue and foreign language)
3. Digital competencies
4. Mathematical and thinking competencies
5. Personal and social relationship competencies
6. Competences of creativity, creative creation, self-expression and cultural awareness
7. Employee, innovation and entrepreneurial competencies

These competencies are common to learning areas as there are no separate subject frameworks for 8th-grade grammar schools.

Green skills in the national curriculum

Although the main competencies do not include sustainability-related competencies and green skills, in the new NCC[83], from primary education, the framework curriculum of some lessons includes these topics. This type of skill is extensible and transversal to the different levels of schooling in Hungary, obviously varying in the specificity and difficulty involved.

Primary and lower secondary education

During the first years of schooling, called primary and lower secondary education, corresponding to grades 1 to 8 (ISCED 1-2), students gradually receive some awareness-raising content for environmental issues that can generate an attitude of respect for nature and a certain receptivity to sustainability issues developed later. Thus, in the first six years of schooling, the **Ethics** subject includes three 12-hour units on "preserving the order of nature for sustainability" with the following expected learning outcomes:

- [The student] takes care of pets or animals and plants in the environment with responsibility;
- learn about some endangered species, the reasons for their endangerment and why it is necessary to protect wildlife;
- provides an example in its consumption patterns of elements that can be used to take environmental considerations into account.
- recognizes the need to protect wildlife; can collect information about all this in both physical and digital environments;
- sets an example in its consumption habits of elements that can be used to take environmental considerations into account and also draws the attention of its peers to these.
- forms his responsibility for the natural and material environment

[83] https://www.oktatas.hu/kozneveles/kerettantervek/2020_nat

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- recognizes the everyday need for ecological, economic balance.

The theme of sustainability becomes explicit in the curriculum framework for the 3rd-4rd grades with the subject of **Environmental Education**. This is the introductory subject of the study field of **Natural Science** and **Geography**. The main goal of the subject is to enable children to get to know their narrower and wider environment, as well as their bodies, to understand the changes, and to see the basic causal relationships, based on the age characteristics, cognitive development and curiosity of the children.

For example, one of the themes of the **Environmental Education** lessons is "The communities of life in the environment where we live", while another topic is "Energy" and the topic of "Term of sustainability and its biological contexts" is covered in **Biology** classes. There are also lessons in high schools that include these topics. For example, **Biology** lessons include the topics of "Man and biosphere – sustainability", while science lessons include the "Human activity shaping the environment", "Raw materials, energy sources", "Changing climate", "Biodiversity", and so on.

In the 3rd and 4th grades, the expected duration of the activities of the **Environmental Education** unit is 68 hours. The processing of this topic is based on the development of skills and the relevant learning outcomes from this unit are:

- [The learner] has a sense of responsibility for its narrower and wider environment;
- illustrates the impact of human activity on the natural environment;
- recognizes which substances can pollute our environment in our daily lives, which habits lead to damage to our environment;
- learns habits and behaviours aimed at preventing damage (e.g. waste minimization, saving material, reusing, prioritizing public transport, walking or cycling, saving energy).

The suggested activities essentially provide practical and active guidance to the student in his/her learning process, involving methods of observation, description, comparison, grouping, measurement and experimentation to apply learning to everyday life.

Natural Sciences (5rd-6rd), **Biology** (7rd-8rd), **Physics** (7rd-8rd), **Geography** (7rd-8rd), Chemistry (7rd-8rd) and **Citizenship** (8rd) are the following subjects in the Hungarian school curriculum that, by their nature, have the potential to explore sustainability content and issues. In fact, in the 6th grade, the curriculum proposal for **Science** includes the following learning outcomes:

- [The learner] groups energy sources according to different aspects;
- provides examples for comparing renewable and non-renewable energy sources;
- recognizes the impact of energy production on natural and artificial environments.

Regarding the discipline of the **Natural Sciences**, it acts as a link between lower secondary environmental knowledge and science subjects (Biology, Physics, Geography, Chemistry) taught in a disciplinary framework from 7th grade onwards. There is a concern to study real problems and actively involve the learner in discussions about the subject of nature and the environment. Sustainability is not a central element in the discipline, but there are 3 topics in the table of

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contents referring to natural-environmental problems, which correspond to 30 of the 136 hours planned for the course, which may indicate educational concerns regarding sustainability.

On the other hand, in **Biology** (7rd-8rd) the object of study is the flora and fauna, the human body and the environmental processes. In this discipline, it is expected that sustainability will play a considerable role, namely by including in the table of contents the topics "The concept of sustainability, its biological contexts - The life of our planet; The concept of sustainability, its biological contexts - Protection of natural assets; The concept of sustainability, biological contexts - The relationship between the living world and man, sustainability", making a total of 28h of the 102 hours foreseen for the discipline dedicated exclusively to the phenomenon of sustainability.

In the subject of **Physics** (7th-8th), consideration of environmental and sustainability issues is again present, since the table of contents covers topics such as "Water, air and solid substances in the home and the environment" and "Global problems in our environment", making up a total of 20h of the 102 hours planned for the discipline focusing on the phenomenon of sustainability. The textbook for **Physics** (7th grade) includes a thematic unit on "Environmental impacts of energy consumption" that covers the subjects of energy security and energy saving.

In turn, **Geography** (7rd-8rd) is dedicated to the study of the phenomena and processes of the natural and socio-economic environment, so considerations of environmental issues can be anticipated. However, the table of contents is against the odds, as there is no concrete approach to environmental education in it.

Regarding the discipline of **Chemistry** (7rd-8rd), there is no objective approach to sustainability issues in the table of contents, although there may be potential for exploring environmental issues at the level of chemistry in the topic "Chemistry in nature", corresponding to at 15 of the 102 hours scheduled for the course. The textbook for **Chemistry** for the 8th-grade delivers planning of each unit including the main subject, the learning outcomes and suggested activities. Unit IX, "Chemistry and environmental protection", covers the following subjects:

- Air pollution and its consequences
- Water pollution
- The waste
- Energy sources in the service of humanity

For these themes, the following learning outcomes are expected:

- [The learner] understands the development and impact of global climate change, acid rain, ozone depletion and smog on humanity;
- Identifies and provides examples of the most common sources of air, water and soil pollution in its environment;
- Describes the composition of household waste, and the possibilities of its use and reduction, in the framework of a presentation or project work, with special regard to hazardous waste.

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Finally, the subject of **Citizenship** (8th) covers some topics related to sustainability competencies. However, it can be seen in the table of contents that sustainability issues are addressed but limited to the topic "Basics of consumer protection", corresponding to 3h of the 34 hours foreseen for the discipline. In this topic, 15 subtopics are included, and the most important one concerning sustainability seems to be the subtopic entitled "The relationship between conscious consumer behaviour and sustainability and environmental protection".

Upper secondary education

Moving on to upper secondary education (grades 9th to 12th; ISCED 3) the subjects that again seem to have the potential to explore environmental content and issues are **Biology**, **Physics** and **Chemistry**.

Thus, **Biology**, in the 9th and 10th grades, makes a total of 170 recommended hours, among which 46 hours are dedicated to the topic "Biosphere balance, sustainability" - a relevant number that makes us think that environmental issues are carefully considered in the curricular plan. In fact, in the 10th grade, the textbook for the subject of **Biology** includes units on environmental and nature protection, and air and soil pollution. These themes cover the following learning outcomes:

- [The learner] recognizes the factors endangering natural habitats, explains its position on the need for habitat protection and the possibilities of its individual and social implementation;
- in cooperation with others, plans and carries out an ad hoc or long-term examination of the environmental condition of his / her place of residence evaluates the obtained results;
- knows the sources of air, water and soil pollution, types and examples of pollutants, and analyses their impact on living communities based on specific cases.

In turn, **Physics**, in the 9th and 10th, also makes up a total of 170 recommended hours. The topics that seem to converge with the theme of sustainability are the following: "Consequences of heating and cooling"; "Water and air in our environment"; "Electricity in our environment"; "Preserving the integrity of our environment", which is equivalent to a total of 48 hours. However, only the topic "Preserving the integrity of our environment" (10th grade) offers guarantees that sustainability is a central component of the study - corresponding to 12 hours and covering the themes of ozone shield and the greenhouse effect, and renewable and non-renewable energies.

As for **Chemistry**, the 9th and 10th grades make up a total of 102 recommended hours, of which 6 hours correspond to educational concerns related to the environment and sustainability, namely associated with the topic "Environmental chemistry and environmental protection". The **Chemistry** textbook for these grades includes a theme concerning "New Challenges" for which the following learning outcomes are expected:

- [The learner] illustrates the most pressing global problems facing humanity (global climate change, ozone depletion, depletion of drinking water supplies, depletion of energy resources) and their chemical implications;

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- is aware of the greatest challenges facing humanity, especially their chemical aspects (energy sources, pollution, sustainability, production of new materials);
- illustrates the chemical consequences of anthropogenic activities through examples
- understands the importance of protecting our environment for the survival of human civilization;
- knows the basic rules of the use of plant protection products in everyday life, interprets the description of plant protection products, instructions for use, gives examples of plant protection products from the past and present (burgundy juice, modern pesticides);
- knows the chemical composition, production and use of the most important (N-, P-, K-containing) fertilizers.

In the 9th grade, the curriculum of **Geography** deals with the connections and interactions of the natural and social environment. Its unit VII is about "Local problems, global challenges" and covers the issues of sustainability, ecological footprint, and environmental disasters. The competencies of this unit related to green skills are the following:

- Development of comprehension, communication and digital competence in the analysis and oral evaluation of traditional and online source texts related to the development of global problems (causes, consequences, mitigation strategies);
- Improving contextual thinking based on the explanation and understanding of the development of local, regional and global natural, socio-economic and environmental hazards of geographical origin;
- Development of environmentally conscious and sustainable behaviour based on the systematization of the environmentally damaging effects on the geospheres and the presentation of the interactions of the processes;
- Analysis of sources dealing with global climate change, formulation of an argument-based opinion on the topic;
- Explaining the causes of climate change and its local, regional and global consequences.
- Developing system thinking, individual and community responsibility, environmentally conscious and sustainable behaviour, and responsible decision-making thorough knowledge of the global and local causes, consequences, mitigation and application strategies of climate change.
- Presentation of the consequences of climate change in Hungary, formulation of mitigation and adaptation strategies.
- Presentation of environmental hazards related to watercourses (inland water, flood), interpretation of the quantitative and qualitative protection of water resources.

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In the 10th grade, the subject of **Sustainability** focuses on sustainability itself including learning how to use resources consciously, sparingly and responsibly, with a view to learners' ability to innovate. This curricular domain aims to form skills, knowledge and attitudes presented in **Table 10**.

Table 10. Skills, Knowledge and Attitudes in Sustainability planning (10th grade)

SKILLS	KNOWLEDGE	ATTITUDE
The student discovers the connection between his / her own consumption and lifestyle habits and natural and environmental problems. It recognizes and can give examples of what can be changed.	*Concepts*: sustainable development and sustainability; ecosystem services.	Is committed to moving toward sustainable development and preserving environmental values.
Creates a simple resource plan. His plan is realistic, in line with its own priorities, the time required for its activities and the sustainable use of available resources.	*Concepts*: vision; aspects of time management (complexity of tasks, priority, measurement). *Processes*: how to plan for the future.	Is committed to building just, peaceful, cooperative communities and societies. Takes responsibility for his own activities and the protection of the natural environment, and for cooperating with his social environment.
Designs and implements a work program based on specified criteria for sustainability. He analyses, evaluates and presents the results of his work.	*Concepts*: work program and project; differences in needs and demands. *Processes*: work program planning steps.	
By analysing a specific problem, he recognizes the interdependencies between the natural and built environment, the behaviour of the individual and the socio-economic space around him. Analyses and gives opinions and suggests decisions that help sustainability based on aspects.	*Knowledge*: recognizing the characteristics of systems, elements and the relationships between them. *Processes*: a way to analyse dependencies.	

The topic "Meaning and goals of sustainable development" (2h) covers the following learning outcomes:

- [The learner] can interpret the services of an ecosystem;

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- is able to consider environmental or social, economic decisions and their consequences through examples;
- is able to discover the systematic connections between the way of life, one's own life and one's environment.

As for the topic "Consumption, fashion, recreation" (6h), the following learning outcomes are predicted:

- [The learner] is able to identify waste-reducing behaviours;
- is familiar with labels for responsibly produced products and examines their contents;
- understands the waste burden and global social and environmental dangers of rapidly changing fashion, especially clothing and digital devices;
- is familiar with the characteristics of the waste generated by the production and depreciation of digital assets;
- can list responsibly produced products.

The topic "Room, building, settlement" (6h) covers the following learning outcomes:

- [The learner] knows the main features of a sustainable building: energy consumption, materials used, traditional and natural building materials, and thermal insulation alternatives.
- knows natural examples of sustainable architectural solutions (e.g. ventilation system of termite castles for thermal control, thermal insulation of bird nests);
- knows the process, advantages and disadvantages of urbanization, individual and community examples of exploiting the advantages, overcoming the disadvantages;
- is able to differentiate and define the concepts of energy saving and energy efficiency;
- is able to design a community space (e.g. community park, house, schoolyard, study trail) with peers, taking into account sustainability considerations, preferably based on examples from nature;
- knows the environmental NGOs in and around the settlement.

Finally, the topic "Leisure, transport, transportation" (5h) covers the following learning outcomes:

- [The learner] is aware that the environmental load and energy requirements of different vehicles differ;
- is able to compare cycling, walking or public transport/car;
- is aware of other pollutants emitted into the air in addition to CO_2

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- knows how to calculate food kilometres;
- is aware of the additional effects that the transport of food from abroad can have (eg the introduction of invasive plant and animal species, the emergence of hitherto unknown micro-organisms);
- is aware of the environmental impact of road transport and the potential for reducing traffic;
- is familiar with the relationship between the world's population, economic development, consumption and environmental pressures and their interactions.

In the 11h and 12h grades, the subject of sustainability aims at promoting the skills and behaviours identified in **Table 11**.

Table 11. Skills and Behaviour for Sustainability (11-12th grades)

SKILLS	BEHAVIOUR
• Change of view • Fact and data management: collection, grouping, ranking, comparison • Data analysis: distinguishing between data and variables that are relevant and irrelevant to the operation of the selected system for problem-solving; examination of the relationship and correlations of data and variables • Attention, observation • Logical abilities: comparison (identification-distinction), analysis, synthesis, generalization, inference - inference, abstraction, concretization, rulemaking • Innovative creativity • Operational skills related to problem management: problem recognition, analysis, formulation of possible solutions, planning, decision making (justification), implementation, evaluation, correction • Operational skills related to planning: goal setting, route finding, choosing between roads (decision), determining the way forward, planning and scheduling the content of activities • Implementation of the plan: progress according to the plans, modification of the plan if necessary	• Self-examination and the need for self-improvement; • Willingness to change lifestyle • Helpfulness, compassion for the needy and supportive behaviour • Initiative; • Commitment to sustainability • Open-minded, forward-thinking thinking; • Accepting that the world must be seen in a system, in its context

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SKILLS	BEHAVIOUR
• Holistic thinking in the system • Distinguishing the difference between facts and personal opinion • Conclusion based on data and criteria provided with justification • Inductive and deductive approach according to a given problem • Formulation of scientific proposals • Cooperation • Conflict of dialogue, statements, arguments and counter-arguments • Ability to ask questions, inquire, find out, raise problems • Time management	

The theme “Relationships between economic development and sustainability” (12h), covers the following expected learning outcomes:

- [The learner] is aware of the territorial aspects of pollution, particularly in vulnerable areas;
- recognizes the links and contradictions between changes in the state of the environment and economic development and development;
- is familiar with the characteristics, advantages and limitations of linear and circular farming;
- presents the characteristics of the 21st-century energy economy, the aspects that promote and limit the sustainability of the use of energy resources;
- Recognizes the socio-economic context and environmental impacts of the use of natural resources, in particular, energy sources;
- understands the strengthening of the role of human and social resources in today's socio-economic development;
- is able to identify some socio-economic aspects and contradictions in the validation of environmental aspects.

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Finally, the topic "Working together for a sustainable future" (10h) covers the following learning outcomes:

- [The student] knows some of the most important environmental and sustainability directives and objectives formulated at the domestic and international levels;
- understands the importance of bringing together different professions and different types of organizations in the preservation of natural and socio-cultural values;
- knows the domestic and international, state, interstate and social environmental organizations and initiatives, is aware of their activities;
- interprets the potential of community service in terms of sustainability.

Besides the framework of competencies from the NCC and the contents and planning from the textbooks and lesson plans, students in Hungary also have the opportunity to acquire and develop sustainability-related and green skills through other initiatives, and programmes; the most relevant are:

- The Green Kindergarten Program and Network;
- The National Eco-School Program and Network;
- The Forestry Kindergarten and Forestry Schools programs
- School gardens
- Thematic weeks in schools

Case Study: "Sustainability Thematic Week"

Description of the case (what skills were delivered)

The Sustainability Thematic Week[84] is a project of sustainability education developed in Hungary with the main goal of involving children and teachers in sustainability and environmental awareness. The programme was inaugurated in 2016 and has had annual editions since then.

The project is inspired by a sustainability pedagogy oriented towards personal transformation, through the development of creative capacity, problem-solving and awareness at an ethical and responsible level, aiming to prepare for decision-making and collective actions that benefit the environment.

These themes can be delivered in schools through training packages that include lesson outlines, sample projects, digital applications, online lessons, competitions, applications, and activities related to each priority topic developed for three age groups (lower grade, upper grade, high school). Teachers also have access to a series of teacher training event lectures and webinars.

[84] https://kormany.hu/emberi-eroforrasok-miniszteriuma
https://www.fenntarthatosagi.temahet.hu/ismerteto
https://kekbolygoalapitvany.hu/oktatas/

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Teachers are encouraged to develop their projects, and schools are also invited to collaborate with organizations and participate in national environmental actions and competitions (Varga et al., 2021).

The highlights of the Thematic Week project for the 2022 school year refer to water, health and responsible consumption and include the following programmes and competitions:

- Most active School Award
- Students and teachers on sustainability – research programme
- Take it! - Volunteer for clean Hungary
- Think again – creative application
- Planting and School Garden Programme
- Story Water Drop Tender
- Green-Wood Spoon Reciping Tender
- Young Innovators (international)

Who/how initiated (drivers and enablers)

This programme was launched and coordinated by the Ministry of Human Resources but implemented and supported by independent organizations. In addition to many other partners and some sponsors, the Kék Bolygo Alapítvány (Blue Planet Foundation) is one of the most decisive contributions to the project; the PontVelem Nonprofit Kft organizes the initiative, and the Hungarian Jane Goodall Institute contributes with activities and expertise.

Results achieved inc. their assessment/evaluation, if available

To provide scientific evidence on the effects of the Thematic Week and database insights for the development of its programs, the organizer of the Thematic Week launched a research program in collaboration with four Hungarian universities: Eötvös Loránd University, University of Nyregyháza, Széchenyi István University, and John von Neumann University – with the professional support of the Hungarian National Committee for UNESCO (Varga et al., 2021).

Given the recent launch of the programme, there is little information available regarding its assessment and the impact generated. A study conducted by Varga et al. (2029) concluded that Thematic Week could have a positive effect on students' environmental awareness. Students who participated in Thematic Week reported more own and planned local environmental activities, as well as a higher level of agreement with general environmental behaviour items.

According to the data collected in this research, the number of schools participating in the Sustainability Week is increasing; in 2020, almost half of the schools in Hungary, 1804, schools joined the program. In the same year, the programme was officially renamed Carpathian Basin Sustainability Thematic Week and was opened to schools outside Hungary. In the first year of

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the internationalization of the programme 121 Hungarian speaking schools from the neighbouring countries joined the activities of the Thematic Week.

Strengths of the practice

The use of game dynamics and the philosophy of gamification in learning, that is, mobilizing mechanisms and elements that are characteristic of games to pedagogical activities, simultaneously contribute to the involvement and active learning of the children who benefit from participating in the project. In addition, the systematic recurrence of group work is also conducive to the development of significant learning, as a result of the cooperative values impregnated in this type of work.

The activities fundamentally refer to a practical dimension, or a close articulation between theory and practice, but with the practical component particularly privileged, centralizing the process, so the application of learning is often concomitant with its process (with the very learning development). This type of approach tends to benefit the learner as it brings the potential to prolong the knowledge, attitudes and skills learned over time, resulting in solid and sustained learning.

As such, children are encouraged to behave and get involved, within the scope of the type of activities presented, actively and dynamically, providing the development of meaningful and impactful learning. Promoting children's direct contact with the environment is also a particularly favourable factor in raising their awareness and responsibility concerning the observed reality. There is nothing better than getting to know a phenomenon than actually going to meet it, immersing yourself in its reality.

Finally, the access to teachers' training, lessons plans and other educational resources can have a motivational effect on teachers and help to include these themes in their practice even after the end of the Thematic Week.

Limitations of the practice

If the use of fun elements like games and competition can be seen as a strong element of the programme, it can also demand some caution about its effects. Sustainability and environmental issues are of urgent concern and need to be contextualized in what has led us here. This demands critical thinking and other high-end skills that games alone may not provide. Thus, it is also important that the teacher dedicates, part of the class time, to equating simple theoretical questions that sometimes the fieldwork may not be able to fully explore, which, for example, the collective reading of texts from a short dimension may be useful and relevant.

The short duration of the initiative can on one hand facilitate joining the program but, on the other, have little impact on school practices, teachers' methodologies and students' behaviours and attitudes.

Challenges and barriers faced

Some of the barriers identified in an evaluation study of the Thematic Week programme are pitfalls well known in the literature like adolescent attitude dip, less attention to the sustainability issues of older students and the higher environmental awareness of girls (Varga et al., 2020).

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Transferability and Scalability

The centralization of the programme in a website enables an easy transferability and scalability of the educational resources out to a large number of schools in and outside Hungary. The availability of lesson plans contributes to the easy adoption of the programme recommendations that can permeate schools and teachers.

Joining the initiative is also facilitated by the short-term activities that don't demand a high compromise nor the assumption of bigger responsibilities by schools and teachers.

Key takeaways

Despite being a set of activities short in time, the Thematic Sustainability Programme has the capability of reaching a large number of schools, teachers and students at the national and international levels. It also has the power of entering the classrooms through lessons plans, teacher training and other resources. It also promotes fun activities that can motivate students' participation and create valuable memories. Its pedagogical approach is directed at experimental and outside learning activities.

The downside of this programme can be the lack of assessment of what is being learned, what is the impact of these activities and how they contribute to the implementation of the National Core Curriculum's key competencies.

Portugal

Curriculum analysis

The Portuguese education system begins with preschool education, an optional cycle for children from three to six years old, followed by compulsory education, which comprises three sequential cycles: the first cycle of four years, the second cycle of two years, corresponding to ISCED1, the third cycle of three years (expected attendance ages: from 12 to 15 years old), corresponding to ISCED 2 (lower secondary education), and upper secondary education, a three-year cycle corresponding to ISCED 3.

The **National Education Strategy for Citizenship (ENEC – Estratégia Nacional para a Cidadania)** includes a set of skills that must be provided by the citizenship education of Portuguese children and young people, such as those linked to sustainable development and environmental education. In addition, the Strategy states that each school must implement and coordinate an **Education Strategy for Citizenship at School** (EECE).

The **Environmental Education Framework for Sustainability** (2018) was developed by Direção Geral da Educação (DGE) do Ministério da Educação (General Education Directorate of the Ministry of Education). It has a coherent structure, subdivided into education levels and teaching cycles. Thus, the Environmental Education Framework for Sustainability constitutes a guiding document for implementing this area of citizenship education in preschool education and compulsory education (basic and secondary). Furthermore, the guidelines explained in the document are intended to contribute to the change of behaviour and attitude towards the

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environment, not only on the part of the young people and children for which it is intended but also on the part of their families and the communities in which they insert. Therefore, it is intended to support the training and action of teachers in terms of the environment and sustainability.

Therefore, the document prescribes global themes, sub-themes, objectives, and performance descriptors in environmental education for sustainability, which benefited from considering the level of knowledge and age of the students for whom they are intended. However, the document is governed by common objectives for the different levels of education and teaching, and its implementation must be considered according to the respective descriptors. **Table 12** highlights the themes, subthemes, objectives and expected learning outcomes.

If it is true that there is a very complete and systematised approach to Environmental Education, and the same to its dimensions and objectives, it is also true, from our point of view, that some learning objectives may be inadequate and inappropriate to the reality of the age group of some students. However, there are still no results of an assessment study that can verify this claim nor present a balance of the strengths and challenges of implementing the framework.

Table 12. Themes, subthemes and objectives at different levels of education and teaching

Themes	Subthemes	Objectives	PS	1C	2C	3C	SC
I. Sustainability, Ethics and Citizenship	A. Pillars of Sustainability	Understand the pillars of sustainability.	✓	✓	✓	✓	✓
	B. Ethics and Citizenship	Understand the importance of ethics and citizenship in environmental issues and sustainability.	✓	✓	✓	✓	✓
		Assume citizenship practices	✓	✓	✓	✓	✓
	C. Intergenerational responsibility	Understand the impact of human activities and attitudes on the content of natural resources.	✓	✓	✓	✓	✓
		Understand the consequences of burnout of natural resources for current generations and the future.	✓	✓	✓	✓	✓
	D. Reduction of Poverty	Know the risks leading to situations of poverty (economic, social and environmental).	✓	✓	✓	✓	✓
		Participate in local initiatives or the other scales aimed at reducing poverty.	✓	✓	✓	✓	✓

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II. Sustainable Production and Consumption	A. Waste	Know the life cycle of different goods from consumption. Incorporate practices of responsible consumption.	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓
	B. Green Economy	Understand the concept of the green economy.	--	✓	✓	✓	✓
	C. Labelling (goods and services)	Understand the importance of information existing on the labels of goods and services for the responsible consumption decision.	✓	✓	✓	✓	✓
	D. Sustainable production modes	Understand the need to adopt environmentally-friendly agricultural sustainable production processes	--	--	✓	✓	✓
	E. Quality of life	Understand the concept of life quality.	✓	✓	✓	✓	✓
III. Territory and Landscape	A. Coast	Relate the phenomenon of littoralization with the threats to ecosystems. Participate in monitoring campaigns of stretches of the coast in an exercise of participatory science (citizen science) aiming to identify problems and the proposal of sustainability solutions.	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓
	B. Landscape	Associate landscape elements with local identity (natural heritage and built heritage). Characterise landscapes in space and time, taking into account the heritage.	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓
	C. Territorial dynamics	Understand the interconnection between natural, economic and sociocultural factors in the territory and landscape construction. Inventory elements of the landscape that allow characterising the multifunctionality of the territory and their territorial dynamics (rural and urban spaces/natural spaces and humanised spaces).	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓
	D. Landscape	Know concrete examples of strategies for the involvement of the population and	--	✓	✓	✓	✓

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	quality objectives	local agents in the definition of objectives aimed at landscape protection, management and planning. Set landscape quality objectives to local scale, valuing fieldwork.	 ✓	 ✓	 ✓	 ✓	 ✓
IV. Climate Change	A. Causes of climate change	Know the causes of climate change on different scales.	✓	✓	✓	✓	✓
	B. Impacts of the climate change	Analyse the different impacts of climate change. Participate in awareness-raising actions on the impacts of human activities on climate change.	-- --	✓ ✓	✓ ✓	✓ ✓	✓ ✓
	C. Adaptation to climate change	Understand the need to adopt adaptation measures to face the risks and impacts resulting from climate change. Implement practices of adaptation to climate change in family and community contexts.	-- ✓	-- ✓	✓ ✓	✓ ✓	✓ ✓
	D. Mitigation of climate change	Understand the importance of adopting attitudes, behaviours, practices and techniques leading to the reduction of greenhouse gas emissions. Participate in an integrated way with different social actors, at school and in the family context, in actions that minimise the impact, at the local level, of human activities on climate change.	✓ --	✓ ✓	✓ ✓	✓ ✓	✓ ✓
V. Biodiversity	A. The importance of biodiversity	Understand the concept of Biodiversity. Get to know the main ecosystems on the planet.	✓ --	✓ ✓	✓ ✓	✓ ✓	✓ ✓
	B. Biodiversity as a resource	Get to know the most emblematic animal and plant species in the national territory. Know the role of ecosystem services, preferably within the framework of the MEA (Millennium Ecosystem Assessment).	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓
	C. Main threats to	Analyse the main threats to Biodiversity on different scales.	✓	✓	✓	✓	✓

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	biodiversity	Report situations of threats to Biodiversity.	--	✓	✓	✓	✓
	D. Strategy to the conservation of biodiversity	Know the natural parks and protected areas of Portugal as part of the strategy for the Biodiversity conservation. Present proposals for the conservation of Biodiversity in specific cases.	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓
VI. Energy	A. Energy resources	Know the different energy sources and the advantages/disadvantages of their use.	✓	✓	✓	✓	✓
	B. Energy problems of current world	Evaluate the social and environmental implications of the current energy model based essentially on the use of fossil fuels.	--	✓	✓	✓	✓
	C. Energy sustainability	Recognise the use of renewable energies and the promotion of energy efficiency as two fundamental pillars for energy sustainability. Participate in actions to promote energy efficiency.	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓
	D. Sustainable mobility	Relate sustainable mobility with the preservation of natural resources and quality of life. Intervene with the competent authorities, namely the municipalities, with proposals leading to the promotion of sustainable mobility.	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓
VII. Water	A. Importance of water for life on Earth	Understand the importance of water on the planet as a resource and life support. Assume environmentally responsible behaviours that respect and value water.	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓
	B. Environmental problems associated with freshwater	Know the main environmental, social and economic problems and challenges associated with water (waste, contamination, scarcity, conflicts, drought). Act to minimise the socio-environmental problems associated with water.	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓

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	C. Literacy of oceans	Understand the importance of the oceans for the planet's sustainability Participate in actions aimed at preserving the oceans.	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓
	D. Sustainable management of Water Resources	Understand the need to adopt appropriate behaviours and practices for the responsible management of water resources. Contribute, through public participation actions, to the definition of local strategies for the sustainable management of water resources	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓
VIII. Soils	A. Soil as a resource	Relate types of soils with their different skills. Participate in actions that promote good practices of sustainable agriculture.	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓
	B. Use and Abuse	Recognise behaviours that lead to soil degradation and regeneration. Inventory examples of soil degradation and good practices for its use at different scales.	✓ --	✓ ✓	✓ ✓	✓ ✓	✓ ✓
	C. Mitigation and adaptation	Understand the importance of adopting appropriate behaviours, practices and techniques for soil conservation. Understand the impact of climate change on soil degradation and desertification.	-- --	-- --	-- --	✓ ✓	✓ ✓

Source: Referential of Environmental Education for Sustainability, 2018. PS = Preschool Education ISCED = 0; 1C = 1st Cycle; 2C = 2nd Cycle ISCED = 1; 3C = 3rd Cycle ISCED = 2; SC = Secondary education ISCED = 3.

Case Study: Serralves Environmental Education Project

Description of the case (what skills were delivered and how)

The Serralves Environmental Education Project (PEAS) is a project integrated into the Foundation's mission to stimulate public interest in and knowledge of landscape and the environment, as critical issues for society and its future, based on its environmental and landscape heritage, classified as a National Monument, which includes the Serralves Park.

The initiatives envisage approaches within the scope of education based on practical, experiential, scientific and environmental and social values, which, in addition to supporting the training of knowledgeable and involved citizens, aims to contribute to changing behaviours that

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affect decisions taken in the day-to-day, namely towards a more responsible consumption and the experience of a participative environmental citizenship.

Who/how initiated? (drivers and enablers)

The Project was created by Serralves Foundation, a cultural institution located in Porto, Portugal, ranking in the list of most-visited art museums in the world. Serralves Park is an area of great ecological value where, for example, tree species acquire truly exceptional sizes, with notable examples of beech, liquidambar, eucalyptus, pine, cork oak and chestnut trees. Visits to this remarkable space offered a starting point for its discovery. For the pursuit of environmental education, the Foundation has established protocols with several renowned entities, among which the following stand out: CIBIO – Research Center in Biodiversity and Genetic Resources; CIIMAR - Interdisciplinary Center for Marine and Environmental Research; AEPGA - Association for the Study and Protection of Donkey Cattle; CRE_PORTO - Regional Center of Excellence in Education for Sustainable Development in the Porto Metropolitan Area.

Strengths of the practice

One of the programme strengths refers to the new technological developments and technical and multimedia approaches to didactic and pedagogical means, as well as the intensification of cooperation between institutions, educational agents, public and private entities, in which the Serralves Foundation presents an exceptional collaborative framework with research and development entities, companies and public entities, namely municipalities and schools, involving education, the environment and culture.

Limitations of the practice

The modular organization of the activities that comprise the Project may not contribute to a complete development of sustainability competences or even create a “poetic” perception of sustainability and environmental issues.

Results achieved

In 2019/20 and 2020/21 school years, the Environment Workshops fell into 4 thematic axes: Biodiversity; Landscape; Pedagogical farm; and Sustainability and Climate Change. Each axis presented a variety of workshop proposals in the context of the classroom and/or in the different spaces of the Park, enabling a differentiating experience within the scope of pedagogical and scientific processes of non-formal learning.

Challenges and barriers

Museums have difficulties in attracting audiences. These places are sometimes seen as very formal, elitist organizations where not every young student feel welcomed. Resorting to innovative activities involving families and the community can help to improve this gap. However, one of the limitations of the programme may be the minor impact on disadvantaged populations.

Transferability and scalability

The project includes several educational programmes along with training sessions for educators and teachers. The Foundation also promotes other training and dissemination sessions. This can

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promote the transferability of good practices. However, the Project is specific to the characteristics of the Park.

Key takeaways

The Serralves Environmental Education Project embodies several educational programs and initiatives to raise awareness and education for the Environment of the most varied types, considering that it is aimed at different target audiences:

1) School community and all educational agents

2) Families (transgenerationality and generational equity)

3) Criticism & Reflection and Value Creation

4) Inclusive Environmental Education

Romania

Curriculum analysis

In Romania, compulsory education has 11 grades and includes primary education, lower secondary education and the first two years of upper secondary education[85].

In the formal curriculum of pre-university education in Romania, the education for sustainable development is approached transversally and through extracurricular activities. Climate change and the environment are themes addressed, especially in the curricula decided by the school. In contrast, in the common core curriculum, they are treated tangentially in some subjects (e. g., Energy and Life, Chemistry and Life, Nature, Human and Environmental Health, etc.) or in the context of general information on the climate and the environment (ECCE, 2021). The competencies are approached mainly in the gymnasium (5th to 8th grade) in the following subjects in pre-university education (ECCE, 2021):

1) **Preschool education**, optional subject: "Ecological and environmental education";

2) **Primary education** (1st to 4th grade, ISCED 1): (i) subjects in the common core: Geography, Civic Education, Counselling and Personal Development; (ii) subjects from the curriculum at the school's decision - national offer: "Create your environment", "Mathematics and Sciences in the Knowledge Society", "Ecological Education and Environmental Protection";

3) **Lower Secondary** (gymnasium education) (5th to 8th grade, ISCED 2): (i) subjects in the common core: Geography, Technological Education, Practice Skills, Civic Culture and Social Education, Counselling and Personal Development, (ii) subjects from the curriculum at the school's decision - national offer: "Education for Health", "Create your

[85] https://eacea.ec.europa.eu/national-policies/eurydice/content/romania_en

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Environment", "Mathematics and Sciences in the Knowledge Society", "Ecological education and environmental protection";

4) **High School** (9th to 12th grade, ISCED 3): (i) subjects in the common core: Geography, Biology, (ii) subjects from the curriculum at the school's decision - national offer: "Education for Development", "Education for Democracy".

It should be noted that there are no specific disciplines aimed at the environment and sustainability education in the schooling levels between the ninth to the twelfth grade. This may illustrate a concern for environmental awareness essentially directed to those children under the seventh grade.

It is essential to reflect, through official documents of Romania, the general state in which Education for the Environment is considered (despite some slight nuances that have changed over the years), emphasising central aspects and taking into account some curricular subjects with a focus on sustainability.

It is necessary to pay attention to the School program for optional discipline entitled "**Create your environment**", which is accessible to 3rd and 4th grades and 5th to 8th grades. On the other hand, the Ministry of education, research and youth (2007) prescribed curricular structures for the use of teachers in the optional subject entitled "**Ecological and environmental education**", aimed at preschool education (school years before primary education). **"Ecological education and environmental protection"** is available for primary education (1th-4th grade) and is also optionally integrated into the Gymnasium education framework (5th-7th grade). Therefore, we chose to analyse the subjects "Ecological and environmental education", "Create your environment", and "Ecological Education and Environmental Protection" since these are the central axes of the target of analysis and learning.

Contrary to what was found, for instance, in the curricula of Hungary and Portugal, the Framework objectives vary significantly according to the age associated with each grade (therefore, also the learning objectives, with even greater differentiation[86]). This may suggest a concern to teachers regarding the need to adapt the content and teaching/learning methods to the characteristics and distinctive complexity peculiar to each level of education. Thus, let's start with "**Ecological and environmental education**", available in preschool. For preschool education, the following framework objectives were structured:

1. Knowledge of the environment by stimulating curiosity for investigation.
2. Training and practising practical skills to make functional objects practical utilitarian, from recyclable or reusable materials.
3. Forming a positive attitude towards nature by carrying out ecological education activities.

For each of the three objectives, the following **Table 13** shows the respective learning goals and skills/learning outcomes expected:

[86] The content is also broader and more complex as the education grade increases.

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Table 13. Ecological and environmental education - Preschool education (ISCED 0)

Framework Objectives	Learning goals	Skills/Learning outcomes
Knowledge of the environment by stimulating curiosity for investigation	Discover the main components of the natural environment.	Ability to process materials from nature to make some products; Ability to perceive visually, aurally, olfactory and tactile the natural environment; Ability to identify as many elements of the environment as possible; Ability to discuss what is observed in the immediate environment; Ability to perform simple experiments on water, air, soil, plants; Ability to represent changes in the weather through drawings; Ability to express verbally or plastically the ideas and impressions accumulated.
	Identify sources of pollution and possibilities for their elimination.	Ability to participate in walks, visits and excursions to observe the consequences of pollution; Ability to recognise waste; Ability to participate directly in environmental sanitation actions; Ability to group images according to the model: "so Yes or so No".
	Understand the notions of reuse and recycling by learning to save.	Ability to recognise the conventional signs of recycling on different packaging; Ability to collect objects from nature that they could use while learning, thus saving; Ability to sort waste correctly; Ability to recover the waste by depositing it at collection centres.
Training and practice of practical skills to achieve functional, practical-utility products from recyclable or reusable materials	Process materials from nature to make some products.	Ability to gather different materials from nature; Ability to observe the characteristics of natural material; Ability to sort the materials according to different criteria; Ability to make functional products (toys, ornaments, decorative objects).
	Observe the beauty of nature and feel the desire to create it.	Ability to play games and activities in nature Ability to express through the artistic-plastic activities the beauty of nature Ability to make exhibitions with the works made Ability to create stories about nature; Ability to use various work techniques in making original works, masks and ecological costumes.
Forming positive attitudes towards nature by carrying out ecological education activities.	Show concern for the environment and be able to take action.	Ability to train parents in their actions; Ability to do teamwork; Ability to participate in ecological actions carried out at the community level; Ability to express a critical attitude towards those who pollute the environment; Ability to show care for nature.
	Express thoughts and feelings towards the environment.	Ability to tell positive facts from their own experience about their environmental life; Ability to appreciate a positive attitude toward the environment
	Apply in real, life	Ability to respect the indicators/symbols encountered in the

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	contexts, the rules and norms of environmental protection	environment; Ability to plant trees and flowers and take care of green spaces; Ability to protect any creature, no matter how small.

The subject "Ecological Education and Environmental Protection" is part of the primary (1th-4th grade) and lower secondary education (5th-7th grade). For primary school education, the following framework objectives were structured:

1. Understand and use basic notions about environmental protection.
2. Training and practice of environmental exploration/investigation skills.
3. Forming a motivating and responsible attitude towards maintaining and improving environmental quality.

For each of the three objectives, the following **Table 14** displays the respective learning goals and skills/learning outcomes expected:

Table 14. Ecological education and environmental protection - Primary education (1st to 4th grades; ISCED 1)

Framework Objectives	Learning goals by grade level
Understand and use basic notions about environmental protection.	**1st grade:** ● Ask questions about the realities observed in the environment (home, school, park). **2nd grade:** ● Use language specific to environmental protection activities (reuse, reconditioning, recycling, sanitation, environmental factors); ● Compare the influence of different environmental factors (water, air, soil) on animals and plants in the immediate environment. **3rd grade:** ● Initiate discussions on environmental protection; ● Illustrate with concrete situations the positive/negative influence of environmental factors. **4th grade:** ● Communicate in various ways findings related to environmental protection; ● Argue the need to protect the environment.
Training and practice of environmental exploration/investigation skills.	**1st grade:** ● Observe the elements in the immediate environment (home, school, park);

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	• Recognise pollution elements in the immediate environment. **2nd grade:** • Record the data of the observations made on the environmental factors; • Identify concrete pollution situations. **3rd grade:** • Explore the results of human activity on the environment starting from concrete situations; • Explain connections and inter-conditionings between various aspects noticed in the environment. **4th grade:** • Interpret observed aspects of the environment (causes, effects); • Highlight the influence of the environment on the human body (risk factors, temperature variations, humidity, pollution, etc.); • Verify hypotheses given by performing experiments.
Forming a motivating and responsible attitude towards maintaining and improving environmental quality.	**1st grade:** • Express opinions about different behaviours in the human relationship with the environment; • Adopt norms and rules of behaviour concerning the environment; • Practice ecological behaviour skills in concrete situations. **2nd grade:** • Participate consciously in actions to preserve and improve the quality of the environment; • Take a stand against situations that lead to environmental degradation. **3rd grade:** • Distinguish between positive and negative actions concerning the environment; • Promote ecological values. **4th grade:** • Report situations of violation of environmental protection rules; • Get involved in popularisation and awareness actions.
Basic notions - Content	

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Basic notions.	**1st grade:** Components of the environment in the near future (home, school, park, forest) - Water, air, soil: life-sustaining factors. **2nd grade:** Biotic and abiotic factors in the environment. **3rd grade:** Causal and trophic relationships established between biotic and abiotic factors. **4th grade:** The influence of biotic and abiotic factors on the planet.
Environmental Hygiene.	**1st grade:** Class hygiene, Home hygiene. **2nd grade:** School hygiene. Neighbourhood hygiene. **3rd grade:** Hygiene of the local habitat. **4th grade:** Ways to improve the quality of the environment.
Human actions on the environment.	**1st grade:** Elements of pollution of the immediate environment. **2nd grade:** Pollution situations identified. **3rd grade:** Protected plants and animals. Protection of endangered plants and animals - Waste: a source of environmental pollution. **4th grade:** Pollution: causes, forms and effects -The importance of waste recycling.

Source: Adapted from Ministry of Education, Research and Youth, 2007.

If in preschool there are "examples of behaviour" that fit perfectly in terms of skills/learning outcomes, in the case of primary school, it is not quite that. Instead, recommended activities are presented, although many of them can configure skills/learning outcomes or, in other words, competencies. The same happens in Gymnasium education (5th - 7th grade). That said, we still recommend keeping in mind the recommended learning activities. As in preschool and Gymnasium education, the key competencies for each of the three stated objectives are fundamentally inscribed in the stipulated learning objectives.

So now, let's see the objective framework **for lower secondary education** (5th to 7th grade; ISCED 2):

1. The use of notions, concepts and principles specific to education for environmental protection.
2. Developing the ability to investigate reality.
3. Assuming and implementing environmentally responsible behaviour.

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Table 15. Ecological and environmental education - Lower secondary education

Framework Objectives	Learning goals
The use of notions, concepts and principles specific to education for environmental protection.	**5th grade:** ● Identify the components of the environment; ● Rank the pollutants according to different criteria; ● Identify the correct sources of information in matters of conservation and environmental protection. **6th grade:** ● Describe, with appropriate language, the components of the environment and the changes produced by human intervention; ● Identify interspecific relationships between the components of the environment; ● Elaborate reports, projects, and portfolios using specific notions, and concepts, principles. **7th grade:** ● Describe the concepts: ecosystem, phenophases, waste management, protected area management, language caused by pollution; ● Using to express specific opinions, ideas, reasoned hypotheses about problem situations; ● Make multimedia presentations on the issues identified.
Developing the ability to investigate reality.	**5th grade:** ● Investigate the state of environmental factors by scientific methods (experiment, modelling, case study); ● Offer practical solutions for improving the quality of the environment. **6th grade:** ● Determine the degree of air, water, and soil pollution; ● Graphically represent the information acquired through direct and indirect observations; ● Practice empirical and/or holistic analyses. **7th grade:** ● Perform determinations of the parameters of the environmental factors in an area (humid environment - pond); ● Carry out an independent investigation activity on the local horizon; ● Experiment with their solutions to improve the negative anthropogenic impact in an "adopted area".
Assuming and implementing environmentally responsible behaviour.	**5th grade:** ● Be aware of the impact of environmental imbalances on humans; ● Take responsibility for improving environmental factors; ● Show ethical, civic behaviour and some nature protection skills.

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	6th grade: ● Promote a balanced behaviour between the individual and the natural environment; ● Appreciate the positive and negative effects of the anthropogenic intervention on the environment; ● Formulate measures for the prevention and protection of the environment in concrete areas. **7th grade:** ● Develop responsible behaviours and attitudes by referring to the legal norms in the field of the environment; ● Make responsible and correct decisions regarding ecological behaviour; ● Demonstrate an understanding of the consequences of one's behaviour concerning the state of health of the environment.
Basic notions - Content	
Basic notions of knowledge and environmental protection	**5th grade:** Conceptual delimitations: Ecology and Geography of the environment. The concept of environment - Abiotic and biotic factors. Water circuit in nature. Institutions with responsibilities in environmental protection. **6th grade:** History of Environmental Ecology and Geography. Abiotic and biotic factors in the local horizon (school, schoolyard). Relationships of organisms with abiotic factors: interspecific and intraspecific relationships in ecosystems. **7th grade:** Romanian contributions to the development of Ecology and Geography of the environment. Physical, observable properties of water, air, and soil. Complex ecosystem - forest: functions, protection measures.
Human influence on the environment	**5th grade:** Types of the environment: natural, anthropogenic. **6th grade:** Anthropic intervention on the environment: ways, consequences. Biodiversity: present and perspectives. Degradation of the environment on the local horizon (county). Environmental degradation in Romania. **7th grade:** Protected areas. Management of protected areas. Organisational framework of the protected area. Management of natural resources in protected areas. Propaganda and education actions.
Environmental Hygiene	**5th grade:** Pollution. Sources of pollution. Classification. Pollution source inventory techniques. Sources of pollution and the distribution of pollutants on the local horizon. **6th grade:** Pollution of air, water, soil. Pollution on the local horizon. **7th grade:** Noise and biological pollution. Radioactive pollution.

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Human protection	**5th grade:** The concept of "environmental protection". Waste: definition, classification. Impact of waste on environmental factors. Types of waste and generating sources in the local horizon. **6th grade:** Conceptual delimitations: protection and conservation of the environment. Improving measures to reduce the degradation of environmental factors. Improving the impact of waste on the environment. The method of the phenological questionnaire in investigating a possible area to be "adopted": the park. **7th grade:** Artificialization of the living environment. Principles of waste management. Waste recovery. • Recycling and waste treatment.

Having finished the presentation and analysis of the discipline entitled "Ecological and environmental education", now it is time to present and analyse the discipline named "**Create your environment**", accessible to grades 3rd and 4th and classes V-VIII.

Framework objectives for the subject "Create your environment" (**3rd and 4th grade**):

1. Relation of environmental factors with living environments;
2. Forming a behaviour of respect and protection for the environment;
3. Practising various ways of pro-ecological involvement.

Table 16. Create your environment - Primary education

Framework Objectives	Learning goals
Relation of environmental factors with living environments.	**3rd grade:** ● Identify common features of living things, following adaptation to the environment; ● Exemplify the effects of natural phenomena on living things. **4th grade:** ● Identify in the environment the forms of its degradation; ● Identify effects of environmental degradation.
Forming a behaviour of respect and protection for the environment.	**3rd grade:** ● Identify ways of polluting the environment by direct observation; ● Anticipate the effects of environmental pollution on living things. **4th grade:** ● Correlate between the sources of pollution - the forms of pollution - the effects of pollution in the observed local environment; ● Identify an ecological imbalance in the area they live.

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Practising various ways of pro-ecological involvement.	**3rd grade:** ● Initiate activities for the protection of the local fauna; ● Engage voluntarily in age-specific actions to protect the environment. **4th grade:** ● Find complementary solutions to stop environmental degradation; ● Involve family members and a group of friends in activities to improve the quality of the local environment; ● Carry out greening activities of some spaces in the area where he lives.
Content	
Environment.	**3rd grade**: Natural environment / anthropogenic environment - Environment protection **4th grade:** Disasters, catastrophes, natural disasters and by chance.
Human influence on the environment.	**3rd grade:** Similarities and differences between living things. Living on the local horizon; The influence of environmental factors on living things on the local horizon; Comparing the different ways of adapting living things to specific living environments. Reference objectives; Adaptations of living things in the local environment to environmental factors; Influences of living things in the local environment on environmental factors. **4th grade:** Environmental pollution. Pollutants, sources of pollution, anti-pollution measures. Waste and recycling. Environmental protection measures.

Finally, let's take a look at the **Framework Objectives** related to the subject "Create your environment" in **5th to 7th grade** and the respective tables constructed:

1. The use of scientific language and terminology appropriate to ecology.
2. Analysis of the causal relationships between natural phenomena, life on Earth and human activities.
3. Manifestation of responsible attitudes concerning the natural environment.
4. Formation of the behaviour of respect and protection towards the environment at the level of the local community.

Table 17. Create your environment - lower secondary education.

Framework Objectives	Learning goals
The use of scientific language and	**5th grade:** ● Identify the causes and effects of environmental degradation;

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terminology appropriate to ecology.	• Write texts based on specific terminology. **6th grade:** • Characterise sources of environmental pollution, using appropriate terminology; • Use specific terminology related to the types of environmental pollution in various communication situations. **7th grade:** • Describe global pollution problems using specific terminology; • Capitalise on informational content from bibliographic sources on ecological topics in materials with a pro-ecological message.
Analysis of the causal relationships between natural phenomena, life on Earth and human activities.	**5th grade:** • Identify ways of polluting the environment through systematic observation; • Differentiate between the short-term and long-term effects of environmental pollution. **6th grade:** • Use simple investigation procedures in a case of pollution; • Identify correlations between human activities and their polluting effects. **7th grade:** • Estimate the overall effects of environmental degradation phenomena; • analyse the impact of human activities on the environment; analyse the disturbing human interventions in the natural environment to improve their effects.
Manifestation of responsible attitudes concerning the natural environment.	**5th grade:** • Appreciate the behaviour of people aiming at environmental protection actions; • Get involved in concrete activities to improve the human-nature relationship; • Show interest in environmental conservation. **6th grade:** • Express opinions on the human relationship with the natural environment, showing interest and tolerance; • Develop a project aimed at solving potential problems between society and the environment; • Identify possible solutions to improve the negative aspects encountered in the environment. **7th grade:** • Assume the responsibility to contribute to the improvement of the environmental conditions through individual and collective actions;

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	• Launch pro-environmental campaigns; • React critically to messages about environmental issues received in informal contexts; Carry projects about the reduction of pollution phenomenon in the area where the students live.
Formation of the behaviour of respect and protection towards the environment at the level of the local community.	**5th grade:** • Participate in the responsible, correct decision-making process in situations of threat to the "health status" of the environment; • Be involved in age-specific environmental protection actions in collaboration with colleagues. **6th grade:** • Consistently behave responsibly towards the environment by initiating and participating in appropriate protection activities; • Participate voluntarily in pro-ecological activities. **7th grade:** • Initiate partnership actions at the level of the local community; • Take responsibility for protecting and improving the environment.
Content	
Environment - General characteristics	**5th grade:** Rock and relief; Support of the environment; The air; The water; Plants and animals; Soil and subsoil; The man.
Environmental degradation	**5th grade:** Air pollution; Water pollution; Soil degradation.
Human activities and their effect on the natural environment	**6th grade:** Effects of industrial activities on the natural environment. Effects of the chemical industry on the environment. Effects of the construction materials industry on the environment. Effects of other industries on the environment. Environmental protection solutions.
The impact of agricultural activities on the environment	**6th grade:** Effects of agricultural activities on the natural environment. Agricultural crops and their effects on the environment. Environmental protection solutions.
Environmental impact of transport	**6th grade:** Road transport and its effects on the environment. Rail transport and its effects on the environment. Air transport and its effects on the environment. The effects caused by other means of transportation on the environment. Environmental protection solutions.
Other types of pollution and effects on environmental degradation	**6th grade:** Urban pollution. Rural pollution. Noise pollution.

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The effects of human degradation on the environment and its activities of waste	**7th grade:** Sources of waste. Collection, transport and storage of waste. Waste recycling.
The effects of pollutants on the ecological balance - Global issues	**7th grade:** Greenhouse effect (formation, influence and improvement measures). Acid rain (formation, influence and measures to prevent the formation of acid rain). Ozone layer (what is ozone, how is the ozone layer affected and the consequences of its destruction)
Environmental protection and pollution control measures	**7th grade:** Water treatment and treatment (types of treatment, treatment plants). Purification of gaseous emissions. Combating vibrations and noises. Drying, draining, fixing and stabilising the land. Rational management of resources. Recovery, recycling and reuse of materials

Case Study: Key competencies for the environment and climate introduced by the Ministry of Education in the National Curriculum in 2016

Description of the case (what skills were delivered and how)

The new national curricula introduced some key environmental and climate competencies in 2016. These competencies include applying simple rules to maintain a healthy life and a clean environment, social and civic competencies, basic skills in science and technology, and a spirit of initiative and entrepreneurship. The concept of climate change is not used, but weather, climate, climate zones, environment / environmental protection, and sustainable development are frequently present. For example, at the secondary level, the following concepts are addressed: climatic zones, diversity of climatic forms, extreme phenomena, the influence of climate and weather on the local/regional activities, behaviour in case of extreme phenomena, and warning methods.

The principal competencies relating to the environment and climate were introduced in the subject of Biology:

1. *5th grade:* recognising the consequences of human activities on the environment (visits are recommended to promote nature conservation values and to observe the impacts of the human activities);
2. *6th grade:* identifying the link behaviour-health;
3. *8th grade:* healthy lifestyle in a natural environment;
4. *9th grade:* transferring and integrating knowledge and working methods specific to biology in new contexts (for example, designing environmental protection and conservation activities);

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5. *10th grade:* ecological imbalances, the influence of environmental factors on absorption, photosynthesis, perspiration, respiration, circulation, excretion, germination;

6. *12th grade:* rules and their application in real life, maintaining human health and environmental conservation.

Some competencies targeting the identification and explanation of environmental phenomena were also introduced in the subject of Geography.

Some examples are

1. *6th grade*: the effects of human activities on the environment and the quality of life;

2. *7th grade:* the identification of existing problems in the environment;

3. *8th grade:* identification of solutions for protecting the geographical environment at the local and national levels.

Other changes targeting environment and climate were made for the subjects of Technological Education (creating the responsible attitudes toward health, environment, and work; reducing energy consumption; rational use of material resources), Civic Education (environmental protection - a condition of life, development of environmental protection projects), and Counselling and Personal Development (adopting a responsible attitude for health and the environment, management of risks).

Another set of competencies was introduced in the Curriculum for some subjects at the school's decision (National Offer for Secondary Education). For example,

1. "Create your own environment!" is an optional subject offered for the curricular area "Mathematics and natural sciences". It is designed for one hour per week (3rd-8th grades);

2. "Ecological and environmental education" is an optional subject designed for one hour a week (1st-7th grades) having interdisciplinary character ("through interactive strategies, students are put in a position to observe, analyse investigate, environmental phenomena and processes, practising intellectual work skills, while developing responsible behaviour, involved in environmental relations").

The principal competencies envisaged by these optional subjects are:

1. identifying types of waste for households, schools, and municipalities;

2. effects of human activities on the environment;

3. sources of wastes, their collection, transport and storage, recycling of wastes,

4. the effects of pollutants on the ecological balance;

5. global issues: the greenhouse effect (generation, influence and mitigation measures);

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6. acid rains;
7. the ozone layer (what is ozone, how is the ozone layer affected and the consequences of its destruction);
8. water treatment (types of treatment plants, sewage treatment plants),
9. gas purification;
10. vibration and noise control;
11. drying, drainage, fixing and stabilisation of land;
12. management of resources, recovery, recycling and reuse of materials.

Who/how initiated? (drivers and enablers)

The process was created in 2016 by the Ministry of Education[87], approving the educational plans (EP) and the training profiles (TP) for secondary education and the high school graduate. The EPs for primary and secondary education are structured in two components: (1) common core and (2) curriculum at the school's decision. The implementation started in the school year 2017-2018.

Strengths of the practice

The competencies are addressed considering the whole spectrum of ages and grades (from preschool to high school), approaching a progressive construction from the knowledge acquisition of simple facts to the complexity of actual climate and sustainability issues.

Limitations of the practice

The climate change issues are tangentially approached by being mentioned only under environmental issues. Most of the competencies are introduced in the optional subjects (at the school's decision). According to the practice, the teacher greatly influences the contents and creation of the competencies for the optional subjects. Interdisciplinarity is mentioned in the curriculum, but in reality, the implementation of these subjects is limited by the knowledge and practice of a single teacher; a group of teachers rarely does learning activities together. At the same time, it is critical to mention the scarcity of resources for teacher training and in-service education.

Results achieved

The main result is the improvement of the national Curriculum by adding elements concerning the environment and climate. At the same time, extracurricular activities were included in the Calendar of National Educational Activities funded by the Ministry of Education (2017-2021). Some examples (ExtrCurr, 2022):

1. National competition for environmental projects;

[87] Decision 3590/2016.

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2. National competition for ecology and environmental protection "Let's love nature";
3. National competition for ecology and environmental protection "A healthy child in a clean environment";
4. National program Another School - Ecological component education and environmental protection.

Some partnerships were created and are in force on the environment and climate, such as

1. Collaboration protocol Ministry of Education - Ministry of Waters and Forests on the national public awareness campaign to promote good practices and financial instruments for compliance with the Directive;
2. Cooperation protocol Ministry of Education - Ministry of Agriculture and Rural Development on the information and education campaign for consumers in pre-university education units on the prevention and reduction of food waste "You can protect the planet!".

At the same time, many extracurricular activities and partnerships were initiated at the local level. Two examples should be mentioned, and both are included in the "Second Chance" Program:

1. *Curriculum for Renewable Energy Education* (optional, grade 8th);
2. *Curriculum for Education for Sustainable Development* (optional, grade 8th).

In the absence of the data resulting from a systematic evaluation of these changes, the appreciation of results may be expressed through the participation of students in environmental activities. According to ECCE (2021), "there is a growing interest among young people in Romania for education on climate change, and the environment and a growing participation of actions related to climate change prevention may be noted".

Challenges and barriers

The complexity of climate change (phenomena, interrelations, impacts) introduces significant difficulties in indirectly approaching different subjects in a fragmented way by teachers without robust training on the issues. There are also methodological and administrative difficulties, such as constraints on out-of-school activities requiring parents' consent for each activity. In terms of contents, most of the issues are treated by the optional subjects; therefore, the chance of a significant education on climate change is very dependent on the general understanding of the urgency/needs.

Transferability and scalability

The experience of schools offering the optional subjects or being involved in projects and activities concerning the environment and climate changes may be easily transferred to other schools. Therefore, scalability is also possible. Such an effort seems to be initiated by the initiative launched by the Presidential Administration (ECCE, 2021).

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Key takeaways

The new programmes combine curricular and extracurricular activities and create partnerships to support educational activities, including some in early education.

Greece

Curriculum analysis

The educational system in Greece is regulated by national laws, presidential decrees, and ministerial acts. The Greek State provides free education to all citizens at all levels of the state education system. Compulsory education lasts 11 years, from 4 to 15. Primary education (*Nipiagogeio* - pre-primary school), *Dimotiko scholeio* (primary school), and secondary education (*Gymnasio* and *Lykeio*) are the three main stages of Greek education. In 2020 a national law[88] established a pilot action titled "Skills workshops" in pre-primary, primary, and secondary education. The action entails implementing new thematic cycles in pre-primary education and primary school compulsory curricula. The goal is to strengthen the development of soft skills, life skills, and digital and science skills in young students.

The curricula and timetables of *genika lykeia* (general upper secondary schools) are drawn up by the Pedagogical Institute. The Pedagogical Institute has been replaced since 2011 by the Institute of Educational Policy (IEP), which among other activities offers consultation and makes suggestions about issues concerning secondary education study programmes, textbooks and other teaching material (Eurydice, 2021).

This way, as seen in other countries, the curricula works as a complete guide for teachers and include the following:

- Explicitly stated aims for each subject, in the context of the general and grade-specific aims of education
- Syllabus organized in units
- Indicative guidelines on the method and the teaching materials per subject. (Eurydice, 2021)

Furthermore, until school year 2017/18 school advisors had the responsibility for the scientific and pedagogical support and guidance of secondary education teachers. However, in 2018 they were replaced by the institution of coordinators of educational work and established new structures for the support of educational work:

- Regional Centres for Educational Planning
- Educational and Counselling Support Centres

[88] Law 4692/2020.

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- School Networks of Educational Support
- Committees of Interdisciplinary Educational Evaluation and Support Environmental
- Environmental Education Centres (Eurydice, 2021).

It should be noted that environmental education is not a compulsory subject at school in Greece (Petkou et al., 2021).

In fact, the cited site alerts to the relevance of the changes that were introduced in the curricula and the teaching material of individual subjects during 2017-2019. The logical aim was to improve education in higher secondary education. Here are some examples that illustrate that:

- New curriculum and related portfolio of educational material for the subject "Modern World: Citizens and Democracy" of grade B of general lykeio. It replaced the subject of Civic Education (Economy, Civil Institutions, Principles of Law and Sociology). The new subject is set in a wider framework of historical and social approach of the modern world under the prism of social sciences. Students approach the social, economic and political reality.
- New teaching examples in the language subjects of grade C of lykeio. The aim is to reinforce students in interpreting and critically assessing texts, as well as producing critical speech. Hence, a new curriculum was designed for the subjects of ancient and modern Greek. For its support and implementation, since the school year 2019/20, there are three portfolios of material for students (Modern Greek language - literature - ancient Greek) and two portfolios for the teacher (Modern Greek language and literature). A new assessment mode was determined nationally.
- Portfolios for the subject of Religious Education (ministerial decision)
- Portfolios for the subject of IT: restructure, updating and modernizing the subject of IT in grade C of general lykeio with new material. (Eurydice, 2021)

Despite these superior indications that guide the pedagogical practices to be established by the teachers, they enjoy a relative independence, since they can modify their teaching methods according to the nature of the subject they teach and the abilities, interests and inclinations of the students.

However, there is an explicit demand to equip schools with an interdisciplinary and holistic approach to learning, which helps to develop student skills for a more effective response to the problems of everyday life. At the same time, the knowledge-oriented teaching approach is reduced, and school time is used to the fullest.

In other words, it is intended to place the learner at the epicentre of the learning process, encouraging an active conduct oriented towards the development of competences. On the other hand, it is up to the teacher to provide support, feedback and a guiding role in the entire learning process, in which the student is the central protagonist.

Additionally, within the context of optional school activities, teachers undertake actions on:

- Environmental education

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- Health education
- Culture and arts-oriented issues (Eurydice, 2021)

Therefore, once again the concerns related to Education for Sustainability gain preponderance, this time as optional activities. The main goal of the Environmental Education / Education for Sustainable Development Curriculum[89] is to create a sustainable school and foster an environmental culture and an ethos of sustainability in the school over time and gradually. The idea is to promote the development of school as a learning organisation in which all participants can learn, create, act, and choose based on environmental protection and the right of all of us to live in economic, cultural, social, and environmental sustainability.

The goals of the new Environmental Education / Education for Sustainable Development curriculum are:

- Students will have environmental awareness, relevant knowledge, and an understanding of the gravity of the problems. However, most importantly, they will have the necessary skills and will to become agents of change toward their solution.
- Students will not simply respond to and adapt to the various centres of power's choices and demands. However, they will investigate and think critically, assume their responsibilities, and participate in decision-making processes, intervening vigorously and democratically in social events to bring about the necessary changes.
- Students will have visions, skills, and values that will assist them individually and collectively in negotiating and projecting the social conditions of sustainability, autonomously identifying their present, and being vigilant for future generations.

On the other hand, it seems important to analyse what compulsory subjects tell us in terms of Education for Sustainability, as in the case of Biology. Thus, the following information is linked to the presentation and analysis of the curriculum for the discipline of Biology in A ', B', C 'Gymnasium Education.

So, the curriculum document for the discipline of Biology (published in 2021) states that respect for life, respect for the environment, recognition of uniqueness and acceptance of diversity are some of the fundamental citizenship values in which the subject can contribute.

We could develop an extensive composition on the different objectives, purposes, among other structural elements of the discipline. However, since the document focuses on a specific division for sustainability issues, we will take this department as the main focus of presentation and analysis.

Thus, with regard to the close relationship between Biology and sustainability, the following learning objectives are inscribed:

- Show interest and appreciate the complexity of the natural environment and to eradicate other organisms, as well as the phenomenon of inflammation at all levels of its organization;

[89] https://peeaad.schools.ac.cy/index.php/el/

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- Recognize the symbol of Biology in improving its quality in sustainable and ecosystem management;
- Recognize their own eligibility for the availability and protection of the quality of the environment and act in accordance with the principles of sustainable development.
- Recognize themselves as a unit of the modern generation, but whose choices address the needs of future generations and seek intergenerational justice.

The following learning outcomes are cumulatively expected, however, not all of them are directly inscribed on Education for Sustainability, as they reflect what the student should learn in all the points of the subject.

- Recognize themselves as part of the living world and to cultivate love and respect for any other creature with whom they share the planet.
- To interpret the changes that are accompanied by their physiological development and to adopt behavioural catheters in relation to the rules of hygiene and nutrition.
- Refine their knowledge about the honey organisms that interest the human being, either because they can threaten their health, or because they provide them with useful products and services, or because of their natural qualities.
- Name the parameters of the diversity of living beings, but also of their common characteristics at the level of basic functions (e.g., metabolism, etc.), their hereditary structure and their organization. biosphere.
- Dealing with issues related to high environmental values, the permeability of natural resources, the need to use renewable energy sources, the knowledge of the cyclical economy and development.
- Approach the phenomenon of inheritance through modelling.
- Undertake the processes by which the diversity of living beings arose with the long-term effects of evolutionary processes.
- Deal with problems related to the causes but also the dilemmas arising from the use of genetically modified organisms and microorganisms for the production of food, pharmaceutical substances, etc.
- Discover and report facts, knowledge and principles of Biology, evils, and relationships between different scientific fields, within the framework of the Study Program.
- Apply knowledge acquired about biological knowledge and principles and skills in order to interpret phenomena and processes and to solve problems.
- Formulate work hypotheses and to design ways for their control.
- Ascend and interpret data, to formulate logical conclusions, to draw conclusions and to present results utilizing various tools (tables, graphs, diagrams, photographs, images, etc.) and in writing.
- Evaluate testimonies and identify errors.

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- Generalize ideas to select, compile and transmit facts and information in a logical, clear and comprehensible way.
- Demonstrate an understanding of the applications of Biology in everyday life and their symbol in solving the problems of the modern face.
- Critically address the applications of modern Biology by evaluating their critical, social, economic and technological impacts at the individual and social level but also in relation to the environment.
- Develop the skilful use of TPEs to retrieve, collect and organize data related to their work.

Sustainability also has a particular role in topics 18 and 19 in terms of the subject's content, namely in the following terms, respectively: “Principles of sustainable development and management of the environment”; “Example of solving an environmental problem according to the principles of sustainability”. In turn, in the “Teaching framework - Learning Planning” it appears in the segment “The emergence of the relationship between biological sciences and their technological applications in all areas of everyday life (health, environment, agricultural production, food adequacy, etc.), development, sustainability and sustainable prosperity”.

Case Study: Environmental Education-Education for Sustainable Development

The program's primary goal is to fill theoretical and practical gaps in Environmental Education - Education for Sustainable Development within the context of Education Sciences. It focuses on human resource education and training in the design, organisation, implementation, and evaluation of Environmental Education (EP) / Education for Sustainable Development (EAA) programmes of formal, non-formal, and non-formal education. In addition, it seeks systematic research in PE / E.A.A. with the primary goal of documenting the current situation, generating new ideas, and developing innovative educational methods and techniques.

This is a VET course for the continuous training and certification of professional skills. It aims to provide a high level of education to current teachers in primary and secondary education (public and private), graduates of departments leading to the educational profession (Pedagogical Departments, Kindergarten Departments, Philosophy Schools, Social Schools Studies, Schools of Sciences) and anyone interested in training in related issues.

Description of the case (what skills were delivered)

The course content covers the following units: Theoretical framework of environmental education; Sustainability and sustainable development; teaching strategies in environmental and sustainable education; environmental education in Greece; design and implementation of Educational Programs for the Environment and Sustainability; Assessment and environmental and sustainability education; presentation of environmental education programs.

Who/how initiated (drivers and enablers)

The course is offered online by the Center for Training and Lifelong Learning of the University of Athens. The programs are not aimed at students to improve their academic knowledge but at University / TEI graduates and, in general, in the labour market participants (employed or unemployed) to improve their professional qualifications regardless of initial studies.

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Strengths of the practice

The programme intends to link theoretical and practical knowledge developing the applied dimensions of sciences in the respective professional fields. Furthermore, E-learning courses have the potential to reach a significant number of students in different locations, offering the learner "autonomy", i.e., the possibility of studying regardless of limiting factors, such as the obligation of his physical presence in a specific space and time. The Complementary Distance Education (E-Learning) Program of the Center for Training and Lifelong Learning of the University of Athens has adopted all European policies and tools that have been developed in the framework of the "Strategy for Education and Training until 2020" and the European Qualification Framework.

All Programs are awarded ECVET (European Credit System for Vocational Education and Training) points, while graduates, along with the certificate, receive a Europass Certificate Supplement.

Limitations of the practice

Due to the limited number of places, participation will be strictly observed criteria for selecting candidates. Also, the course is paid; the tuition can be between 361€ and 425€. These two aspects can restrict the number of students attending the course.

Results achieved inc. their assessment/evaluation, if available

There are no references to a formal assessment of the course's impact. However, the Program of Supplementary Distance Education (E-Learning) of the Center for Continuing Education and Training website displays tents of comments from previous students, and the appreciations are strongly positive.

Challenges and barriers faced

There is no follow-up after the end of the course on how to introduce sustainability in classrooms and learning environments.

Transferability and Scalability

E-learning courses have an excellent potential for scalability. Also, the course is directed to educators and can help them improve their environmental education practices in their schools. Teacher training programs can have a strong transferability reaching students, families, other teachers and, eventually, management teams.

Key takeaways

The course is an eight-month self-paced course that introduces the topics of sustainability and examples of environmental education projects.

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Spain

Curriculum analysis

The Organic Law on Education 2/2006 (LOE), in force since 2006, was modified by the Organic Law 3/2020 (LOMLOE) passed in 2020. The implementation of the amendments introduced by the LOMLOE started in the academic year 2020/21 and will end in the academic year 2023/24.

The undergoing reform gives a central role to the development of digital competences and recognises the importance of education for sustainable development. An interesting feature of the new Spanish curriculum is the indication of each competence's learning/demonstration criteria.

The National Curriculum for Education in Spain seems to define, very concretely, which competences are targeted for each teaching/learning cycle. In this way, Early Childhood Education, Primary Education and Secondary Education include specific competences and key competences.

The key competences are the same for all education cycles, even extending to the high school degree:

- Competence in linguistic communication
- Digital competence
- Entrepreneurial competence
- Multilingual competence
- Personal, social and learning-to-learn competence
- Competence in Cultural Awareness and Expression
- Mathematics and science, technology and engineering competence
- Citizen competence

The base document of the Ministry of Education and Professional Training, "keys to dialogue" (2020), is organised around five crucial questions, namely:

- Why a new curriculum?
- What do our young people need to learn?
- What changes does the current curriculum need?
- Why a skills curriculum?
- What can we learn from our environment?

Therefore, it is essential to analyse the extent to which sustainability is considered a relevant element in these questions, paying particular attention to the last one, "What can we learn from our environment?". By the written form it denotes, this one seems to correspond to a topic not only crucial for those in school but also for all those who are no longer there. So, everyone must contribute to the same path.

Thus, the following elements are associated with the matter of sustainability:

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> "Set up a curriculum that is harmonized with that of neighbouring countries with success in this area (Portugal) and with the 2030 Agenda (Education for sustainable development)".
>
> "It is necessary to emphasize the development of specific skills in the use of (...) climate change and sustainability awareness (...)."

On the other hand, the concern for Education for sustainable development is in itself a relevant factor for the transformation of the Spanish school curriculum towards competence orientation:

> "We must ask ourselves what is the future of education that we want to give our coming generations. In a world in which great changes are taking place, both locally and internationally, it is necessary to include new learning in teaching that includes not only content but also values, skills, emotions, motivations and attitudes, intending to contribute to the training of responsible and decisive people, committed to collaboration, sustainability and well-being".

Additionally, it is mentioned that "In Spain, the Action Plan for the implementation of the 2030 Agenda is drawn up with the commitment to anticipate the fulfilment of goal 4.7 by 2025: "In 2030, 100% of the student body in Spain acquires the theoretical and practical knowledge necessary to promote the sustainable development, including through education for sustainable development and the adoption of sustainable lifestyles, human rights, gender equality, the promotion of a culture of peace and non-violence, global citizenship and the appreciation of cultural diversity of culture's contribution to sustainable development, among other means". The document also underlines the concern that the curriculum can fully comply with SDG4: "Ensure inclusive and quality education and promote lifelong learning opportunities for all».

Let us see, for example, how concerns about sustainable development are inscribed in the subject - **Knowledge of the natural, social and cultural environment** - related to the third cycle of Primary Education. It should also be noted that the specific competences of this subject, as in the others, are naturally associated with specific assessment criteria, which seem to take the form of learning objectives, for example Criterion 2.2. "Search, select and compare information from different safe and reliable sources, using source reliability criteria, acquiring basic scientific lexicon, and using it in research related to the natural, social and cultural environment". The competences also derive from a set of basic knowledge that seems to correspond to the content and program of the discipline, organised into three aspects: A - Scientific culture; B - Technology and digitization; C - Societies and Territories. Similar structures are applied in the remaining compulsory school years.

Here are the nine specific competences prescribed for the subject - **Knowledge of the natural, social and cultural environment**:

- Use digital devices and resources in a safe, responsible and efficient way to search for information, communicate and work individually, in a team and a network, and rework and create digital content under the digital needs of the educational context.
- Pose and answer simple scientific questions, using different techniques, instruments and models of scientific thought to interpret and explain facts and phenomena in the natural, social and cultural environment.

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- Solve problems through design projects and computational thinking to cooperatively generate a creative and innovative product that responds to specific needs.
- Know and become aware of one's own body and one's own and others' emotions and feelings, applying scientific knowledge to develop healthy habits and achieve physical, emotional and social well-being.
- Identify the characteristics of the different elements or systems of the natural, social and cultural environment, analyse their organisation and properties and establish relationships between them to recognize the value of cultural and natural heritage, conserve it, improve it and undertake actions for its responsible use.
- Identify the causes and consequences of human intervention in the environment, from the social, economic, cultural, technological and environmental points of view, to improve the ability to face problems, seek solutions and act individually and cooperatively in their resolution, and put into practice sustainable lifestyles consistent with respect, care and protection of people and the planet.
- Observe, understand and interpret continuities and changes in the social and cultural environment, analysing relationships of causality, simultaneity and succession to explain and assess the relationships between different elements and events.
- Recognize and value diversity and gender equality, showing empathy and respect for other cultures and reflecting on ethical issues, contributing to the individual and collective well-being of a society in continuous transformation and achieving the values of European integration.
- Participate in the environment and social life effectively and constructively with respect for democratic values, human and childhood rights and the principles and values of the Spanish Constitution and the European Union, valuing the role of the State and its institutions in the maintenance of peace and comprehensive citizen security, to generate respectful and equitable interactions and promote the peaceful and dialogued resolution of conflicts.

Case Study: Youth with Researchers

Description of the case (what skills were delivered)

Research is essential for the advancement of science, and that is why it is so important to introduce it from high school to train future researchers. In the same way, it is essential to learn to carry out a research project applied to any discipline. These two objectives are fully covered by the **Youth with Researchers programme**[90] ("Jóvenes con Investigadores"), which is defined here as a reference and good example. The programme is an inter-centre project in which research projects are developed from different fields in collaboration with the University. Generally, more than 90 students from 11 different centres have participated in each edition with different research proposals.

University researchers participating propose a research project, and the students select a research project to join under the supervision of the organisers to have an adequate distribution.

[90] https://jovenesconinvestigadores.wordpress.com

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This involvement of the University staff implies that the students also visit laboratories and other specific areas of the University for the first time. Research groups are from all disciplines (humanities, social sciences, chemistry, physics, and technical). For example, researchers from the University of Seville group within ECF4CLIM have participated in experimental and applied projects on Environmental Education in the context of Engineering and Architecture subjects over the last five years. The goal was to promote sustainability in buildings and reduce fuel resource consumption.

Once the students in each centre have been selected, and the inter-centre research teams have been formed, the students attend four research sessions with the IES tutor professor from the University. The work environment is again Google Drive, and through the blog, they make known the projects that the students will then choose, guided by the high school teacher coordinator of their centre. Finally, the final results are exhibited in a regional Congress, in which all the developed projects are presented, in English, just like any standard Scientific Congress (**Fig. 1**).

They work the scientific methodology around a research project: they make assumptions, do experiments to test them, and finally, assumptions are validated or disregarded. The preparation of papers and posters and presenting the results in front of a broad audience generate additional skills for the students.

Figure 1. Annual Conference for dissemination and exhibition of the developed research works in 2017.

Who/how initiated (drivers and enablers)

This educational program links high school students with researchers from the University, which emerged during the 2014-2015 academic year from the Piiisa project[91]. In this project, secondary and high school students carry out research projects with researchers from the University of Seville, who belong to multiple disciplines, thus discovering how to investigate with a coordinating teacher from the high school. This program was also implemented in Malaga, Granada and Córdoba (Spain).

[91] https://piiisaandalucia.blogspot.com

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Strengths of the practice

Innovative ideas are always welcomed to improve learning in educational environments. This is especially true in those areas or spaces where students can manage diverse and robust experiences to develop their own identities outside the school, helping them seek their future and appreciate their learning activities (**Fig. 2**).

The programme promotes the use of digital tools through ICT work tools, specifically those provided by the GSuites environment: Google docs, presentations, drive.

Figure 2. Initial training sessions between students and researchers in 2018.

The primary outcome of this initiative is pulling together the educational and scientific communities targeting students' skills acquisition. It has created a rich "all-in-one package" methodology based on academic key areas like creating new learning communities, learning by action, crossing boundaries, multiple intelligences, and social learning. The topic of environmental education contributes significantly to good practices and generates greater awareness after experimenting, measuring and testing results on the impact of specific actions. It is considered a very efficient tool for students' engagement in Science during and after secondary school. It motivates and commits students to make school interesting for youngsters.

Limitations of the practice

The main limitation of the programme is the selection of students. The participants have to fulfil specific requirements like good competencies in matters related to the area of the project, a good level of English, and send a motivation letter outlining the skills and competencies that can contribute to the project. This selection strategy may leave behind students who do not feel so confident and who have lower grades in STEM subjects. These selection criteria can cause the program to be seen as elitist. The second limitation is that projects do not need to address sustainability or climate change issues.

Results achieved inc. their assessment/evaluation, if available

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Six editions of this Congress have already been held, two of them on an Andalusian scale, in which projects from other provinces have participated. More than 200 people, students, teachers and other members of the University attended the presentation of the final results. The project has garnered numerous awards and recognitions in: Injuve, Science in Action, and the Youth Awards for Scientific Culture of the Seville City Council.

Challenges and barriers faced

The programme depends on the availability of scientific researchers and unique spaces like laboratories. The logistics involved can be a challenge that the programme and participants need to address.

Transferability and Scalability

Students and teachers can learn about other research projects under development through the work tools on the google drive environment, through protocols to prepare all the documents and final products. In addition, two high schools have implemented a new specific subject aligned with the "Jóvenes con Investigadores" programme. Students develop these research activities with an active methodology during the rest of the season. They are oriented to introduction to research and acquiring transversal skills that enrich the students' capacities and prepare them for applying scientific methodology to different areas.

Key takeaways

As the main insights of this Program, firstly, the students learn to develop a research project and acquire excellent skills such as learning to learn, digital competence, and autonomy. Secondly, teachers improve their skills in ICT tools, update their knowledge and design activities that can be implemented in the classroom based on the research they have carried out. Finally, they establish links between High Schools and the University, publicise the community's research work, and create scientific or humanistic vocations.

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Benchmark

Benchmarking is variously defined as a self-improvement tool for organisations to compare themselves to others, identify comparative strengths and weaknesses, and learn how to improve. Thus, it is widely accepted that benchmarking is a method of comparing performance, usually to establish 'good' 'best' practices (Schofield, 1998). benchmarking is not just 'comparative analysis' of how an institution matches up to others in terms of measures like student-staff ratios, or graduation rates, because this doesn't drive change and does not specifically focus on the practices which create superior performance (Schofield, 1998).

***

The Netherlands[92] has a long and rich history of using environmental education as a key strategy in addressing environmental issues, with its first national environmental education policy enacted in 1988. The Dutch government facilitates a "learning society" to assist individuals and institutions in addressing critical issues through education and sustainable practices by positioning environmental education as a platform for forging relationships and building capacity. National policy also encourages new monitoring and evaluation forms for the country's well-known environmental education programmes. One of them is Groen Gelinkt, a web hub that provides teaching materials and information about environmental education and sustainability.

Environmental education resources are available to K-12 educators in the Netherlands through Groen Gelinkt[93]. This online search system allows educators from primary, secondary, and afterschool programmes to locate EE resources by topic and audience. Sustainable PABOs assist schools in launching sustainability projects. Sustainable Chain Gang (VO) is a network of secondary schools collaborating on sustainability education efforts.

In the Netherlands, the national plan on Education for Sustainable Development (ESD) is known as 'DuurzaamDoor,'[94] promoting formal, nonformal, and informal learning. As underlying concepts, this plan is based on multi-stakeholder participation, cocreation, social innovation, and transformative learning. 'DuurzaamDoor' is a Dutch government initiative led by the Ministry of Agriculture, Nature, and Food Quality and implemented by the Netherlands Enterprise Agency. 'DuurzaamDoor' focuses on five thematic areas: biodiversity, food systems, circular economies, energy and climate, and water. Furthermore, there are three cross-cutting areas: Curriculum and Whole School Approach, Integral Decisionmaking for SD ('Omgevingswet'), and Regional Cooperations for (E)SD ('Regionale duurzaamheidsnetwerken'), all of which support bottom-up energy in society.

Although there is no specific national mandate for environmental education in the **UK**[95], there are a variety of policies and practices that assist teachers in this work. Many organisations and groups, for example, are now working to raise public awareness of environmental issues and climate change, as well as to bridge the gap between people's lives and the natural world by incorporating environmental and sustainability education into the curriculum, building capacity

[92] https://thegeep.org/learn/countries/netherlands
[93] https://groengelinkt.nl
[94] https://www.duurzaamdoor.nl/education-sustainable-development-netherlands
[95] https://thegeep.org/learn/countries/united-kingdom

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to take action, and influencing policy. The following are especially important: cross-disciplinary references to environmental issues in school curricula, government support for global learning, a widespread Eco-Schools programme (an international award that provides a framework for schools to integrate sustainability into school life), and numerous outdoor learning programmes (such as forest schools) that use the 'outdoor classroom.'

The phrase "environmental education" does not appear in English legislation, but there are numerous examples of environmental issues and topics appearing in curricula and schemes of work (for primary schools, see). Secondary education follows a similar pattern, as do public examinations taken by students between the ages of 16 and 18. The **National Curriculum** covers a limited number of environmental topics, but an overarching goal is to develop pupils' awareness and understanding of, and respect for, the environments in which they live, and secure their commitment to sustainable development at a personal, local, national, and global level was removed in 2014.

Norway has a long history and affinity with SD principles, reflected in its current commitment to numerous SDGs international targets. As a result, Norway recognises the SDG 2030 agenda as a transformative global roadmap for our national and international efforts to eradicate extreme poverty while protecting global boundaries and promoting prosperity, peace, and justice. SD has been included in Norway's formal education curriculum since the 1970s, with various subsequent additions incorporating ESD-related principles into the core curriculum (Mathie, 2019).

The 2020 national curricula renewal has set a high bar for ESD's future implementation. In a Norwegian Government press release (2018), SD is proposed as a core interdisciplinary topic alongside health and life choices and democracy and citizenship in UDIR's (2019) overview of curricula renewal. According to the press release, these proposed themes will be delivered through topics that naturally cross several subjects based on current social challenges and dilemmas, and students will understand the relationship between actions and choices and know how to find solutions through knowledge acquisition and the use of technology (Mathie, 2019).

Four key factors have been identified to facilitate student action competencies and ESD implementation in schools: 1. school leaders' support and vision; 2. local community partnerships; 3. school owners' support; and 4. support for multi- and interdisciplinary projects. The Foundation for Environmental Education's Eco-school green flag accreditation scheme and Sustain, which provides online training support, project ideas, and tools for ESD and is used both nationally and internationally, are two other Environmental Education networks (Mathie, 2019).

Norway is frequently grouped and compared within a broader 'Scandinavian' context; thus, viewing Norway alongside its neighbours provides a broader context and comparison point regarding ESD policy and the effectiveness of ESD practices. In this context, Norway's ESD contribution and implementation strategy have been portrayed as lagging behind their Scandinavian neighbours (Mathie, 2019).

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To elaborate on the benchmark exercise between the countries under study and three reference countries (UK, Norway and the Netherlands), we developed a classification table of curriculum

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designs. The categorization derives from the article by Suárez-López & Eugenio-Gozalbo (2021). In this paper, the researchers compare the curricula for sustainability in Portugal and Spain. Based on the reflections presented there, we identified the following topics and rationale for comparing curricula:

Definition of sustainability and type of knowledge

Manuel Castells defines environmental movements into five currents: preservation of nature, defence of space itself, counterculture/deep ecology, saving the planet, and green policy.

In the educational systems analysed, sustainability is mainly addressed in the form of posing environmental problems (pollution, climate change, etc.) in STEM subjects, without explicit links to economic or social issues. Sustainability is also addressed a lifestyle choice covered by subjects such as ethics and environmental awareness activities. The European perspective based on learning outcomes is replacing ecological and traditional perspectives, but a poetic approach still exists in the first years of schooling. Contrary to the first ecological movements, economic and political debate are not part of sustainability competences.

- ➔ Resorting to local projects can help to balance traditional and technical knowledge as it seems to be the case of the reference countries.

Policy-driven versus School-driven

Sustainability in curricula may be driven by national/regional policies or by school projects and initiatives. Educational policies need to be formulated to affect the entire educational system; otherwise, they risk becoming merely symbolic. School administrators and teachers tend to respond by making superficial changes without impacting teaching.

Both perspectives coexist in the countries at study, although the tendency is to create national curricula that address sustainability as a competence. The new curriculum designs promote their development through school and local developments and contextualisation. Besides this, the complexity of sustainability demands the contribution of different stakeholders. This way, networks and territorial projects are also present and necessary. This allows complementing the individual and standardised approach of national curricula with outdoor, experiential learning and the collective and territorial experiences.

Also, national environmental policies are complemented with educational policies. These countries also promote the participation of civil society in projects for sustainability competence namely in CSR programmes.

- ➔ The participation of different stakeholders in sustainability education and the proliferation of local and collective projects can promote the collective construction and share of pedagogical resources and teaching materials. These resources can be made available in digital platforms as in the **Netherlands**. However, the participation of enterprises is still reduced.
- ➔ The reinforcement of school leadership and local partnership is being valued in **Norway.**
- ➔ Resorting to outdoor activities and schools projects can foster the participation of organizations and groups working with environmental awareness as in the **UK**.

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Subject matter

The concentration of references to sustainability in subjects in the natural sciences fosters technological and scientific optimism. These references are related to issues, such as recycling or renewable energy, and more general reflections lack reflection on the underlying economic model.

Sustainability content is more concentrated in STEM and Geography subjects. This can make sustainability competences to be considered as a specific attribute of a group of people working in these areas.

Traditional ecological knowledge derived from practical experience is part of European cultural heritage and constitutes a valuable source of environmental, economic and social information about territory based on secular. Resorting to traditional knowledge and not only technical knowledge can facilitate the adoption of collective behaviours and attitudes towards the environment by recovering collective memories and considering alternative solutions.

- ➔ The presence of sustainability contents at every school level and grade, crossing subjects can contribute to a "learning society" that seeks to acquire and develop sustainability competences in lifelong learning. Education for sustainability can be promoted in formal, nonformal, and informal learning. This tendency can approximate these countries to the good practices of the **Netherlands**.
- ➔ These countries have placed sustainability as a core interdisciplinary topic alongside health and life choices and democracy and citizenship, as does the **Norwegian** educational system.

Content-based versus outcomes-based

Competencies-based curricula can face difficulties to overcome the structural limitations that the framework of content-based curricula involve.

The countries taken as reference for this benchmarking did not depend on recent curricular changes to promote sustainability. Instead, they seem to have a tradition of resorting to a broader perspective that includes school and out of school learning. The delivery of sustainability competence is a collective social commitment and not an exclusively educational one.

This also poses the question of assessment and testing. Should sustainability competences be evaluated, and can traditional evaluation methods restrict the pedagogical strategies for sustainability training? These transversal and complex competences demand a change in assessment methods and practices.

These countries are moving towards outcomes-based curricula; where this change is more recent the contents still prevail and are described in a traditional content-based design.

- ➔ The implementation of outcome-based curricula must be accompanied by teacher training or collaboration between schools; such is the case of **Norway**.

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Country highlights

Finland

- Sustainability competences are present in two out of seven transversal competencies in the National Core Curriculum for basic education. This way, every subject in each grade offers learning modules and contents that promote the acquisition of these competences starting as early as the first two grades but growing in later years.
- Sustainability contents present at every stage and grade.
- A holistic approach over sustainability competences addressed by such different subjects such as ethics, the arts, music or physical education.
- The offer of multidisciplinary learning modules facilitates the understanding of complex sustainability problems.
- These contents are more centralized in STEM subjects, but also available in personal development areas such as ethics and religion and specific subjects such as environmental studies.
- This approach possibly makes sustainability part of one's attitude and behaviour in the world combining a technological approach and a poetic one.
- Sustainability is part of a national curriculum, but this is a flexible design that allows space for schools and teachers' pedagogical and local elaborating and interpretations.

Hungary

- Reduced presence of sustainability concerns in the national curricula.
- Sustainability more present in the first schools' years as a poetic approach to nature.
- Despite recent changes in educational policies, sustainability contents still prevail in STEM and geography subjects.
- Offer of a separate subject for Sustainability consisting of learning how to use the resources consciously
- Space for pedagogical independence for schools and teachers to prepare the annual curriculum for their subjects and groups of students.
- Recent changes in the national curriculum to a European design; sustainability is not directly mentioned in the seven transversal competences.
- Awareness raising activities in the first years to set positive attitudes towards environmental protection.
- Sustainability education offer through school's projects and based on traditional knowledge.
- Juxtaposition of projects and activities that separate sustainability into a specific set of problems and strategies for attitude formation with recent curricular changes that try to promote sustainability as transversal competence.

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Portugal

- Portugal has a national curriculum for citizenship that includes a national strategy for environmental education. This sets a national policy flexible enough to promote local curriculum management in schools.
- Environmental education starts in preschool education.
- Sustainability competence as citizen competence based on consumption
- The national set of competences and learning contents cover STEM and geography contents related to biodiversity, energy as well as climate change awareness and ethics
- The set of skills does not guarantee how schools will organize these learning contents and what pedagogical strategies will be used.

Romania

- Sustainability as transdisciplinary competence
- Sustainability taught in separated subjects
- Predominance of an ecological perspective and environmental protection approach over sustainability.
- Sustainability competence as a scientific research/investigation competence
- Sustainability competence as environmental concern
- Concentration of sustainability issues in STEM subjects.

Greece

- Sustainability as STEM and Geography competence
- Environmental education as interdisciplinary subject
- Awareness of the need to accomplish the 17 SDGs

Spain

- Recent changes in national curricula towards outcome-based curriculum and a profile of the student at the end of compulsory education.
- Citizen competence as one of the transversal competencies
- Sustainability contents provided as early as child education
- Sustainability as part of a healthy lifestyle
- Sustainability as part of the values of European and democratic societies
- Education in Civic and Ethical Values as a separate subject in secondary education

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Main conclusions

The period we leave in is one of impending transition unprecedented in human history. A growing number of scientists and scholars are converging on a consensus: that some degree of the planetary destabilization humans have put into place is now irreversible, at least over the next century or more (Robertson, 2014). The International Geosphere-Biosphere Programme has proposed a definition for a new geological age in which human impact on the planet equals or exceeds natural forces: The Anthropocene (Agirreazkuenaga, 2019).

Sustainability not only become a concern addressed by national environmental and educational policies in the countries analysed, but also has driven a set of changes in national and local curricula.

In these European countries, sustainability as a competence disputes its place among citizenship and ethics competences and STEM and Geography competences. This perspective of sustainability as an attitude over individual lifestyle choice and a technical skill can reinforce two common ways of approaching environmental issues: as an anxiety factor for younger generations or as a problem that can be addressed by technological optimism demanding only the ability to identify problems and risks and to implement research and engineering skills and knowledge. The impact of political, social and economic models on climate change is not forgotten because the concept of sustainability is attached to the idea of a European society built over traditional knowledge.

Warnings based on convergent empirical evidence of climate change's environmental, economic, and social implications should make us understand that sustainability is not an option. It is a duty that must be addressed immediately, and official curricula on sustainability must be urgently updated (Suárez-López and Eugenio-Gozalbo, 2002). Besides this, the update must be constant, and this can benefit from informal and non-formal learning as well.

The lack of a genuine conception of sustainability in formal education is critical because it does not involve a paradigm shift—from development to sustainable development—and is far from facilitating a paradigm shift (Suárez-López and Eugenio-Gozalbo, 2002). The paradigm shift is also necessary in curricula to interdisciplinary educative approaches, with a focus on real-life practical problems.

Finally, there is no explanation of the theoretical foundations or embedded ideology in sustainability policies. The complex and diverse historical origins of sustainability remains both context-specific and ontologically open. Thus, any rigorous operationalisation needs an explicit description of how it is understood (Purvis et al., 2018).

As mentioned in the literature review there are different sustainability competences frameworks available. A recent proposal is that of the Joint Research Center: **GreenComp – The European sustainability competence framework.** This framework consists of 12 competences organized in four areas: Embodying sustainability values; Embracing complexity in sustainability; Envisioning sustainable futures and Acting for sustainability.

This framework proposes a broad, holistic and balanced view of green competences. It goes beyond the national curricula by moving away from the general lifestyle approach and technological optimism. However, it places sustainability as a cognitive challenge.

The GreenComp combines an individual development and a cognitive approach by placing "values", "critical thinking", and "problem framing" as the first competences. It brings, however, two novelties. The first one is considering envisioning the "future" as the next area of competence. It will be necessary to elaborate on a distinct future to tackle environmental problems. However, this can pose two fundamental problems: first, it is a common idea that climate change consequences will impact only "the future," making it a less urgent problem and justifying a lack of commitment; second, the imagination about the future and its progress and novelties got us right at the centre of a planet under attack. It can also promote the idea that the past has no answers to what is a sustainable collective life.

Even so, the GreenComp also addresses competences regarding urgent situation with climate change, this is embedded in the competence area "Embodying sustainability values" and in its competence "Promoting nature". This can be seen also in the area "Embracing complexity in sustainability", where circular economy using the concept of "life cycle" is explicit.

Also, the knowledge from the past is very explicit in the competence area "Embodying sustainability values", in the competence "Supporting fairness". Showing that actions towards a sustainable future can be fostered on competences that were built on the top of prior learnings.

The fourth area of competence, "Acting for sustainability", brings a relevant set of knowledges, behaviours and attitudes that emerge from a definition of environmental problems and sustainability as the result of political decisions that must be made accountable. It also gives place to collective action and community values.

In the appendix, we compare the GreenComp framework with the national curricula. As the table presents, this framework covers much of the national curricula introducing new and relevant areas of competence e describing actual competences in a more balanced way.

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Glossary of terms[96]

Attitudes are a set of mind or disposition to react to, and to take action for, a particular value or purpose.

Climate change education for sustainable development (CCESD) is defined as a multi- and interdisciplinary response to climate change that enhances knowledge and awareness of the basic science, causes, and impacts of climate change; encourages changes in individual and societal behaviours and lifestyles; and increases individuals' and societies' adaptation and mitigation capacities.

Competence is the quality of being functionally adequate in performing the tasks and assuming the role of a specified position with the requisite knowledge, ability, capability, skill, judgment, attitudes and values. Competence is molar, consisting of several interrelated parts, and is stated in general terms. Competence is made up of the areas of competence.

Competence-based education derives from and organizes around an agreed-upon set of competences and provides the learning experiences designed to lead to the attainment of those competences.

Corporate Social Responsibility and Sustainable Development emerges as a new management perspective to answer these market demand and it goes beyond the traditional social sphere to include the environmental dimension as well. Thereby, it is possible to affirm that the concept of Corporate Social Responsibility is directly related with the principles of sustainable development. Considering that corporate responsibilities permeate economic, environmental, and social responsibility, their main result is corporate sustainability, promoting an organization's growth while improving sustainable development.

Green Education and Sustainable Development can be broadly considered as education for social, economic, and environmental sustainability. It is a transformative paradigm which values, sustains and realizes human potential in relation to the need to attain and sustain social, economic and ecological wellbeing, recognizing that they must be part of the same dynamic.

Eco-schools and Sustainable Development also known as green school, movements have been initiated worldwide. Environmental responsibility in schools has led to the emergence of a variety of criteria to administer Eco-Schools' contributions to sustainability. The Eco-School movement is impacting both the formal and informal environmental education that young people experience in school. By advancing new school construction, retrofitting current buildings, changing cleaning and maintenance practices, changing lunchroom practices and modifying teacher-led curriculum, the Eco-School movement is saving money and having an initial impact in improving educational outcomes.

[96] Adapted from Ferreira, J. A., Neus (Snowy). Evans, Davis, J. M., & Robert (Bob). Stevenson. (2019). Learning to embed sustainability in teacher education. Singapore, Singapore: Springer; Butler, F. C. (1978). The Concept of Competence: An Operational Definition. *Educational Technology*, *18*(1), 7–18. http://www.jstor.org/stable/44418395; Gale, L. E., & Pol, G. (1975). Competence: A Definition and Conceptual Scheme. *Educational Technology*, *15*(6), 19–25. http://www.jstor.org/stable/44417993 and Leal Filho W. (eds) Encyclopedia of Sustainability in Higher Education. Springer, Cham. https://doi.org/10.1007/978-3-030-11352-0_220

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Education for sustainability (EfS) develops the knowledge, skills, values and worldviews necessary for people to act in ways that contribute to more sustainable patterns of living. It seeks to empower individuals and communities to reflect and act on ways of interpreting and engaging with the world such that social, economic and environmental systems are not diminished for both current and future generations.

Education for sustainable development (ESD) is more commonly used in Europe, and in United Nations (UN) and United Nations Educational, Scientific and Cultural Organization (UNESCO) policies and documents. This term is not widely used in Australia and has been critiqued in the fields of EE and EfS for its focus on economic development.

Environmental education (EE) is a holistic, lifelong learning process directed at creating responsible citizens who explore and identify environmental issues, engage in problem solving, and take action to improve the environment. Originally, its focus was on learning and teaching about, in and for the natural environment but it is now similar to Education for Sustainability and Education for Sustainable Development.

Knowledge is a set of identifications, differentiations, concepts, classifications, rules, principles, processes, operations and strategies; the who, what, when, where, how and why; the informational basis for a skill.

Learning Outcomes for Sustainable Development can be defined as educational goals that aim to support students' full development and well-being in an holistic and sustainable perspective. A main role has been attributed to education and educational practices, which are the most relevant means for enhancing specific learning outcomes for sustainable development: knowledge, self-regulation skills, critical thinking skills, social responsibility, social participation, and cooperation among people.

Skill is the ability to carry out a purposeful activity with facility; the proficient application of knowledge and process to a task

Sustainable development (SD) commonly refers to human development processes that simultaneously meet human needs while also sustaining the ability of natural systems to provide the natural resources and ecosystem services upon which society and the economy depend.

Sustainability is the commonly used term for SD in Australia. There are multiple interpretations of sustainability and varied foci, usually either on economic sustainability or environmental sustainability. There are also 'weak' and 'strong' forms of sustainability. Weak forms tend to focus on economic development, while strong forms tend to focus on the environment and on human development and well-being.

Sustainability education (SE) is an alternative term used instead of education for sustainable development and education for sustainability.

Values are ideals and purpose held in high regard; concepts and principles of particular importance and worth to the individual, a group, a society or a culture; the basis for attitudes.

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Appendix

Hungary

Levels of education	Subject /grades	Themes / Contents	Skills / Learning outcomes
Primary and lower secondary (ISCED 1-2)	Environmental education (3-4) (68h)		[The learner] has a sense of responsibility for its narrower and wider environment; illustrates the impact of human activity on the natural environment; recognizes which substances can pollute our environment in our daily lives, which habits lead to damage to our environment; learns habits and behaviours aimed at preventing damage (e.g. waste minimization, saving material, reusing, prioritizing public transport, walking or cycling, saving energy).
	Natural Sciences (5-6) Biology, Physics, Chemistry (7-8)	The concept of sustainability, its biological contexts (28h): - The life of our planet - Protection of natural assets - The relationship between the living world and man, sustainability. Water, air and solid substances in the home and environment Global problems in our	[The learner] groups energy sources according to different aspects; provides examples for comparing renewable and non-renewable energy sources; recognizes the impact of energy production on natural and artificial environments. understands the development and impact of global climate change, acid rain, ozone depletion and smog on humanity; Identifies and provides examples of the most common sources of air, water and soil pollution in its environment; describes the composition of household waste, the possibilities of its use and reduction, in the framework of a presentation or project work, with special regard to hazardous waste.

Levels of education	Subject /grades	Themes / Contents	Skills / Learning outcomes
		environment Environmental impacts of energy consumption Chemistry and environmental protection: - Air pollution and its consequences; - Water pollution - The waste	
	Citizenship (8)	Basics of consumer protection (3h): - The relationship between conscious behaviour and sustainability and environmental protection.	
Upper secondary (ISCED 3)	Biology, Chemistry, Physics (9-10)	Biosphere balance, sustainability Environmental and nature protection	[The learner] recognizes the factors endangering natural habitats, explains its position on the need for habitat protection and the possibilities of its individual and social implementation; In cooperation with others, plans and carries out an ad hoc or long-term examination of the environmental condition of his / her place of residence evaluates the obtained results;

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Levels of education	Subject /grades	Themes / Contents	Skills / Learning outcomes
		Air and soil pollution Preserving the integrity of our environment (12h): ozone shield, the greenhouse effect, renewable and non-renewable energies. Environmental chemistry and environmental protection	Knows the sources of air, water and soil pollution, types and examples of pollutants analyses their impact on living communities based on specific cases. Illustrates the most pressing global problems facing humanity (global climate change, ozone depletion, depletion of drinking water supplies, depletion of energy resources) and their chemical implications; Is aware of the greatest challenges facing humanity, especially their chemical aspects (energy sources, pollution, sustainability, production of new materials); Illustrates the chemical consequences of anthropogenic activities through examples understands the importance of protecting our environment for the survival of human civilization; Knows the basic rules of the use of plant protection products in everyday life, interprets the description of plant protection products, instructions for use, gives examples of plant protection products from the past and present (burgundy juice, modern pesticides); Knows the chemical composition, production and use of the most important (N-, P-, K-containing) fertilizers.
	Geography (9)	Local problems, global challenges	Development of comprehension, communication and digital competence in the analysis and oral evaluation of traditional and online source texts related to the development of global problems (causes, consequences, mitigation strategies); Improving contextual thinking based on the explanation and understanding of the development of local, regional and global natural, socio-economic and environmental hazards of geographical origin; Development of environmentally conscious and sustainable behaviour based on the systematization of the environmentally damaging effects on the geospheres and the presentation of the interactions of the processes;

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Levels of education	Subject /grades	Themes / Contents	Skills / Learning outcomes
			Analysis of sources dealing with global climate change, formulation of an argument-based opinion on the topic; Explaining the causes of climate change and its local, regional and global consequences; Developing system thinking, individual and community responsibility, environmentally conscious and sustainable behaviour, and responsible decision-making through knowledge of the global and local causes, consequences, mitigation and application strategies of climate change. Presentation of the consequences of climate change in Hungary, formulation of mitigation and adaptation strategies. Presentation of environmental hazards related to watercourses (inland water, flood), interpretation of the quantitative and qualitative protection of water resources.
	Sustainability (10-12)	Meaning and goals of sustainable development (2h) Consumption, fashion, recreation (6h) Room, building, settlement (6h) Leisure, transport, transportation (5h) Relationships between economic development and sustainability (12h) Working together for a	The student discovers the connection between his / her own consumption and lifestyle habits and natural and environmental problems. It recognizes and can give examples of what can be changed. Creates a simple resource plan. His plan is realistic, in line with its priorities, the time required for its activities and the sustainable use of available resources. Designs and implements a work program based on specified criteria for sustainability. He analyses, evaluates and presents the results of his work. By analysing a specific problem, he recognizes the interdependencies between the natural and built environment, the behaviour of the individual and the socio-economic space around him. Analyses, gives opinions and suggests decisions that help sustainability based on aspects. Is aware of the territorial aspects of pollution, particularly in vulnerable areas; Recognizes the links and contradictions between changes in the state of the environment and economic development and development;

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Levels of education	Subject /grades	Themes / Contents	Skills / Learning outcomes
		sustainable future (10)	Is familiar with the characteristics, advantages and limitations of linear and circular farming; Presents the characteristics of the 21st-century energy economy, the aspects that promote and limit the sustainability of the use of energy resources; Recognizes the socio-economic context and environmental impacts of the use of natural resources, in particular, energy sources; Understands the strengthening of the role of human and social resources in today's socio-economic development; Is able to identify some socio-economic aspects and contradictions in the validation of environmental aspects. Knows some of the most important environmental and sustainability directives and objectives formulated at the domestic and international levels; Understands the importance of bringing together different professions and different types of organizations in the preservation of natural and socio-cultural values; Knows the domestic and international, state, interstate and social environmental organizations and initiatives, is aware of their activities; Interprets the potential of community service in terms of sustainability.

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Portugal

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Levels of education	Subject /grades	Themes / Contents	Skills / Learning outcomes
Pre-school (ISCED 0) to upper Secondary (ISCED 3)	Citizenship Education (Pre-school to 12th grade)	I. Sustainability, Ethics and Citizenship	Understands the concept of sustainability; Becomes aware that their actions influence the environment (or the environment quality); Understands their rights and duties as citizens in the face of the environment; Adopts behaviours aimed at preserving natural resources in the present with a view to future generations; Adopts behaviours that aim at animal welfare.
		II. Sustainable Production and Consumption	Becomes aware of the need to adopt practices aimed at waste reduction; Understands that waste contains reusable elements or recyclable; Understands the need to adopt a personal and responsible consumption community; Knows ways of production that aim at sustainability; Recognizes that unlimited consumption exerts too much pressure on natural resources and causes damage to the environment.

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		III. Territory and Landscape	Recognizes the existence of different types of landscape; Understands the link between landscape elements and local identity; Identifies territorial dynamics from the analysis of different sights; Understand the need to preserve and manage the landscape;
		IV. Climate Change	Knows the causes of climate change; Understands the environmental impacts resulting from climate change; Becomes aware of the need to adopt behaviours aimed at adapting to and mitigating climate change.
		V. Biodiversity	Know different energy sources, as well as the advantages and disadvantages arising from their use; Understand the effects on the environment resulting from the energy model in force until today; Recognize the need to adopt models that promote energy efficiency; Adopt behaviours aimed at energy sustainability; Look for personal and community solutions to move towards efficient and sustainable use of energy.

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		VII. Water	Understand the importance of water as an essential resource for the existence of life on the planet; Assume behaviours that reflect respect and appreciation of water as a resource; Understand the main challenges facing the use of water rationale; Understand the possible consequences of water contamination on the lives of current and future generations; Understand how the ocean influences the climate; Recognize the ocean as a source of goods and services; Know the importance of the oceans for the sustainability of the planet. Adopt behaviours that aim to preserve the oceans.
		VIII. Soils	Understand the fundamental role of the soil as landscape support, human activities and much of life on Earth. Understand that soil is not a renewable resource. Become aware of the main threats to the soil. Understand that human activities are the main responsible for soil degradation. Recognize the need to adopt sustainable practices in the use of soil.

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Romania

Levels of education	Subject /grades	Themes / Contents	Skills / Learning outcomes
Preschool (ISCED 0)	Ecological and environmental education (optional)	Knowledge of the environment by stimulating curiosity for investigation	Discover the main components of the natural environment; Identify sources of pollution and possibilities for their elimination; Understand the notions of reuse and recycling by learning to save.
		Training and practice of practical skills to achieve functional, practical-utility products from recyclable or reusable materials	Process materials from nature to make some products; Observe the beauty of nature and feel the desire to create it.
		Forming positive attitudes towards nature by carrying out ecological education activities.	Show concern for the environment and be able to take action; Express thoughts and feelings towards the environment; Apply in real-life contexts the rules and norms of environmental protection.

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Levels of education	Subject /grades	Themes / Contents	Skills / Learning outcomes
Primary (ISCED 1)	Ecological education and environmental protection (1st to 4th)	Understand and use basic notions about environmental protection.	Ask questions about the realities observed in the environment (home, school, park); Use language specific to environmental protection activities (reuse, reconditioning, recycling, sanitation, environmental factors); Compare the influence of different environmental factors (water, air, soil) on animals and plants in the immediate environment. Initiate discussions on environmental protection; Illustrate with concrete situations the positive/negative influence of environmental factors. Communicate in various ways findings related to environmental protection; Argue the need to protect the environment.
		Training and practice of environmental exploration/ investigation skills.	Observe the elements in the immediate environment (home, school, park); Recognise pollution elements in the immediate environment; Record the data of the observations made on the environmental factors; Identify concrete pollution situations; Explore the results of human activity on the environment starting from concrete situations; Explain connections and inter-conditionings between various aspects noticed in the environment; Interpret observed aspects of the environment (causes, effects); Highlight the influence of the environment on the human body (risk factors, temperature variations, humidity, pollution, etc.); Verify hypotheses given by performing experiments.

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Levels of education	Subject /grades	Themes / Contents	Skills / Learning outcomes
		Forming a motivating and responsible attitude towards maintaining and improving environmental quality.	Express opinions about different behaviours in the human relationship with the environment; Adopt norms and rules of behaviour concerning the environment; Practice ecological behaviour skills in concrete situations; Participate consciously in actions to preserve and improve the quality of the environment; Take a stand against situations that lead to environmental degradation. Distinguish between positive and negative actions concerning the environment; Promote ecological values; Report situations of violation of environmental protection rules; Get involved in popularisation and awareness actions.
	Create your environment (3rd to 4th)	Relation of environmental factors with living environments	Identify common features of living things, following adaptation to the environment; Exemplify the effects of natural phenomena on living things; Identify in the environment the forms of its degradation; Identify effects of environmental degradation.
		Forming a behaviour of respect and protection for the environment.	Identify ways of polluting the environment by direct observation; Anticipate the effects of environmental pollution on living things. Correlate the sources of pollution - the forms of pollution - the effects of pollution in the observed local environment;

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Levels of education	Subject /grades	Themes / Contents	Skills / Learning outcomes
			Identify an ecological imbalance in the area they live.
		Practising various ways of pro-ecological involvement.	Initiate activities for the protection of the local fauna; Engage voluntarily in age-specific actions to protect the environment. Find complementary solutions to stop environmental degradation; Involve family members and a group of friends in activities to improve the quality of the local environment; Carry out greening activities of some spaces in the area where he lives.
Lower secondary education (ISCED 2)	Ecological education and environmental protection (5th to 7th)	The use of notions, concepts and principles specific to education for environmental protection.	Identify the components of the environment; Rank the pollutants according to different criteria; Identify the correct sources of information in matters of conservation and environmental protection. Describe, with appropriate language, the components of the environment and the changes produced by human intervention; Identify interspecific relationships between the components of the environment;
		Developing the ability to investigate reality.	Investigate the state of environmental factors by scientific methods (experiment, modelling, case study); Offer practical solutions for improving the quality of the environment; Determine the degree of air, water, and soil pollution; Graphically represent the information acquired through direct and indirect observations;

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Levels of education	Subject /grades	Themes / Contents	Skills / Learning outcomes
			Practice empirical and/or holistic analyses; Perform determinations of the parameters of the environmental factors in an area (humid environment - pond); Carry out an independent investigation activity on the local horizon; Experiment with their solutions to improve the negative anthropogenic impact in an "adopted area".
		Assuming and implementing environmentally responsible behaviour.	Be aware of the impact of environmental imbalances on humans; Take responsibility for improving environmental factors; Show ethical, civic behaviour and some nature protection skills; Promote a balanced behaviour between the individual and the natural environment; Appreciate the positive and negative effects of the anthropogenic intervention on the environment; Formulate measures for prevention and protection of the environment in concrete areas; Develop responsible behaviours and attitudes by referring to the legal norms in the field of the environment; Make responsible and correct decisions regarding ecological behaviour; Demonstrate an understanding of the consequences of one's behaviour concerning the state of health of the environment.
	Create your environment (5th to 7th)	The use of scientific language and terminology appropriate to ecology.	Identify the causes and effects of environmental degradation; Write texts based on specific terminology;

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Levels of education	Subject /grades	Themes / Contents	Skills / Learning outcomes
			Characterise sources of environmental pollution using appropriate terminology; Use specific terminology related to the types of environmental pollution in various communication situations; Describe global pollution problems using specific terminology; Capitalise on informational content from bibliographic sources on ecological topics in materials with a pro-ecological message.
		Analysis of the causal relationships between natural phenomena, life on Earth and human activities.	Identify ways of polluting the environment through systematic observation; Differentiate between the short-term and long-term effects of environmental pollution; Use simple investigation procedures in a case of pollution; Identify correlations between human activities and their polluting effects; Estimate the overall effects of environmental degradation phenomena; Analyse the impact of human activities on the environment; Analyse the disturbing human interventions in the natural environment to improve their effects.
		Manifestation of responsible attitudes concerning the natural environment.	Appreciate the behaviour of people aiming at environmental protection actions; Get involved in concrete activities to improve the human-nature relationship; Show interest in environmental conservation; Express opinions on the human relationship with the natural environment, showing interest and tolerance; Develop a project aimed at solving potential problems between society and the

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Levels of education	Subject /grades	Themes / Contents	Skills / Learning outcomes
			environment; Identify possible solutions to improve the negative aspects encountered in the environment; Assume the responsibility to contribute to the improvement of the environmental conditions through individual and collective actions; Launch pro-environmental campaigns; React critically to messages about environmental issues received in informal contexts; Carry projects about the reduction of pollution phenomenon in the area where the students live.
		Formation of the behaviour of respect and protection towards the environment at the local community level.	Participate in the responsible, correct decision-making process in situations of threat to the "health status" of the environment; Be involved in age-specific environmental protection actions in collaboration with colleagues. Consistently behave responsibly towards the environment by initiating and participating in appropriate protection activities; Participate voluntarily in pro-ecological activities; Initiate partnership actions at the level of the local community; Take responsibility for protecting and improving the environment.

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Greece

Levels of education	Subject /grades	Themes / Contents	Skills / Learning outcomes
Primary school (ISCED 1 and 2)	Geography	Global Problems and Sustainable Development	To develop attitudes and adopt behaviours that contribute to protection of the environment and the perspective of sustainable development. To develop risk management skills aware of natural disasters, evils and environmental protection in the perspective of sustainable development. To report on the activities that are changing our planet and to evaluate the behaviours that contribute to the protection of the environment and the perspective of sustainable development.
	Geology-Geography	Political Geography, Economics Geography	To understand the relationship between man and the natural environment, to raise awareness of environmental issues and to develop attitudes and behaviours towards environmental protection in the perspective of sustainability. To have built and expanded their personal experiences in Geology -Geography. Through practical and experiential approaches, students will broaden their understanding and awareness of geological and geographical concepts, such as the importance of location, the nature of the environment, time, natural hazards, mineral resources and sustainability development. To link geosciences (Geology - Geography) with areas of the Curriculum of other disciplines, including: Physics, Chemistry, Biology, Technology, Environmental Education, Language, Informatics, History, Art, etc., which include topics related to sustainability, globalization, the European dimension, with the evolution of science, etc.
Secondary (ISCED 3)	Social and Political Education	Sustainability as a model of economic development and social organization	The awareness of the multidimensional character of sustainable development and individual and collective ability to achieve it. Identify the concept of global competence and the characteristics of world politics.

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Levels of education	Subject /grades	Themes / Contents	Skills / Learning outcomes
			To delve into the understanding of the World Heritage Objectives linking the principles of human rights with the 17 Sustainable Development Goals. Support the 17 goals of sustainable development. Understand the logic of sustainable development and corporate socialism To export and compare the various models of economic development. Evaluate, accept, and apply the principles of sustainable development. To clear the offsets from the renewable energy sources. Apply reflection to the school environment. Develop a sustainable development plan for their school. Realize that sustainability is now a concern for the global community and that many organizations and NGOs are involved, so it is and with the world. Realize that the implementation of the sustainable development model presupposes (at the level of the individual) education and corresponding daily individual and economic behaviour, but also (at the level of society) political decision-making
Gymnasium (ISCED 3)	Biology A, B, C	Biology and sustainability	To show interest and appreciate the complexity of the natural environment and to eradicate other organisms, as well as the phenomenon of inflammation at all levels of its organization. Recognize the symbol of Biology in improving its quality in sustainable and ecosystem management. Recognize their own eligibility for the availability and protection of the quality of the environment and act in accordance with the principles of sustainable development. Recognize themselves as a unit of the modern generation, but whose choices address the needs of future generations and seek intergenerational justice.

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Levels of education	Subject /grades	Themes / Contents	Skills / Learning outcomes
Primary and Secondary (ISCED 1, 2, 3)	Environmental Education / Training for Sustainable Development (interdisciplinary)	Trash; Urban Development; Biodiversity; Forest; Energy; Desertification; Means of transport; Water; Production and Consumption; Culture and Environment; Tourism; Poverty	Students should be able to recognize parametric dimensions of an environmental issue / sustainable development issue and evaluate critically proposed actions. Identify and analyse an environmental issue / sustainable development characteristics issue, causes. They analyse the consequences and components of an issue, in their local context, as well as nationally and globally. Critically investigate and evaluate the symptoms, causes, effects and alternatives of the environmental issues / sustainable development issues under investigation. Students are able to approach the issues of sustainable development holistically, systematically, interdisciplinary, to understand and critically analyse their parameters. Recognize the interdependence of the coefficients inherent in a system. Recognize the institutions and mechanisms of public life, the various interests embodied in policies related to sustainability, the political ideologies and the systems that lead to decisions and policies on the environment and sustainable development at local, national and international levels. Critically monitor and understand public debate on environmental issues and sustainable development. Students develop communication, dialogue, collaboration, teamwork and participation skills. Collaborate, discuss, exchange views, arguments and thoughts democratically in groups, to investigate the problem under study, while distinguishing the essential and insignificant points of the conversation, critically controlling their ideas while avoiding criticism of persons.

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Levels of education	Subject /grades	Themes / Contents	Skills / Learning outcomes
			To organize and classify the required information, to assess the relevance and coherence of an argument, to cultivate critical thinking and respect for different points of view, to draw conclusions and to encourage dialogue by supporting their views with arguments. Develop critical appraisal skills. Students should be able to search, collect, process, classify, critically analyse, synthesize, evaluate, communicate information and data related to environmental issues / sustainable issues They select information related to an environmental problem through a variety of sources and media judging their suitability. Organize into categories the information they have gathered on an environmental / sustainable development issue. Critically evaluate sources, information and data. Students should be able to recognize, evaluate, systematize and accept values. Recognize the value in choices, categorize them into anthropocentric, ecocentric, biocentric, and analyse their beliefs about environmental / development issues. They analyse and clarify both commonly accepted social values and stereotypes, as well as personal values, defining at the same time the concepts "common good" and "stereotype". Pupils acquire skills of citizenship, personal and collective responsibility and competence for action. Be able to plan and take action on cross-cutting community, national and international level. Recognize actions organized locally, nationally and globally and aim at sustainable development, linking regular or individual actions to specific environmental issues/ sustainable development issues.

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Levels of education	Subject /grades	Themes / Contents	Skills / Learning outcomes
			Understand the need to organize and implement environmental actions / sustainable development actions at local, national and global level, as well as the social, economic, political factors that highlight an environmental / sustainable development issue and the social, emotional reasons. Participate in actions organized at local, national and global level and related to environmental issues / sustainable development issues. They plan actions at local, national and global level related to solving or tackling environmental issues / sustainable development issues promoting sustainable development. Organize and implement actions at local, national and global level related to resolving or addressing environmental / sustainable development issues.

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Spain

Levels of education	Subject / grades	Themes / Contents	Skills / Learning outcomes
Child education (ISCED 1)		**Knowledges:** Healthy lifestyle habits for self-care and care for the environment - Progressive adaptation of their biological rhythms to the group's routines. - Care and basic needs. - Routines related to commitment and autonomy: the anticipation of actions, norms of social behaviour in eating, resting, hygiene or displacement, etc. - Sustainable and eco-socially responsible habits related to food, hygiene, personal hygiene, rest or cleaning of the space. - Actions that promote health and general well-being. Interest in offering a healthy and neat appearance. Structured physical activity.	**Citizenship competence** "To lay the foundations for the exercise of democratic citizenship, positive models are offered at this stage that favours the learning of attitudes based on the values of respect, equity, equality, inclusion and coexistence and that offer guideline for the peaceful and dialogue resolution of conflicts. Furthermore, the identification of social facts related to one's identity and culture is also invited. Similarly, an active commitment to the values and practices of sustainability and the care and protection of animals is encouraged. To this end, the acquisition of healthy and sustainable habits is promoted based on routines that boys and girls will gradually integrate into their daily practices. In addition, the necessary conditions are created to create respectful behaviour with themselves, with others and with the environment, which prevents discriminatory behaviour of any kind." **Specific competences** *Growth in harmony: specific skills, evaluation criteria and basic knowledge* **Specific competence 3:** Adopt models, norms and habits, developing confidence in their possibilities and feelings of achievement, to promote a healthy and eco-socially responsible lifestyle *Discovery and exploration of the environment: specific skills, evaluation criteria and basic knowledge* **Specific competence 3:** Recognize elements and phenomena of nature, show interest in the habits that affect it, to appreciate the importance of sustainable use, care and conservation of the environment in people's lives.

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Levels of education	Subject / grades	Themes / Contents	Skills / Learning outcomes
		Inquiry into the physical and natural environment. Care, appreciation and respect. - Natural elements (water, earth and air). Characteristics and behaviour (weight, capacity, volume, mixtures or transfers). - Influence people's actions on the physical environment and natural and cultural heritage. Climate change. - Natural resources. Sustainability, clean and natural energies. - Natural phenomena: identification and impact on people's lives. - Respect and protection of the natural environment. - Empathy, care and protection of animals. Respect for your rights. - Respect for the cultural heritage present in the physical environment.	
Primary and lower secondary education (ISCED 1 and 2)		**Knowledges:** **1st cycle** 4. Ecosocial awareness: - Knowledge of our environment. Natural	**Profile of the student leaving compulsory school** Develop a responsible attitude based on awareness of environmental degradation and animal abuse based on knowledge of the causes that provoke, aggravate or improve them, from a systemic vision, both local and global.

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Levels of education	Subject / grades	Themes / Contents	Skills / Learning outcomes
		landscapes and humanized landscapes and their elements. Human action on the environment and its consequences. - Eco-social responsibility. Actions for the conservation, improvement and sustainable use of common goods. Animal abuse and its prevention. - Sustainable lifestyles. The responsible use of water, safe, healthy and sustainable mobility, and the prevention and management of waste. **2nd cycle** 4. Ecosocial awareness or climate change. Introduction to the causes and consequences of climate change and its impact on the Earth's landscapes. Mitigation and adaptation measures. - Eco-social responsibility. Ecodependence and interdependence between people, societies and the natural environment. - The transformation and degradation of natural ecosystems by human action. Conservation and protection of nature.	Identify the different aspects related to responsible consumption, assessing its repercussions on the individual and the common good, critically judging the needs and excesses and exercising social control against the violation of their rights. **Key competences** CC2. Participate in community activities, decision-making and conflict resolution in a dialogued manner that respects democratic procedures, the principles and values of the European Union and the Spanish Constitution, human and childhood rights, the value of diversity, and the achievement of gender equality, social cohesion and the Sustainable Development Goals. CC4. Understanding the systemic relationships between human actions and the environment begins with adopting sustainable lifestyles to contribute to the conservation of biodiversity from both a local and global perspective. **Knowledge of the natural, social and cultural environment: specific skills, evaluation criteria and basic knowledge** **Specific competences** **Specific competence 5:** Identify the characteristics of the different elements or systems of the natural, social and cultural environment, analysing their organization and properties and establishing relationships between them in order to recognize the value of cultural and natural heritage, conserve it, improve it and undertake actions to its responsible use. **Specific competence 6:** Identify the causes and consequences of human intervention in the environment, from the social, economic, cultural, technological and environmental points of view, to improve the ability to face problems, seek solutions and act individually and cooperatively in its resolution, and to put into practice sustainable lifestyles consistent with respect, care and protection of people and the planet.

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Levels of education	Subject / grades	Themes / Contents	Skills / Learning outcomes
		Animal abuse and its prevention. - Sustainable lifestyles. Responsible consumption and production, a balanced and sustainable diet, the efficient use of water and energy, safe, healthy and sustainable mobility, and the prevention and management of waste. **3rd cycle** **4. Ecosocial awareness.** - Climate change from local to global: causes and consequences. Mitigation and adaptation measures. - Eco-social responsibility. Ecodependence, interdependence and interrelation between people, societies and the natural environment. - Sustainable development. Human activity in space and the exploitation of resources. Economic activity and wealth distribution: social and regional inequality in the world and Spain. The Sustainable Development Goals. - Urban Agenda. Sustainable urban development. The city as a space for coexistence or green economy. The	**Specific competence 7:** Observe, understand and interpret continuities and changes in the social and cultural environment, analysing relationships of causality, simultaneity and succession to explain and assess the relationships between different elements and events. **Education in civic and ethical values: specific skills, evaluation criteria and basic knowledge** **Specific competence 3:** Understand the systemic relationships between the individual, society and nature, through knowledge and reflection on ecosocial problems, to actively commit to values and practices consistent with respect, care and protection of people and the environment planet.

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Levels of education	Subject / grades	Themes / Contents	Skills / Learning outcomes
		influence of markets (goods, financial and labour) in the lives of citizens. Economic agents and labour rights from a gender perspective. The social value of taxes. Social and environmental responsibility of companies. Advertising, responsible consumption (needs and desires) and consumer rights. - Sustainable lifestyles: the limits of the planet and the depletion of resources. The ecological footprint. **C. Sustainable development and environmental ethics** - Empathy, care and appreciation for living beings and the natural environment. Animal abuse and its prevention. - Human action in nature. Ecosystems and societies: interdependence, ecodependency and interrelation. - The limits of the planet and climate change. - The ethical duty and the legal obligation to protect and care for the planet. - Habits and activities to achieve the Sustainable Development Goals.	

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Levels of education	Subject / grades	Themes / Contents	Skills / Learning outcomes
		Responsible consumption. The sustainable use of land, air, water and energy. Safe, healthy and sustainable mobility. Waste prevention and management.	
Secondary education (ISCED 3)	The subject of **Education in Civic and Ethical Values** must be taken by all students in one of the four years of the stage, being possible to take it in one of the first three years.		**Citizenship Competence** CC2. Analyses and assumes the principles and values that emanate from the European integration process, the Spanish Constitution and human and childhood rights, taking part in community activities, such as decision-making or conflict resolution, with a democratic attitude, respect for diversity, and commitment to gender equality, social cohesion, sustainable development and the achievement of global citizenship. CC4. Understands the systemic relationships of interdependence, eco-dependence and interconnection between local and global actions and adopts, in a conscious and motivated way, a sustainable and eco-socially responsible lifestyle. **Specific skills** 3. Understand the interconnected and inter- and eco-dependent nature of human activities, through the identification and analysis of relevant eco-social problems, to promote ethically committed habits and attitudes with the achievement of sustainable ways of life.

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Finland

In Finland, Finland's National Core Curriculum for Basic Education (2014), sustainability is included in so many pages, that we cannot present all the extracts here. Instead, we present the themes concerning ecological sustainability and in which chapters and how many pages they are presented in the curriculum, and one example of objectives and content areas per theme (all chosen are obligatory studies).

Theme	Chapters and subjects that consist the theme	On how many pages (of total 508)	One example of the Objectives of instruction	One example of the Key content areas
Sustainability (sustainable lifestyle, sustainable development, sustainable future, ecosocial knowledge and ability)	Chapters: 1, 2, 3, 4, 5 + 13-15 incl. subjects YM, BI, GE, FY, KE, TT, US, ET, YH, KU, KS, KO	77	Home economics in grades 7–9, O13: to guide the pupil to adopt a sustainable way of living by paying attention to environmentally conscious and cost-conscious daily-life choices.	Health education in grades 7–9, C3: When examining a sustainable way of life, social sustainability, and responsible consumption are taken into account. When discussing the health impacts of the living environment, key approaches to the promotion of health and the prevention of illness as well as health services, civic activity, and health risks in the environment are addressed.
Nature: structures and principles	Chapters 2 +13-15 incl. subjects YM, ET, BI, GE, FY, KE	32	Environmental studies in grades 1–2, O12: to guide the pupil to analyse the environment, human activities, and the related phenomena using concepts from the different fields of knowledge of environmental studies	Biology in grades 7-9, C3: The basic structure and function of an ecosystem: The structure and function of the Finnish forest ecosystem and the actions and impacts of human activities in them are emphasized in the contents. Basic knowledge on aquatic, marsh, fell, and urban ecosystems is also included. The pupils familiarize themselves with the ecology of different species and the interdependencies between them. Compiling a collection of organisms is also a part of teaching and learning. When selecting contents, the

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				importance of biodiversity in ecosystems is emphasized.
Values and attitudes towards sustainability	Chapters 2, 3 + 13-15 incl. subjects YM, BI, FT, KE, US, ET, KU, KS, KO	40	Religion in grades 3-6, O10: to guide the pupil to evaluate the choices he or she makes and to reflect on the values underlying his or her actions from the perspective of ethical principles and a sustainable future. OR Ethics in grades 3-6, O4: to guide the pupil to take responsibility for himself or herself as well as for other people and the environment	Environmental studies in grades 3-6, C6: The pupils reflect on the impacts of their own actions on themselves, other people, animal welfare, nature, and society. They practise environmentally responsible actions in their surroundings as well as taking care of others.
Human-nature relationship	Chapters 2, 3, 4 +13-15 incl subjects YM, BI, GE, FY, KE, HI, US, ET, KS, KO	43	Geography in grades 7–9, O4: to encourage the pupil to consider the interaction between human activities and the natural environment and to understand the significance of sustainable use of natural resources	History in grades 7–9, C1: The origins and development of the industrial society: The pupils familiarize themselves with a phenomenon that has changed the lives of human beings and the relationship between humans and nature as well as the world.
State of the environment, including climate change, biodiversity, natural resources	Chapters 2 + 13-15 incl. subjects YM, BI, GE, KE, ET,	18	Biology in grades 7-9, O6: to guide the pupil to evaluate changes occurring in natural environments and human impact on the environment and to understand the significance of ecosystem services	Geography in grades 7-9, C6: A sustainable way of living and sustainable use of natural resources: The instruction focuses on sustainable use of natural resources and the possibilities of bioeconomy in Finland and elsewhere in the world. The pupils examine the life cycles of products and consider their personal consumer choices and activity as responsible citizens. They get acquainted with environmental changes, particularly the climate change and the loss of biodiversity. The state of the environment and possibilities for cooperation in the Baltic Sea region are discussed. The effects of

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				globalisation and questions of regional development are reflected on through examples.
Agency and responsibility concerning sustainability	Chapters 2, 3, 4, 5, 6 + 13-15 incl. subjects YM, BI, GE, FY, KE, FY, KE, TT, US, ET, YH, MU, KU, KS, KO, OP	86	Physics in grades 7–9, O4: to guide the pupil to use his or her competence in physics in building a sustainable future and to evaluate his or her personal choices in terms of sustainable use of energy resources.	Environmental studies in grades 1–2, C6: Practising a sustainable way of living: The contents are selected diversely from different areas of sustainable development. The pupils practise taking care of their own belongings and shared items. They learn to reduce the amount of waste they generate, to recycle, and to sort waste. The pupils learn about their home region and its significance. They participate in improving the state of their surroundings and in promoting the well-being of the school community. The pupils consider the significance of their own actions for themselves, other people, and their surroundings.
Activities in nature and practices according to environment, incl. nature as learning environment, plans for sustainability, using materials from nature and environment	Chapters 1,3,4,5 +13-15 incl. subjects AI, MA, YM , BI, GE, FY, KE, HI, ET, MU, KU, KS, LI	67	Chemistry in grades 7-9, O15: to guide the pupil to apply his or her knowledge and skills in chemistry in multidisciplinary learning modules and to provide opportunities for getting acquainted with applying chemistry in different situations, such as in nature	Crafts in grades 3–6, C1: Producing ideas: The pupils learn about different approaches to design and draw on their own multisensory experiences. They also observe and analyse objects as well as built and natural environments to produce new ideas.
General competencies that are important for promoting sustainability incl. political agency, participation, democracy, responsibility, critical thinking, exploratory learning, cooperation outside school	Chapters 1,2,3,4,5,7 + 13-15 incl. subjects AI, KI, MA, YM, BI, GE, FY, KE, TT, US, ET, HI, YH, MU, KU, KS, LI, KO, OP	233	Finnish language and literature in grades 7–9, O7: to guide the pupil to develop analytical and critical literacy, to practise making observations from texts and interpreting them using appropriate concepts […]	Social studies 3-6, C3: Active citizenship and involvement: The pupils explore and practice the skills in democratic involvement and acting in the society needed as responsible and active members of different communities, for instance, in the class and the school, in different pastimes and organizations, in the media and economic activity. They practice cooperation with actors in the local

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				community. They practice working together with actors in the local community.

Chapters: 1. The significance of local curricula and the local curriculum process; 2. Basic education as the foundation of general knowledge and ability; 2.2Underlying values of basic education; Chapter 2.3 The conception of learning; 3. Mission and general goals of basic education; 3.1 Mission of basic education; 3.3 Aiming for transversal competence; 4. Operating culture of comprehensive basic education; 5. Organisation of school work aiming to promote learning and well-being; 6. Assessment; 7. Support in learning and school attendance; 12. Optional studies in basic education; 13-15: Subjects on grades 1-2, 3-6 and 7-9 (AI=mother tongue and literature; KI=second national language and foreign languages; MA=mathematics; YM=environmental studies (grades 1-6): BI=biology (grades 7-9); GE=geography (grades 7-9); FY=physics (grades 7-9); KE=chemistry (grades 7-9); TT=health education (grades 7-9); US/ET=religion or ethics; HI=history (grades 4-9); YH=social studies (grades 4-9); MU=music; KU=visual arts; KS=crafts; KO=home economics (grades 7-9); LI=physical education; OP=guidance counselling)

O= Objective of instruction, C= Key content area

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GreenComp comparision with national curricula

Area	Competence	Descriptor	Coverage
Embodying sustainability values	**Valuing sustainability**	To reflect on personal values; identify and explain how values vary among people and over time, while critically evaluating how they align with sustainability values	Adopt models, norms and habits, developing confidence in their possibilities and feelings of achievement, to promote a healthy and eco-socially responsible lifestyle **[ES]** Recognize elements and phenomena of nature, show interest in the habits that affect it, to appreciate the importance of sustainable use, care and conservation of the environment in people's lives **[ES]** Identify the different aspects related to responsible consumption, assessing its repercussions on the individual and the common good, critically judging the needs and excesses and exercising social control against the violation of their rights **[ES]** CC4. Understanding the systemic relationships between human actions and the environment begins with adopting sustainable lifestyles to contribute to the conservation of biodiversity from both a local and global perspective **[ES]** Identify the causes and consequences of human intervention in the environment, from the social, economic, cultural, technological and environmental points of view, to improve the ability to face problems, seek solutions and act individually and cooperatively in its resolution, and to put into practice sustainable lifestyles consistent with respect, care and protection of people and the planet **[ES]** Observe, understand and interpret continuities and changes in the social and cultural environment, analysing relationships of causality, simultaneity and succession to explain and assess the relationships between different elements and events **[ES]** Analyses and assumes the principles and values that emanate from the European integration process, the Spanish Constitution and human and childhood rights, taking part in community activities, such as decision-making or conflict resolution, with a democratic attitude, respect for diversity, and commitment to gender equality, social cohesion, sustainable development and the achievement of global citizenship **[ES]** CC4. Understands the systemic relationships of interdependence, eco-dependence and interconnection between local and global actions and adopts, in a conscious and motivated way, a sustainable and eco-socially responsible lifestyle **[ES]** To develop attitudes and adopt behaviours that contribute to protection of the environment and the perspective of sustainable development **[ES]**

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			To show interest and appreciate the complexity of the natural environment and to eradicate other organisms, as well as the phenomenon of inflammation at all levels of its organization **[ES]** Recognize their own eligibility for the availability and protection of the quality of the environment and act in accordance with the principles of sustainable development **[GR]** Students should be able to recognize, evaluate, systematize and accept values **[GR]** Recognize the value in choices, categorize them into anthropocentric, ecocentric, biocentric, and analyse their beliefs about environmental / development issues **[GR]** They analyse and clarify both commonly accepted social values and stereotypes, as well as personal values, defining at the same time the concepts "common good" and "stereotype" **[GR]** Show concern for the environment and be able to take action **[RO]** Express thoughts and feelings towards the environment **[RO]** Be aware of the impact of environmental imbalances on humans **[RO]** Take responsibility for improving environmental factors **[RO]** Show ethical, civic behaviour and some nature protection skills **[RO]** Promote a balanced behaviour between the individual and the natural environment **[RO]** Appreciate the positive and negative effects of the anthropogenic intervention on the environment **[RO]** Formulate measures for prevention and protection of the environment in concrete areas **[RO]** Develop responsible behaviours and attitudes by referring to the legal norms in the field of the environment **[RO]** Make responsible and correct decisions regarding ecological behaviour **[RO]** Demonstrate an understanding of the consequences of one's behaviour concerning the state of health of the environment **[RO]** Necessity of a sustainable way of living: Humans are part of nature and completely dependent on the vitality of ecosystems. Understanding this plays a key role in growth as a human being. Basic education acknowledges the necessity of sustainable development and ecosocial knowledge and ability, follows their principles and guides the pupils in adopting a sustainable way of living. (in

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			Chapter 2.2 Underlying values of basic education – in addition to this these viewpoints reflect in other parts of the curriculum) [FI] Environmental responsibility and sustainable future orientation: A learning community accounts for the necessity of a sustainable way of living in all of its activities. The school demonstrates its responsible attitude towards the environment by its everyday choices and activities. Material choices and operating methods that waste raw materials, energy and biodiversity are replaced by sustainable ones. The role that immaterial factors of a sustainable way of living plays in well-being is highlighted, and time is set aside, and visibility is given for these factors in everyday school work. The pupils are involved in planning and implementing sustainable everyday life. (Chapter 4.2 Principles that guide the development of the school culture) [FI] Environmental studies, objective "Significance, values, and attitudes": Grades 1-2: O1 to provide the pupil with opportunities to satisfy his or her natural curiosity and to help the pupil experience the topics discussed in environmental studies as meaningful; […] O3 to support the development of the pupil's environmental awareness and to guide the pupil to act sustainably in the surroundings and the school community. Grades 3-6: O1 to spark and maintain the pupil's interest in the environment and environmental studies and to help the pupil experience all fields of knowledge of the subject as significant for himself or herself; O3 to support the development of the pupil's environmental awareness and to guide the pupil to act and become involved in his or her surroundings and community in order to promote sustainable development and to appreciate the significance of sustainable development to himself or herself and the world. [FI] *There are also other chapters through the curriculum which are related to this competence in Finland.*
	Supporting fairness	To support equity and justice for current and future generations and learn from previous generations for sustainability	Understand the systemic relationships between the individual, society and nature, through knowledge and reflection on ecosocial problems, to actively commit to values and practices consistent with respect, care and protection of people and the environment planet **[ES]** Understand the interconnected and inter- and eco-dependent nature of human activities, through the identification and analysis of relevant eco-social problems, to promote ethically committed habits and attitudes with the achievement of sustainable ways of life **[ES]** Recognize themselves as a unit of the modern generation, but whose choices address the needs of future generations and seek intergenerational justice **[GR]** Apply in real-life contexts the rules and norms of environmental protection **[RO]** Promote ecological values **[RO]**

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			Report situations of violation of environmental protection rules **[RO]** Get involved in popularisation and awareness actions **[RO]** SOCIAL STUDIES grades 4–6: The task of the subject of social studies is to support the pupils' growth into active, responsible, and enterprising citizens. The pupils are guided to act in a pluralistic society that understands diversity and respects human rights and equality in accordance with the values and principles of democracy. […] Objectives: O1 to guide the pupil to become interested in the surrounding society and social studies as a field of knowledge; O2 to support the pupil in practising his or her ethical evaluation skills related to different human, societal, and economic questions […] O6 to support the pupil in understanding that the societal information produced by different actors is affected by different values, perspectives, and motives. […] Contents: C2 Democratic society: The pupils get acquainted with nearby communities and the rights and duties of their members as well as practise making decisions together. The values and basic principles of democratic action, including human rights, equity, and equality, are examined in teaching and learning. The pupils learn about different cultures and minority groups in Finland. [FI] FOREIGN LANGUAGES, English grades 7-9: The pupil realises that values differ depending on individual experience and cultural point of view. [FI] GEOGRAPHY grades 7–9: Objectives related to attitudes and values: O13 to guide the pupil to appreciate his or her regional identity as well as the diversity of nature, human activity, and cultures and to respect human rights in all parts of the world [FI] ETHICS grades 7–9: C3 Human rights and a sustainable future: The pupils get acquainted with human dignity, human rights, and equality among people. [FI] *There are also other chapters through the curriculum which are related to this competence in Finland.*
	Promoting nature	To acknowledge that humans are part of nature; to respect the needs and rights of other species and of nature itself in order to restore and regenerate healthy and resilient ecosystems	Develop a responsible attitude based on awareness of environmental degradation and animal abuse based on knowledge of the causes that provoke, aggravate or improve them, from a systemic vision, both local and global **[ES]** Identify the characteristics of the different elements or systems of the natural, social and cultural environment, analysing their organization and properties and establishing relationships between them in order to recognize the value of cultural and natural heritage, conserve it, improve it and undertake actions to its responsible use **[ES]** Discover the main components of the natural environment **[RO]** Identify sources of pollution and possibilities for their elimination **[RO]**

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			Understand the notions of reuse and recycling by learning to save **[RO]** Process materials from nature to make some products **[RO]** Observe the beauty of nature and feel the desire to create it **[RO]** Adopts behaviours that aim at animal welfare **[RO]** Becomes aware of the need to adopt practices aimed at waste reduction **[PT]** Understands that waste contains reusable elements or recyclable **[PT]** Understands the need to adopt a personal and responsible consumption community **[PT]** Knows ways of production that aim at sustainability **[PT]** Recognizes that unlimited consumption exerts too much pressure on natural resources and causes damage to the environment **[PT]** Adopt behaviours that aim to preserve the oceans **[PT]** [The learner] has a sense of responsibility for its narrower and wider environment **[HU]** ETHICS grades 7–9:[The pupils] familiarize themselves with different views of the relationship between humans and nature, such as the humanist, utilitarian, mystical, and nature-centred view. They explore the possibilities of a sustainable future for the nature and the society as well as questions of environmental ethics, such as animal rights. [FI] *There are also other chapters through the curriculum which are related to this competence in Finland.*
Embracing complexity in sustainability	**Systems thinking**	To approach sustainability problem from all sides; to consider time, space and context in order to understand how elements interact within and between systems.	To report on the activities that are changing our planet and to evaluate the behaviours that contribute to the protection of the environment and the perspective of sustainable development **[GR]** The awareness of the multidimensional character of sustainable development and individual and collective ability to achieve it **[GR]** Identify and analyse an environmental issue / sustainable development characteristics issue, causes **[GR]** They analyse the consequences and components of an issue, in their local context, as well as nationally and globally **[GR]** Recognize the interdependence of the coefficients inherent in a system **[GR]**

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			Identify the causes and effects of environmental degradation **[RO]** [The learner] groups energy sources according to different aspects **[HU]** provides examples for comparing renewable and non-renewable energy sources **[HU]** recognizes the impact of energy production on natural and artificial environments **[HU]** understands the development and impact of global climate change, acid rain, ozone depletion and smog on humanity **[HU]** Identifies and provides examples of the most common sources of air, water and soil pollution in its environment **[HU]** describes the composition of household waste, the possibilities of its use and reduction, in the framework of a presentation or project work, with special regard to hazardous waste **[HU]** In basic education, the pupils examine the conflicting aspects of our modes of consumption and production in terms of a sustainable future and seek and jointly put to practice solutions that improve our way of living over the long term. The pupils are also familiarised with social structures and solutions that impact on the development and guided in exerting influence on them. (Chapter 2.2 Underlying values of basic education) **[FI]** *There are also other chapters through the curriculum which are related to this competence in Finland.*
	Critical thinking	To assess information and arguments, identify assumptions, challenge the status quo, and reflect on how personal, social and cultural backgrounds influence thinking and conclusions.	To understand the relationship between man and the natural environment, to raise awareness of environmental issues and to develop attitudes and behaviours towards environmental protection in the perspective of sustainability **[GR]** Critically investigate and evaluate the symptoms, causes, effects and alternatives of the environmental issues / sustainable development issues under investigation **[GR]** Students are able to approach the issues of sustainable development holistically, systematically, interdisciplinary, to understand and critically analyse their parameters **[GR]** Develop critical appraisal skills **[GR]** Finnish/ Swedish as a second language: Key content areas […] C2 Interpreting texts: […] The texts are examined in terms of the values, ideologies, and means of influence apparent in them (the influence of viewpoint, sentence structure, naming individuals and issues, metaphors and irony on the interpretation of text [FI]

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			Crafts O8 (grades 3-6) to guide the pupil to critically assess different consumer habits and methods of production *There are also other chapters through the curriculum which are related to this competence in Finland.*
	Problem framing	To formulate current or potential challenges as a sustainability problem in terms of difficulty, people involved, time and geographical scope, in order to identify suitable approaches to anticipating and preventing problems, and to mitigating and adapting to already existing problems.	Ask questions about the realities observed in the environment (home, school, park) **[RO]** Use language specific to environmental protection activities (reuse, reconditioning, recycling, sanitation, environmental factors) **[RO]** Compare the influence of different environmental factors (water, air, soil) on animals and plants in the immediate environment **[RO]** Initiate discussions on environmental protection **[RO]** Illustrate with concrete situations the positive/negative influence of environmental factors **[RO]** Communicate in various ways findings related to environmental protection **[RO]** Argue the need to protect the environment **[RO]** Observe the elements in the immediate environment (home, school, park) **[RO]** Recognise pollution elements in the immediate environment **[RO]** Record the data of the observations made on the environmental factors **[RO]** Identify concrete pollution situations **[RO]** Explore the results of human activity on the environment starting from concrete situations **[RO]** Explain connections and inter-conditionings between various aspects noticed in the environment **[RO]** Interpret observed aspects of the environment (causes, effects) **[RO]** Highlight the influence of the environment on the human body (risk factors, temperature variations, humidity, pollution, etc.) **[RO]** Verify hypotheses given by performing experiments **[RO]** Identify common features of living things, following adaptation to the environment **[RO]** Exemplify the effects of natural phenomena on living things **[RO]**

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			Identify in the environment the forms of its degradation **[RO]** Identify effects of environmental degradation **[RO]** Identify ways of polluting the environment by direct observation **[RO]** Anticipate the effects of environmental pollution on living things **[RO]** Correlate the sources of pollution - the forms of pollution - the effects of pollution in the observed local environment **[RO]** Identify an ecological imbalance in the area they live **[RO]** Write texts based on specific terminology **[RO]** Characterise sources of environmental pollution using appropriate terminology **[RO]** Use specific terminology related to the types of environmental pollution in various communication situations **[RO]** Describe global pollution problems using specific terminology **[RO]** Capitalise on informational content from bibliographic sources on ecological topics in materials with a pro-ecological message **[RO]** Identify ways of polluting the environment through systematic observation **[RO]** Differentiate between the short-term and long-term effects of environmental pollution **[RO]** Use simple investigation procedures in a case of pollution **[RO]** Identify correlations between human activities and their polluting effects **[RO]** Estimate the overall effects of environmental degradation phenomena **[RO]** Analyse the impact of human activities on the environment **[RO]** Analyse the disturbing human interventions in the natural environment to improve their effects **[RO]** Understands the concept of sustainability **[PT]** Recognizes the existence of different types of landscape **[PT]** Understands the link between landscape elements and local identity **[PT]** Identifies territorial dynamics from the analysis of different sights **[PT]**

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			Understand the need to preserve and manage the landscape **[PT]** Knows the causes of climate change **[PT]** Understands the environmental impacts resulting from climate change **[PT]** Becomes aware of the need to adopt behaviours aimed at adapting to and mitigating climate change **[PT]** Understand the importance of water as an essential resource for the existence of life on the planet **[PT]** Assume behaviours that reflect respect and appreciation of water as a resource **[PT]** Understand the main challenges facing the use of water rationale **[PT]** Understand the possible consequences of water contamination on the lives of current and future generations **[PT]** Understand how the ocean influences the climate **[PT]** Recognize the ocean as a source of goods and services **[PT]** Know the importance of the oceans for the sustainability of the planet **[PT]** Understand the fundamental role of the soil as landscape support, human activities and much of life on Earth **[PT]** Understand that soil is not a renewable resource **[PT]** Become aware of the main threats to the soil **[PT]** Understand that human activities are the main responsible for soil degradation **[PT]** illustrates the impact of human activity on the natural environment **[HU]** recognizes which substances can pollute our environment in our daily lives, which habits lead to damage to our environment **[HU]** [The learner] recognizes the factors endangering natural habitats, explains its position on the need for habitat protection and the possibilities of its individual and social implementation **[HU]** Knows the sources of air, water and soil pollution, types and examples of pollutants analyses their impact on living communities based on specific cases **[HU]** Illustrates the most pressing global problems facing humanity (global climate change, ozone

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			depletion, depletion of drinking water supplies, depletion of energy resources) and their chemical implications **[HU]** Is aware of the greatest challenges facing humanity, especially their chemical aspects (energy sources, pollution, sustainability, production of new materials) **[HU]** Illustrates the chemical consequences of anthropogenic activities through examples **[HU]** understands the importance of protecting our environment for the survival of human civilization **[HU]** Knows the basic rules of the use of plant protection products in everyday life, interprets the description of plant protection products, instructions for use, gives examples of plant protection products from the past and present (burgundy juice, modern pesticides) **[HU]** Knows the chemical composition, production and use of the most important (N-, P-, K-containing) fertilizers **[HU]** Development of comprehension, communication and digital competence in the analysis and oral evaluation of traditional and online source texts related to the development of global problems (causes, consequences, mitigation strategies) **[HU]** Improving contextual thinking based on the explanation and understanding of the development of local, regional and global natural, socio-economic and environmental hazards of geographical origin **[HU]** Development of environmentally conscious and sustainable behaviour based on the systematization of the environmentally damaging effects on the geospheres and the presentation of the interactions of the processes **[HU]** Analysis of sources dealing with global climate change, formulation of an argument-based opinion on the topic **[HU]** Explaining the causes of climate change and its local, regional and global consequences; Developing system thinking, individual and community responsibility, environmentally conscious and sustainable behaviour, and responsible decision-making through knowledge of the global and local causes, consequences, mitigation and application strategies of climate change **[HU]** Presentation of the consequences of climate change in Hungary, formulation of mitigation and adaptation strategies **[HU]** Presentation of environmental hazards related to watercourses (inland water, flood), interpretation

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			of the quantitative and qualitative protection of water resources **[HU]** By analysing a specific problem, he recognizes the interdependencies between the natural and built environment, the behaviour of the individual and the socio-economic space around him **[HU]** Analyses, gives opinions and suggests decisions that help sustainability based on aspects **[HU]** Is aware of the territorial aspects of pollution, particularly in vulnerable areas **[HU]** Recognizes the links and contradictions between changes in the state of the environment and economic development and development **[HU]** Is familiar with the characteristics, advantages and limitations of linear and circular farming **[HU]** Presents the characteristics of the 21st-century energy economy, the aspects that promote and limit the sustainability of the use of energy resources **[HU]** Recognizes the socio-economic context and environmental impacts of the use of natural resources, in particular, energy sources **[HU]** Understands the strengthening of the role of human and social resources in today's socio-economic development **[HU]** Is able to identify some socio-economic aspects and contradictions in the validation of environmental aspects **[HU]** Knows some of the most important environmental and sustainability directives and objectives formulated at the domestic and international levels **[HU]** Understands the importance of bringing together different professions and different types of organizations in the preservation of natural and socio-cultural values **[HU]** Knows the domestic and international, state, interstate and social environmental organizations and initiatives, is aware of their activities **[HU]** Interprets the potential of community service in terms of sustainability **[HU]** During their years in basic education, the pupils consider the links between the past, the present and the future and reflect on various alternative futures. They are guided to understand the significance of their choices, way of living and actions not only to themselves but also to their local environment, society and nature. The pupils develop capabilities for evaluating both their own and their community's and society's operating methods and structures and for changing them so that they contribute to a sustainable future. **[FI]**

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			Geography (grades 7-9) Interaction between nature and human beings as well as its connection to the state of the environment are discussed in the teaching and learning of geography, and a foundation is laid for understanding different regional views and conflicts on Earth. Understanding and analysing causal geographic relationships and changes in the environment activate the pupil to act responsibly in his or her daily life. **[FI]** *There are also other chapters through the curriculum which are related to this competence in Finland.*
Envisioning sustainable futures	**Futures literacy**	To envision alternative sustainable futures by imagining and developing alternative scenarios and identifying the steps needed to achieve a preferred sustainable future	A learning community inspires hope of a good future by laying a foundation for ecosocial knowledge and ability. A realistic and practical attitude towards shaping the preconditions for a good future reinforces the pupils' growth into responsible community members, municipal residents and citizens. It encourages the pupils to encounter the world's diversity with an open mind and curiosity and to act for a more just and sustainable future. (Chapter 4.2 Principles that guide the development of the school culture) **[FI]** Physics grade 7-9: O4 to guide the pupil to use his or her competence in physics in building a sustainable future **[FI]** Ethics grades 7–9 : C3 Human rights and a sustainable future: The pupils […] explore the possibilities of a sustainable future for the nature and the society **[FI]** *There are also other chapters through the curriculum which are related to this competence in Finland.*
	Adaptability	To manage transitions and challenges in complex sustainability situations and make decisions related to the future in the face of uncertainty, ambiguity and risk.	Various parts of this system are being updated to ensure that changes in the world around the school can be responded to and that the school's role in building a sustainable future can be strengthened in the organisation of education. **[FI]** Health education in grades 7–9: O3 to guide the pupil to develop his or her self-awareness and ability to recognise his or her values and attitudes as well as messages of his or her body and mind, and to identify and regulate factors that support his or her behaviour, learning, and studying. **[FI]** *There are also other chapters through the curriculum which are related to this competence in Finland.*
	Exploratory thinking	To adopt a relational way of thinking by exploring and linking different disciplines, using creativity and experimentation with novel ideas or methods	To organize and classify the required information, to assess the relevance and coherence of an argument, to cultivate critical thinking and respect for different points of view, to draw conclusions and to encourage dialogue by supporting their views with arguments **[GR]** Express opinions about different behaviours in the human relationship with the environment **[RO]** Students should be able to search, collect, process, classify, critically analyse, synthesize, evaluate, communicate information and data related to environmental issues / sustainable issues **[GR]**

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			They select information related to an environmental problem through a variety of sources and media judging their suitability **[GR]** Organize into categories the information they have gathered on an environmental / sustainable development issue **[GR]** Critically evaluate sources, information and data **[GR]** Identify the components of the environment **[RO]** Rank the pollutants according to different criteria **[RO]** Identify the correct sources of information in matters of conservation and environmental protection **[RO]** Describe, with appropriate language, the components of the environment and the changes produced by human intervention **[RO]** Identify interspecific relationships between the components of the environment **[RO]** Elaborate reports, projects, and portfolios using specific concepts and principles **[RO]** Describe the concepts: ecosystem, phenophases, waste management, protected area management, language caused by pollution **[RO]** Using to express specific opinions, ideas, reasoned hypotheses about problem situations; Make multimedia presentations on the issues identified **[RO]** Investigate the state of environmental factors by scientific methods (experiment, modelling, case study) **[RO]** Offer practical solutions for improving the quality of the environment **[RO]** Determine the degree of air, water, and soil pollution **[RO]** Graphically represent the information acquired through direct and indirect observations **[RO]** Practice empirical and/or holistic analyses **[RO]** Perform determinations of the parameters of the environmental factors in an area (humid environment - pond) **[RO]** Carry out an independent investigation activity on the local horizon **[RO]** Experiment with their solutions to improve the negative anthropogenic impact in an "adopted area"

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			[RO] Chapter 4.4 Integrative instruction and multidisciplinary learning modules: Integrative instruction is a vital part of a school culture that supports comprehensive basic education. The purpose of integrative instruction is to enable the pupils to see the relationships and interdependencies between the phenomena to be studied. It helps the pupils to link knowledge of and skills in various fields and, in interaction with others, to structure them as meaningful entities. Examination of wholes and exploratory work periods that link different fields of knowledge guide the pupils to apply their knowledge and produce experiences of participation in the communal building of knowledge. This allows the pupils to perceive the significance of topics they learn at school for their own life and community, and for the society and humankind. In the learning process, pupils are supported to expand and structure their worldview. **[FI]** Social studies (grades 3-6) In terms of achieving the objectives of social studies, it is essential to use interactive, experiential, and functional working methods in creating knowledge, including simulations, discussions, debates, and drama. **[FI]** Biology (grades 7-9) The pupils' problem-solving and teamwork skills and the development of togetherness are supported in the teaching and learning. **[FI]** *There are also other chapters through the curriculum which are related to this competence in Finland.*
Acting for sustainability	**Political agency**	To navigate the political system, identify political responsibility and accountability for unsustainable behaviour, and demand effective policies for sustainability	Identify the concept of global competence and the characteristics of world politics **[GR]** To delve into the understanding of the World Heritage Objectives linking the principles of human rights with the 17 Sustainable Development Goals **[GR]** Understand the logic of sustainable development and corporate socialism **[GR]** To export and compare the various models of economic development. Evaluate, accept, and apply the principles of sustainable development. To clear the offsets from the renewable energy sources **[GR]** Recognize the institutions and mechanisms of public life, the various interests embodied in policies related to sustainability, the political ideologies and the systems that lead to decisions and policies on the environment and sustainable development at local, national and international level **[GR]** Critically monitor and understand public debate on environmental issues and sustainable development **[GR]**

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			Participation, involvement, and building a sustainable future: Basic education creates the bases for the pupils' interest in the school community and society. The school respects their right to participate in decision-making as indicated by their age and level of development. **[FI]** Foreign languages: The instruction also helps the pupils to develop their capacity for participation and active involvement in a global world. **[FI]** *There are also other chapters through the curriculum which are related to this competence in Finland.*
	Collective action	To act for change in collaboration with others	CC2. Participate in community activities, decision-making and conflict resolution in a dialogued manner that respects democratic procedures, the principles and values of the European Union and the Spanish Constitution, human and childhood rights, the value of diversity, and the achievement of gender equality, social cohesion and the Sustainable Development Goals **[ES]** CC2. Participate in community activities, decision-making and conflict resolution in a dialogued manner that respects democratic procedures, the principles and values of the European Union and the Spanish Constitution, human and childhood rights, the value of diversity, and the achievement of gender equality, social cohesion and the Sustainable Development Goals **[ES]** Realize that sustainability is now a concern for the global community and that many organizations and NGOs are involved, so it is and with the world **[GR]** Realize that the implementation of the sustainable development model presupposes (at the level of the individual) education and corresponding daily individual and economic behaviour, but also (at the level of society) political decision-making **[GR]** Students develop communication, dialogue, collaboration, teamwork and participation skills **[GR]** Collaborate, discuss, exchange views, arguments and thoughts democratically in groups, to investigate the problem under study, while distinguishing the essential and insignificant points of the conversation, critically controlling their ideas while avoiding criticism of persons **[GR]** Organize and implement actions at local, national and global level related to resolving or addressing environmental / sustainable development issues **[GR]** Understand the need to organize and implement environmental actions / sustainable development actions at local, national and global level, as well as the social, economic, political factors that highlight an environmental / sustainable development issue and the social, emotional reasons **[GR]** Participate in actions organized at local, national and global level and related to environmental issues / sustainable development issues **[GR]**

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			They plan actions at local, national and global level related to solving or tackling environmental issues / sustainable development issues promoting sustainable development **[GR]** Initiate activities for the protection of the local fauna **[RO]** Engage voluntarily in age-specific actions to protect the environment **[RO]** Find complementary solutions to stop environmental degradation **[RO]** Involve family members and a group of friends in activities to improve the quality of the local environment **[RO]** Carry out greening activities of some spaces in the area where he lives **[RO]** Appreciate the behaviour of people aiming at environmental protection actions **[RO]** Get involved in concrete activities to improve the human-nature relationship **[RO]** Show interest in environmental conservation **[RO]** Express opinions on the human relationship with the natural environment, showing interest and tolerance **[RO]** Develop a project aimed at solving potential problems between society and the environment **[RO]** Identify possible solutions to improve the negative aspects encountered in the environment **[RO]** Assume the responsibility to contribute to the improvement of the environmental conditions through individual and collective actions **[RO]** Launch pro-environmental campaigns **[RO]** React critically to messages about environmental issues received in informal contexts **[RO]** Carry projects about the reduction of pollution phenomenon in the area where the students live **[RO]** Participate in the responsible, correct decision-making process in situations of threat to the "health status" of the environment **[RO]** Be involved in age-specific environmental protection actions in collaboration with colleagues **[RO]** Consistently behave responsibly towards the environment by initiating and participating in appropriate protection activities **[RO]** Participate voluntarily in pro-ecological activities **[RO]**

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			Initiate partnership actions at the level of the local community **[RO]** Take responsibility for protecting and improving the environment **[RO]** Understands their rights and duties as citizens in the face of the environment **[PT]** In cooperation with others, plans and carries out an ad hoc or long-term examination of the environmental condition of his / her place of residence evaluates the obtained results **[HU]** 14.2 Transversal competences in grades 3–6: The pupils are encouraged to participate in student council and club activities and, for example, environmental activities or other forms of action offered by the school and the local community where they can learn skills in participation and involvement and gradually learn to take more responsibility. **[FI]** Social studies, Grades 4-6: Contents […] C3 Active citizenship and involvement: The pupils explore and practise the skills in democratic involvement and acting in the society needed as responsible and active members of different communities, for instance, in the class and the school, in different pastimes and organisations, in the media and economic activity. They practice cooperation with actors in the local community. They practise working together with actors in the local community. **[FI]** Environmental studies, objectives: Grades 3-6: to guide the pupil to act and become involved in his or her surroundings and community in order to promote sustainable development **[FI]** Objectives related to attitudes and values in biology, grades 7-9: […] O14 to inspire the pupil to become actively involved in building a sustainable future. […] objectives: O12 to inspire the pupil to deepen the interest in nature and its phenomena and to strengthen his or her relationship with nature as well as his or her environmental awareness; […] assessment target: Perceiving the relationship with nature and the importance of awareness of the environment **[FI]** *There are also other chapters through the curriculum which are related to this competence in Finland.*
	Individual initiative	To identify own potential for sustainability and actively contribute to improving prospects for the community and the planet	Pupils acquire skills of citizenship, personal and collective responsibility and competence for action. Be able to plan and take action on cross-cutting community, national and international level **[GR]** Recognize actions organized locally, nationally and globally and aim at sustainable development, linking regular or individual actions to specific environmental issues/ sustainable development issues **[GR]** Adopt norms and rules of behaviour concerning the environment **[RO]** Practice ecological behaviour skills in concrete situations **[RO]**

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			Participate consciously in actions to preserve and improve the quality of the environment **[RO]** Take a stand against situations that lead to environmental degradation **[RO]** Distinguish between positive and negative actions concerning the environment **[RO]** Becomes aware that their actions influence the environment (or the environment quality) **[PT]** Adopts behaviours aimed at preserving natural resources in the present with a view to future generations **[PT]** Recognize the need to adopt sustainable practices in the use of soil **[PT]** learns habits and behaviours aimed at preventing damage (e.g. waste minimization, saving material, reusing, prioritizing public transport, walking or cycling, saving energy) **[HU]** The student discovers the connection between his / her own consumption and lifestyle habits and natural and environmental problems. It recognizes and can give examples of what can be changed **[HU]** Creates a simple resource plan. His plan is realistic, in line with its priorities, the time required for its activities and the sustainable use of available resources **[HU]** Designs and implements a work program based on specified criteria for sustainability. He analyses, evaluates and presents the results of his work **[HU]** A learning community inspires hope of a good future by laying a foundation for ecosocial knowledge and ability. A realistic and practical attitude towards shaping the preconditions for a good future reinforces the pupils' growth into responsible community members, municipal residents and citizens. It encourages the pupils to encounter the world's diversity with an open mind and curiosity and to act for a more just and sustainable future. (Chapter 4.2 Principles that guide the development of the school culture) **[FI]** Environmental studies, objective “Significance, values, and attitudes” *Grades 1-6*: to guide the pupil to act sustainably in the surroundings and the school community. **[FI]** PHYSICS and CHEMISTRY grade 7-9: O4 to guide the pupil […] to evaluate his or her personal choices in terms of sustainable use of energy resources **[FI]** ETHICS grades 7–9 : C3 Human rights and a sustainable future: The pupils […]reflect on responsible actions for the good of a sustainable future. **[FI]**

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			VISUAL ARTS grades 7–9 : In his or her visual production, the pupil examines cultural diversity and sustainable development and recognises the possibilities of influencing through images. **[FI]** *There are also other chapters through the curriculum which are related to this competence in Finland.*

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