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Proposal for a Council Recommendation

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Council Recommendation on learning for environmental sustainability

Staff Working Document

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Contents

About this Staff Working Document

This Staff Working Document accompanies and supports the European Commission proposal for a Council Recommendation on learning for environmental sustainability, adopted in January 2022. It provides detail on the concepts and recommendations put forward in this new initiative and presents research evidence and good practice examples from across Europe. It can serve as a guide for policy makers, educators and all individuals and organisations working on environmental sustainability in the education and training sector.

Chapter 1 provides an introduction to the topic, outlining the reasons, scope and wider policy context for the Recommendation.

Chapter 2 gives an overview of key findings from the public survey and consultations. It presents recent evidence related to EU Member States' approaches to learning for environmental sustainability and more generally from the wider field of research and practice.

Chapter 3 describes a vision for achieving lasting change towards sustainability through learning and teaching. It builds on key learnings from the consultations and research and outlines the action needed with regard to systems, institutions, educators and learners.

Chapter 4 presents in brief the new European Sustainability Competence Framework, developed by the European Commission to support learners, educators, policy makers and other stakeholders in developing and fostering knowledge, skills and attitudes related to sustainability.

Chapter 5 provides details on how the Recommendation will be implemented, monitored and supported through various EU instruments, programmes, and platforms.

1. Learning for the green transition: a challenge and opportunity for Europe

Through the European Green Deal[1] and the goal to become climate-neutral by 2050, the European Union (EU) is working to deliver on the transformational changes needed in our economy and society. By aligning action across a range of policy areas, including energy, environment, mobility and agriculture, the EU aims for a green transition that is just and inclusive. Like all sectors, education and training needs to critically examine how it is responding to the climate and ecological crises – in terms of its operations, processes and practices and – crucially – how it is preparing learners for the future.

Key EU policies, including the Green Deal, the EU Biodiversity Strategy for 2030[2], the EU Skills Agenda[3] and the Council Resolution on the European Education Area[4] all point to the role of education and training in empowering and engaging people for environmental sustainability and boosting the skills and competences[5] needed for the green transition.

Education and training for environmental sustainability is about the learning and teaching we need for personal, societal and environmental well-being now and in the future. It can be understood as an umbrella under which all subjects and disciplines have a contribution to make. Learners need to understand the inter-connectedness of economic, social and natural systems and move from awareness to individual and collective action and empowerment. Achieving this requires hands-on, engaging and action-based ways of learning, which foster knowledge, understanding and critical thinking (cognitive learning); practical skills development (applied learning); and empathy, solidarity and caring for nature (socio-emotional learning).

Many different strands and movements in education and training advocate for environmental protection, active citizenship, sustainability and global change. This includes environmental education, sustainability education, climate change education, peace education, global education and education for sustainable development. **All these movements and concepts share a vision of education and learning which is transformative, embraces change and promotes sustainability.** They also all recognise the interconnected nature of environmental, social, and economic issues. The European Commission's work on learning for environmental sustainability builds on those movements and puts renewed attention on environmental concerns to support the goals and ambition of the European Green Deal.

Seizing the momentum for change

Europeans rank climate change among the most serious problems facing the world today (European Commission, 2021b). Protecting the environment is important to 94% of EU citizens personally; 78% consider that environmental issues impact directly on their daily

[1] COM(2019) 640 final

[2] COM(2020) 380 final.

[3] COM(2020) 274 final.

[4] 2021/C 66/01 of 26.2.2021.

[5] Following the Council Recommendation on key competences for lifelong learning, competences are defined as 'a combination of knowledge, skills and attitudes, where knowledge is composed of the facts and figures, concepts, ideas and theories which are already established and support the understanding of a certain area or subject; skills are defined as the ability and capacity to carry out processes and use the existing knowledge to achieve results; and attitudes describe the disposition and mind-sets to act or react to ideas, persons or situations' (2018/C 189/01).

lives and health and almost all feel that urgent action is needed to tackle biodiversity loss (European Commission, 2020). People also expect stronger action by national governments and the EU to tackle climate change and environmental degradation (European Commission, 2021a).

Young people have been especially vocal and active in demanding change and calling on public authorities to act urgently to tackle climate change and protect the environment for current and future generations. Many young people consider that school is failing to give them an adequate understanding of climate change, the environment, and how to live, work and act more sustainably (European Commission, 2019). Despite being the least responsible, children are already facing the devastating consequences of the climate crisis: half the world's 2.2 billion children are now exposed to multiple climate and environmental shocks, figures which are likely to worsen as the impacts of climate change accelerate (UNICEF, 2021).

The COVID-19 public health crisis has put renewed attention on the interconnections between global societies, human systems and the environment. It has brought greater public and political awareness to the essential role that education and training has in society. The pandemic has highlighted specific issues in education such as wellbeing and mental health, the benefits of outdoors and nature, social inequalities and the role of local and wider communities (Finlayson et al, 2021). The crisis has also exposed weaknesses in the resilience of education and training systems, including disparities in accessing digital technologies for remote learning. The education and training sector will need to learn from the lessons of the crisis and continue to adapt and build resilience. Preparing for future disruptions and negative impacts on learning related to climate change, including extreme weather, flooding and heat, is also vital.

Beyond the immediate and longer-term crisis response, the pandemic has raised questions not only on the *what* but also the *how, where* and *when* of learning and teaching. And it has triggered reflections on the fundamental purpose of education and how learners can live, thrive and be active and engaged citizens in a changing world (ibid.). COVID-19 has been and continues to be a major challenge for education and training (Carretero Gomez et al, 2021), but it can also be an accelerator for the changes needed in education and training to empower and engage people for the green transition.

Towards deeper, systemic change

Since the early days of environmental education in the 1960s, learning for the environment and sustainability has visibly progressed all over the world. Across Europe, a great number of initiatives, programmes and policy measures have been put in place to advance sustainability at all levels of education and training. Despite clear progress and growing public and policy attention, **learning for environmental sustainability is not yet a *systemic* feature of education and training policy in the EU.** Challenges exist at various levels:

- the interdisciplinary nature of learning for environmental sustainability; the need for learner-centred pedagogies, new approaches to assessment, organisational change and community partnerships often run counter to established cultures and norms in education policy and practice.

- whole institution approaches where sustainability is embedded in all processes and operations (e.g. teaching and learning, research, campus and buildings management) are not yet widespread due in part to insufficient funding and institutional support.

- institutions are often lacking data and tools on how to monitor the effectiveness of sustainability initiatives and efforts and there is further scope to adapt curricula for sustainability at all levels of education and training.

- teachers and trainers across Europe are already actively teaching for sustainability, often driven by their sense of responsibility to prepare future generations. At the same time, many educators say they lack training and support in sustainability education and training, in particular, regarding interdisciplinary approaches, active pedagogies and the challenging subject matter.

Urgent efforts are therefore needed to **redirect education and training as a whole towards the deep and transformative changes needed** for the green transition and prepare learners for a rapidly changing society, economy and future.

As will be detailed in this handbook, effective learning for sustainability:

- Starts from early childhood education and care,
- Takes a life-long learning approach,
- Requires supportive learning environments where the institution as a whole is active on sustainability,
- Is learner-centred, hands-on and based on real-life experiences,
- Supports educators, including leadership teams, to teach and act for sustainability,
- Fosters collaboration and partnerships in local and wider communities,
- Empowers youth,
- Builds sustainability competences,
- Is founded on strong policies.

Re-visioning education and training and putting sustainability at the heart of its design will offer learners of all ages and at all stages of education and training a wide range of opportunities to learn about, in and for environmental sustainability in different settings and contexts, within and beyond formal education. Schools, universities and other education and training institutions will become places where sustainability is not only taught, but also *actively practised*. If this happens, then education and training for environmental sustainability can make all learning more relevant; motivate students and educators towards greater societal engagement and help develop competences for sustainability increasingly needed for life and work.

Putting sustainability at the heart of education and training is, therefore, a **tremendous opportunity to deliver future-oriented, relevant, engaging and inclusive education and training,** which is closely linked to and supports other education agendas of inclusion, quality, innovation, internationalisation and student-centred learning.

Purpose and context of the Council Recommendation

The Commission proposal for a Council Recommendation on learning for environmental sustainability is a response to the challenges set out above. The Recommendation aims to foster greater cooperation at EU level on the deep and transformative changes needed in education and training for the green transition. It can serve as a reference to Member States and aims to support and facilitate policy development and whole-system

approaches to learning for environmental sustainability in national settings, including by sharing expertise and best practices at system and institution level. Through the new European competence framework on sustainability (see chapter 4), a further goal is to develop a shared understanding of the competences and skills that people need to act, live and work in a sustainable manner.

The proposal aims to contribute to the initiatives at global level to strengthen climate, environmental and sustainability education and training. Sustainable development is a core principle of the EU, and delivering on the UN's Sustainable Development Goals is a priority objective for the Union's internal and external policies. The Recommendation therefore builds on the extensive work by UNESCO, the United Nations Educational, Scientific and Cultural Organization, to make education a more central and visible part of the international response to the climate crisis through its Education for Sustainable Development programme, including the 2030 Roadmap[6].

Key points

The vision for learning for environmental sustainability is aligned to Europe's vision of a green transition that is just and inclusive.

Despite progress and growing attention, learning for environmental sustainability is not yet a systemic feature of education and training policy in the EU.

The purpose, policies, provision and practices of learning and teaching need to be fundamentally re-examined to integrate sustainability at all levels.

Putting environmental sustainability at the heart of education and training means responding to the realities of the 21st century and equipping learners with the competences they need to contribute positively to a sustainable society and economy.

The Commission's proposal for a Council Recommendation aims to foster greater cooperation at EU level on the deep and transformative changes needed in education and training for the green transition.

[6] https://unesdoc.unesco.org/ark:/48223/pf0000374802.locale=en

2. State of play and challenges to further progress

To prepare the proposal, the European Commission consulted widely on the current state of play regarding learning for environmental sustainability in the EU. This consultation was an opportunity to collect good practice and to identify difficulties and barriers in effectively embedding environmental sustainability in schools, higher education, vocational educational and training and other education sectors.

A public survey, which consisted of 10 questions and the option to submit a position paper ran from 18 June to 24 September 2021. A total of 1369 responses were received from individuals (49%) and organisations (43%)[7] as well as 95 position papers.

From April to September 2021, online workshops were held with the aim of identifying existing challenges, guiding principles and good practice. This included:

- Four workshops with policy makers and other representatives from EU Member States and partner countries focused on (i) early childhood education and care for sustainability; (ii) pedagogies and support for teachers; (iii) whole-institution approaches to environmental sustainability; and (iv) barriers and enablers for system level change.
- Four online workshops with stakeholders from education and training, research, environment and youth sectors on (i) policy levers and measuring impact and effectiveness of learning for environmental sustainability; (ii) cross-sector collaboration and partnerships; (iii) building capacity of educators; and (iv) lessons from Erasmus+ projects related to the environment and sustainability.
- A series of online meetings was organised in April and June 2021 with teachers from the European Commission's eTwinning community who are active on sustainability and environmental issues in their schools.

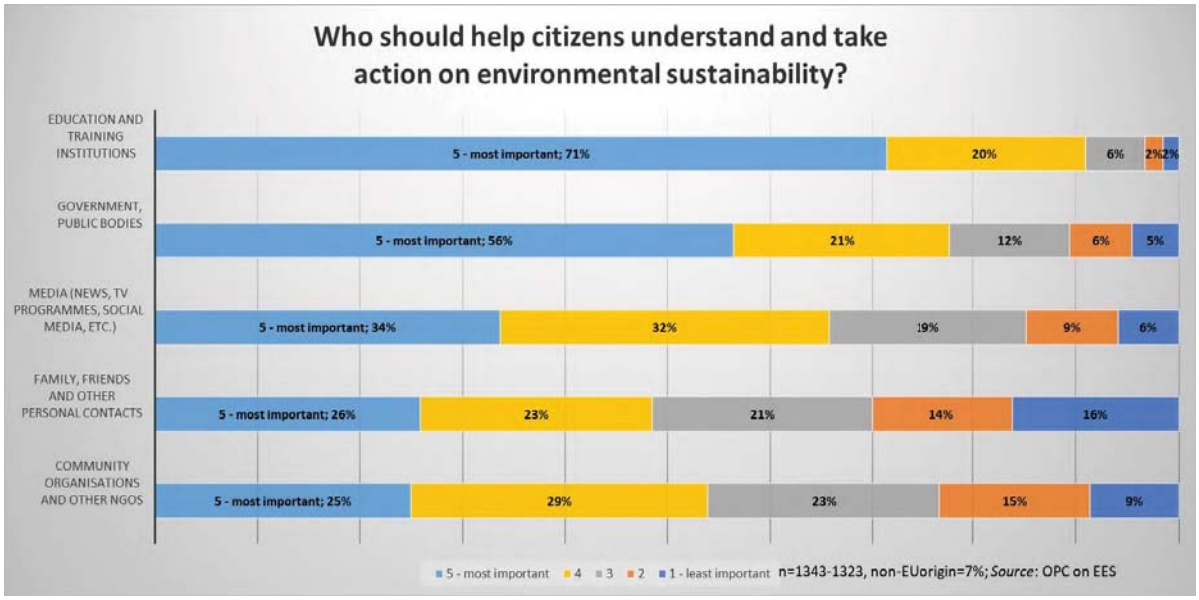
[7] 'Other': 8%.

This chapter presents findings from the consultation workshops and the public survey, and includes illustrative quotes (in italics) from respondents and participants. Further evidence presented includes findings from a number of dedicated studies carried out for the European Commission to inform the proposal. This included a mapping of curricula, policies and other measures in EU Member States related to education for environmental sustainability; a review of relevant Erasmus+ projects and a study on education for sustainable development in the context of COVID-19 and the green and digital transitions. Wider academic research has also been taken into account as well as findings from large-scale surveys, including the Programme for International Student Assessment (PISA) from the Organisation for Economic Co-operation and Development (OECD) and evidence gathered by other organisations active in the field, including UNESCO, the United Nations Economic Commission for Europe (UNECE) and the European Centre for the Development of Vocational Training (Cedefop).

While the evidence provided in this chapter is extensive, it is nonetheless a snapshot of the current state-of-play; it should be acknowledged that new research and perspectives are constantly emerging.

Key role of education and training in the green transition

Respondents to the public survey to inform the Recommendation pointed to the **crucial role of education and training in helping people understand and take action on environmental sustainability.** Education and training was ranked as the most important sector by 71% of respondents, ahead of public bodies and governments (56%), and media (34%). A number of position papers stressed that as ecological impact comes largely from industry, the burden of 'solving' these challenges should not be placed solely on young people or the education system.



To encourage action on sustainability, respondents opted most often for **guidance on how to change behaviour and take action in everyday life** (75%), followed by more opportunities to **take part in decision-making** related to environmental sustainability (64%) and **more information** on environmental issues and challenges (48%)[8].

[8] Participants could select more than one response.

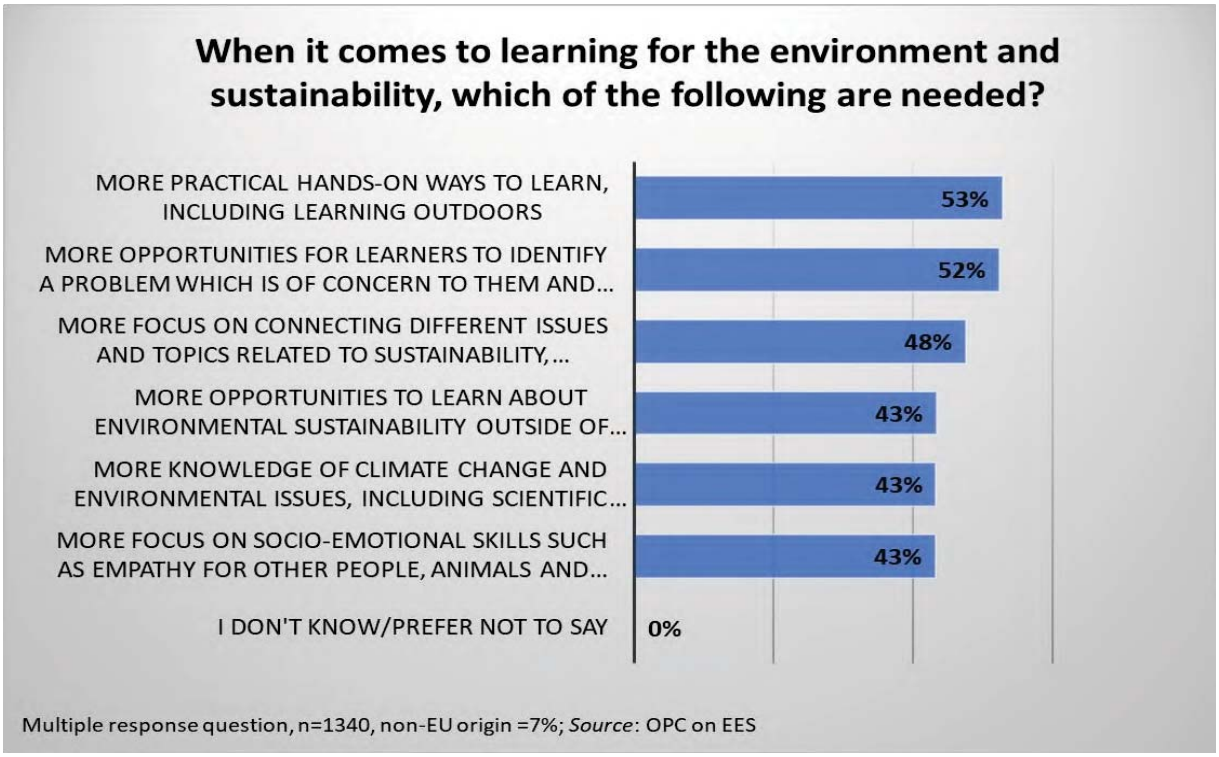
'If children are to live with the climate crisis, the curriculum needs to be fit for this purpose'

'Education and training at the earliest age is needed to create awareness'

'We should aim to raise our students as world citizens'

Learning, teaching and assessment

Respondents were asked to identify what is needed most urgently when it comes to learning for the environment and sustainability. The main areas highlighted were **more practical hands-on ways to learn, including learning outdoors** (53%), and **more opportunities for learners to identify a problem which is of concern to them and work together on solutions** (52%). A further priority area was to **connect different issues and topics related to sustainability**, considering multiple perspectives and acknowledging uncertainty (48%).



Position papers highlighted the need to recognise the value and opportunities of natural environments and outdoors settings for learning. Active engagement and connection with nature was seen as crucial for raising awareness of climate change and biodiversity loss, and fostering environmental citizenship. To achieve this, respondents called for new approaches and additional funding to actively engage citizens, in particular younger people, in monitoring nature and biodiversity, including in urban settings and for field work to be a priority for schools, for both curricular and extracurricular activities. An active role for community organisations in sustainability education was also seen as necessary. A number of position papers stressed that people in all sectors of employment should develop knowledge and skills related to environmental sustainability.

'The acquisition of green skills in the workplace will increase resilience and adaptability while contributing to green growth'

'We need to enable and invite families and grandparents to share expertise and joint actions to support intergenerational learning'

Position papers also called for education and training for environmental sustainability to be open and accessible to all learners, irrespective of gender, age and socio-economic background. All programmes and initiatives related to learning for sustainability should take into account the needs and context of people from disadvantaged backgrounds, including access to digital tools and technologies.

Need for action-oriented and socio-emotional learning

A global review of national curricula and policy documents by UNESCO in 2021 shows that crucial environmental themes are not yet sufficiently covered (UNESCO, 2021). Globally, 'the environment' is largely present in policy documents (83% of documents analysed); however, climate change and biodiversity are much less represented (47% and 19% respectively). This is of concern given the increasing relevance and urgency of those issues and the need to develop understanding and related competences in these fields. Across the board, cognitive learning, i.e., learning *about* the environment, prevails over socio-emotional and action-oriented learning. The latter are especially important for developing learners' engagement with the environment and climate change and developing their sense of agency.

'We need to place emotional skills into focus and encourage a sense of hope'

'The educational offer for our students and researchers must not only teach them a set of sustainability themes, but enable them to live and behave in a sustainable way'

'When they actually plant a tree or when they actually touch a solar panel it stays with them and it motivates them to want to continue doing such activities'

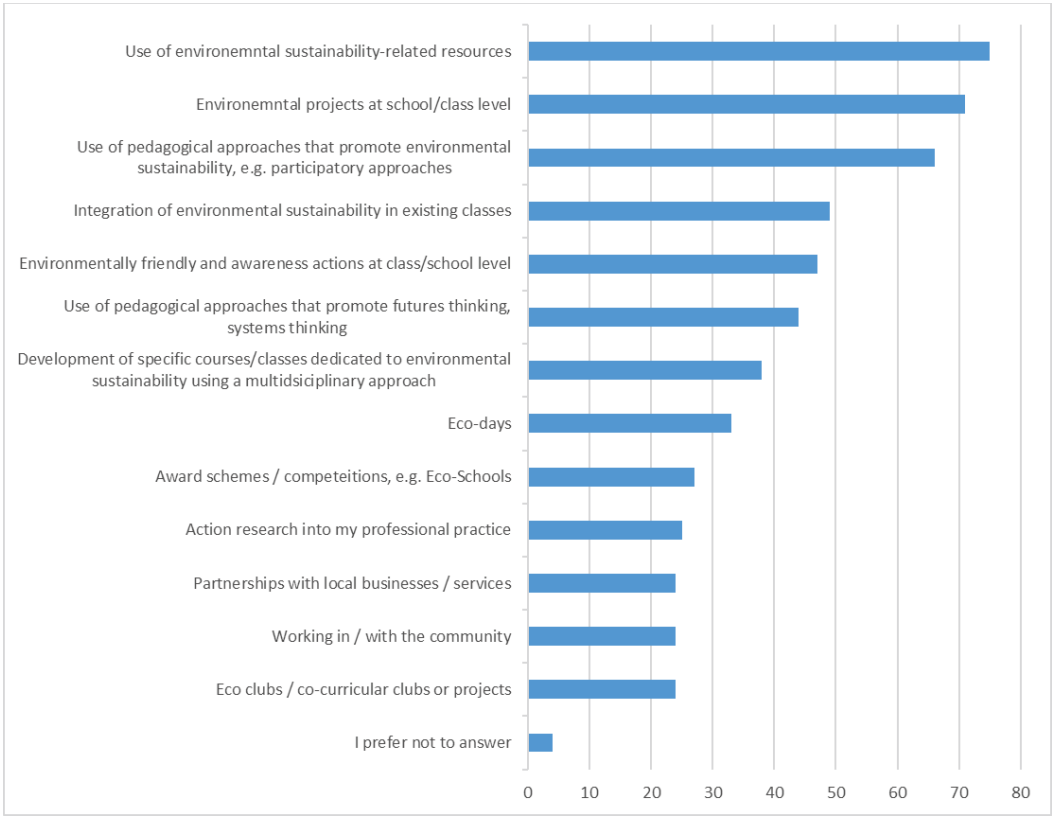
The discrepancy between cognitive and socio-emotional learning for environmental sustainability is also reflected in learning outcomes. The OECD's 2018 Programme for International Student Assessment (PISA) showed that most 15-year-olds *know about* climate change and global warming (79% of students across the 37 OECD countries). However, on average, only 57% feel that they could *do something about* problems such as climate change. While students are aware of environmental and other global challenges, they do not feel 'a sense of empowerment and agency to make a real difference' (Schleicher, 2021).

The findings on the **need for more action-oriented learning** are in line with teachers' own beliefs. A qualitative survey (Mulvik et al, 2021) of 140 teachers in 32 European countries showed that most teachers thought their students would benefit from more hands-on, experiential learning on the environment and sustainability.

Source: Mulvik et al, 2021.

In the same survey, only 29% of teachers report cross-curricular integration of sustainability to be present in their schools. Some 83% responded that sustainability was part of natural sciences, while 58% said it was included in extracurricular activities (ibid). Teachers also listed a variety of approaches, pedagogies and resources that they use (see figure 1 below).

Figure 1. Pedagogies and practices commonly used



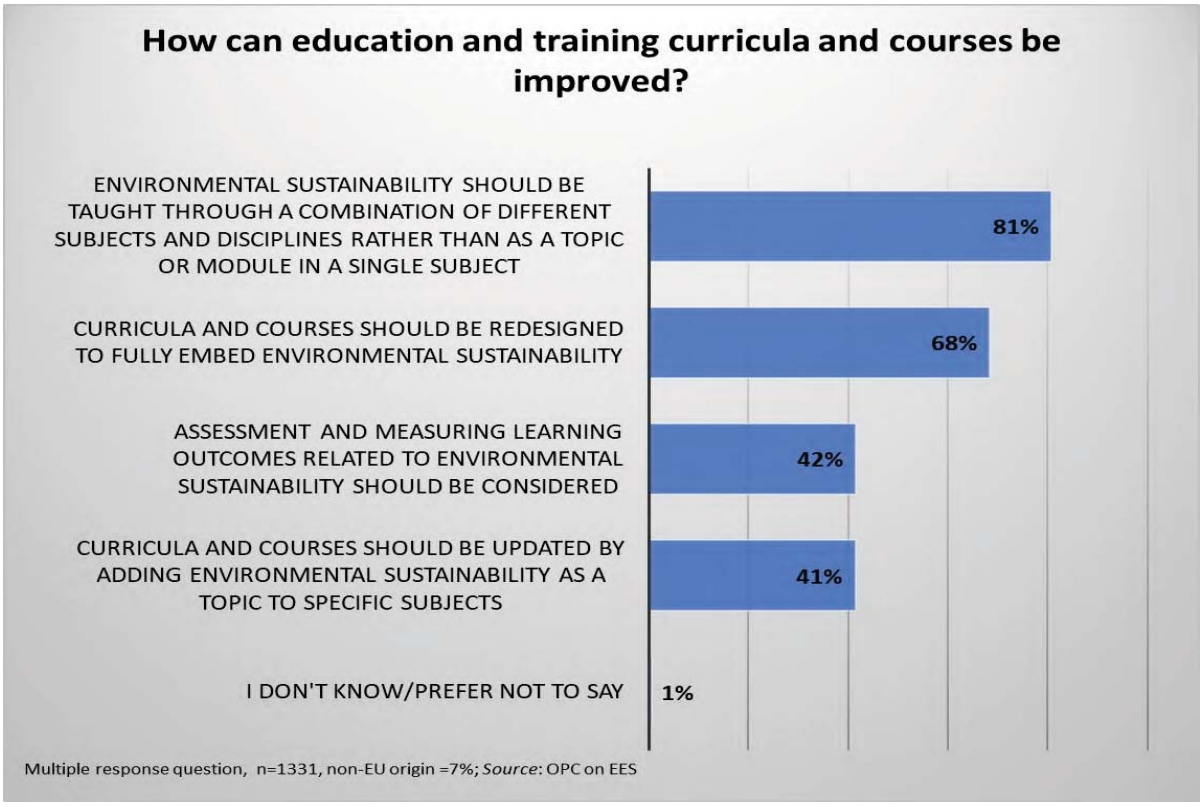
Source: Mulvik et al, 2021.

Research and feedback at the consultation workshops show that the switch to emergency remote teaching during the COVID-19 pandemic has negatively impacted action-based, hands-on learning, including in the field of vocational education and training. Face-to-face learning and gaining practical experience in VET schools and workplaces is crucial for

providing quality education to apprentices and graduates, and to prevent early school leaving[9] and encourage lifelong learning. However, in the context of COVID-19, VET students 'have seen their opportunities diminish in terms of the experience acquired in the workplace, the relational capital gained, and the personal maturity achieved' (Finlayson et al, 2021).

Integration of environmental sustainability in curricula and study programmes

Regarding curricula and courses[10], the majority of respondents favoured a **cross-curricular and interdisciplinary approach to environmental sustainability**, rather than adding it as a topic or module in a single subject (81%). A majority also favoured the redesign of curricula and courses to fully embed sustainability (68%).



'Sustainability must not be taught as a subject per se. It should encompass all activities and subjects. Everything should be read with sustainability eyes'.

A **mapping of curricula** to prepare the Council Recommendation (Mulvik et al, 2021) showed that over half of EU Member States have defined, at least partially, competences for environmental sustainability. Environmental sustainability is most frequently integrated in primary and secondary education. Some countries refer to specific teaching

[9] See Cedefop's VET toolkit for tackling early leaving https://www.cedefop.europa.eu/en/tools/vet-toolkit-tackling-early-leaving

[10] Respondents could select more than one option.

methods in the curricula, the majority of which promote learner-centred approaches (e.g., Finland, the Netherlands, Hungary, Latvia, Romania, Estonia, Slovenia). Austria, Cyprus and Czechia have national curricula specifically on sustainability education.

Information on early childhood education and care (ECEC) curricula and programmes across the EU is fragmented as responsibility for this sector may be under different ministries and/or falls under regional or local governance competence. Finland has established a national core curriculum for ECEC, based on respect for life, sustainable living, and human rights, and the inviolability of human dignity.

The mapping study suggests that only one third of EU countries include multidisciplinary approaches in curricula. Given the interconnected nature of learning for sustainability, the structuring of curricula around single subjects appears to be a barrier to further embedding environmental sustainability. Cross-cutting themes on the environment and sustainable development are either integrated into certain subjects or delivered as separate subjects (e.g. environmental studies). Most often, sustainability features in natural science subjects across the EU, but in a growing number of countries it is integrated into citizenship education. Citizenship education in general is part of secondary education in all EU countries and taught at primary level in 16 EU countries. Austria has a particularly comprehensive approach to interdisciplinarity in its curricula frameworks and interdisciplinary competences are included as a quality criterion at various levels of education.

Sustainability is being progressively integrated in **higher education** study programmes (Lozano et al, 2019), albeit often limited to discipline-based courses. In some knowledge areas (e.g., social sciences or environmental sciences and engineering), environmental sustainability is more frequently integrated. Research conducted on the integration of the SDGs into higher education study programmes globally found that 43% of the polled universities have integrated or will integrate, the SDGs. However, many reported embedding single goals rather than all SDGs, the most popular being climate action (SDG 13), followed by sustainable cities and communities (SDG 11) and education (SDG 4) (Leal Filho et al 2019).

The existence of disciplinary silos within HEIs is a major barrier to fully embedding sustainability across study programmes (Kurland et al, 2010). Lack of leadership and management support with regard to fostering sustainability are further obstacles. Where courses and modules on environmental sustainability exist, these are often not interdisciplinary, and more learner-centred and collaborative pedagogies are not yet widespread. Moreover, environmental aspects of sustainability usually receive more attention in the literature and in the practice of HEIs over the social and economic dimensions (Rey-Garcia et al, 2020).

Lack of **suitable teaching materials and guidance** was also identified as an issue during the consultations. Whereas knowledge-based material is generally available, more guidance is needed for educators on suitable pedagogies, competences linked to sustainability, multidisciplinary approaches and outdoors learning. Access restrictions - for example where subscription is necessary - can be frustrating for teachers who are self-motivated to promote sustainability but who have limited financial resources for support materials. Teaching materials are also often too broad and general. Clear classification of resources by theme, education levels, target users and type of resource can render the search for resources more interactive and dynamic and save valuable time for educators.

Assessment of learning for environmental sustainability

Assessment frameworks related to environmental sustainability are lacking in many Member States, even where relevant knowledge and competences are included in the national curriculum or education policy documents. Without defined learning outcomes and accompanying assessment frameworks, **schools** may have difficulties delivering on curricula. In some cases, assessment of knowledge and skills related to sustainability is part of a general assessment framework. In Estonia, for example, state examinations in upper secondary schools can cover cross-curricular topics and topics related to environmental sustainability.

In some countries, schools and teachers can find tools and guidance in assessment frameworks developed by other partners, such as the Curricular Framework for Advancing Circular Economy by eco-schools. While filling a gap with regard to assessment, depending solely on outside partners for assessment practices, can create a disproportionate burden for individual schools and teachers to implement and assess learning and teaching for environmental sustainability. It may also lead to disparities between schools and assessment practices.

In **higher education**, several reviews of assessment tools for sustainability found that most tend to focus on one dimension of sustainability only, while a few use an integrated approach (Tumbas et al, 2015). Often the focus is on environmental performance of the institution, while teaching, research and outreach are underrepresented (Yarime and Tanaka, 2012).

'It is challenging to design learning interventions focused on behaviour change and evaluate their success.'

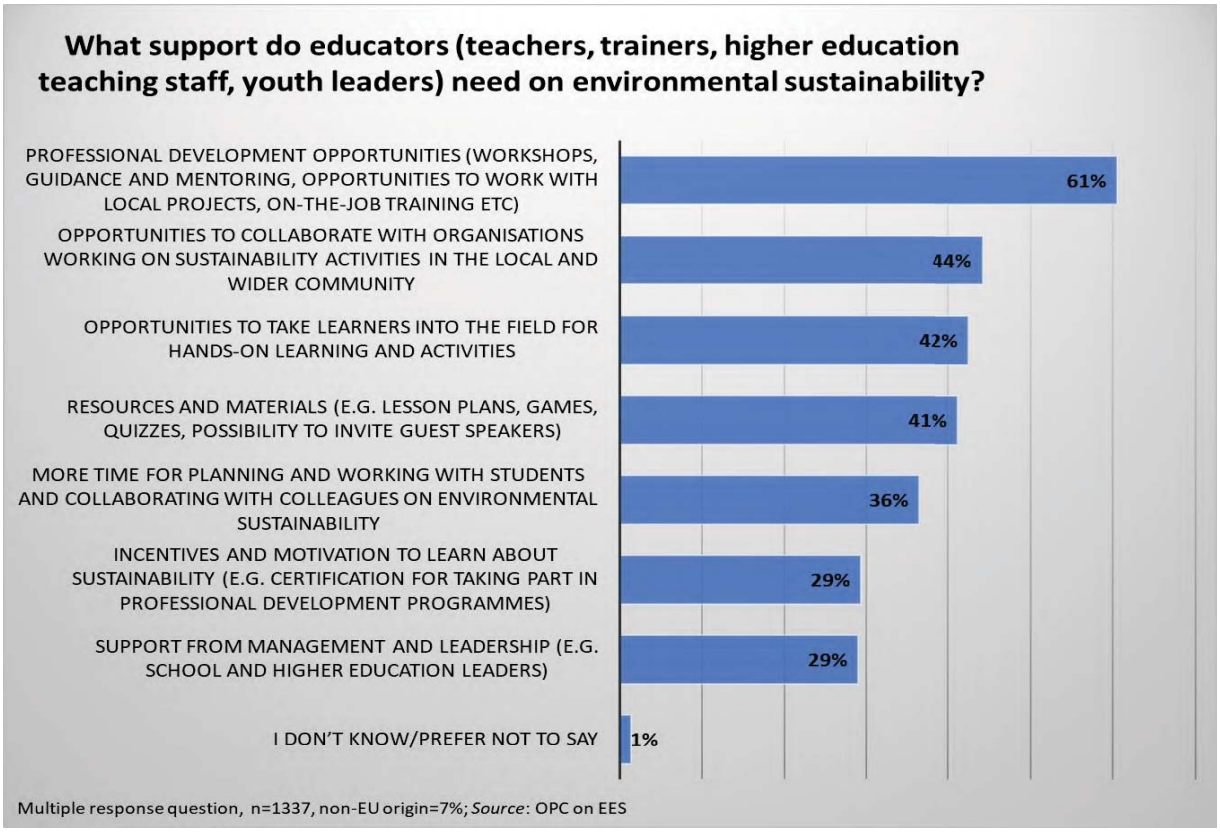
'We need a holistic approach to learning outcomes that go beyond knowledge and skills and focus on the social and emotional aspects of learning, creativity, inspiration and changes in values, attitudes and behaviour.'

Educator preparedness for sustainability

Evidence from studies and consultations confirms that many teachers, trainers, academics and youth leaders across Europe are already actively teaching for sustainability, often driven by a sense of responsibility and duty to prepare learners to live, work and thrive in a highly complex and rapidly changing society and economy. At the same time, many educators are seeking support and training in sustainability education, in particular, regarding interdisciplinary approaches, active pedagogies and how to deal with the challenging subject matter of the climate and biodiversity crises.

Regarding the support that educators need on environmental sustainability, respondents to the consultation survey selected[11]: **professional development opportunities**, e.g. workshops, guidance and mentoring, opportunities to work with local projects and on-the-job training (61 %), opportunities to **collaborate with organisations working on sustainability activities in the local and wider community** (44%) and opportunities to **take learners into the field for hands-on learning and activities** (42%).

[11] Respondents could select more than one answer.



Position papers and replies in the open fields also pointed to the general need for more investment in teacher capacity building; to boost the status and attractiveness of the teaching profession; improve career pathways for teachers and provide more and better teacher training opportunities. All employees in education and training should have opportunities to learn about sustainability, not only those with teaching responsibilities.

To inform the proposal, the Commission also organised a series of online workshops in April and June 2021 with over 100 teachers from the e-Twinning network who are active on sustainability and environmental issues within their schools. The teachers are members of the SENSE (Sustainability Education Network Service eTwinning) group within the e-Twinning community. The workshops consisted of keynote talks, presentations of classroom and school-wide projects by the teachers, a survey on their experiences in teaching and sustainability and collaborative work. They highlighted the following challenges and barriers:

- Primary and secondary pupils and students were highly motivated and enthusiastic to work on topics related to the environment. Collaborating on environmental and sustainability projects with students in different countries is also a highly motivating factor.

- The curriculum does not always allow for working across disciplines. Teachers often do not have the time, space or resources they need, even where the curriculum has been redesigned to include sustainability.

- Working with organisations beyond the school is highly beneficial. The COVID-19 crisis has disrupted these connections and has reduced opportunities for students to go on field trips and in general, enjoy the benefits of learning outdoors and in nature.

- The shift to remote teaching had improved both staff and student digital skills and opened up new ways of cooperating online. Teachers were more aware of opportunities for their own professional development through online platforms.

- More quality professional development opportunities, and more opportunities to network with peers is needed. Peer learning from other teachers would be highly beneficial as teachers are often on their own or working with a small number of teachers on sustainability issues.

Initial teacher education and continuing professional development

In most EU countries, environment and sustainability is present in some form in initial teacher education (ITE). In some Member States it is obligatory, while in the majority, it is offered as an elective topic or module (see table 1). Disciplinary silos and subject-specific timetables in ITE represent key challenges for further embedding sustainability, in particular through interdisciplinary approaches (Bolscho et al, 2006 and Stevenson, 2007). In addition, where there is insufficient emphasis on learning for environmental sustainability during initial teacher training, teachers may be less inclined to take part in sustainability-related continuing professional development (CPD) during their career. At the same time, many countries report shortages of teacher educators or a lack of teacher educator competences with regard to environmental sustainability.

'It is important to make professional development on sustainability as attractive as possible for teachers'
'Initial teacher education needs to work with associations and other actors in the field'

Some countries have created guidelines on the integration of environmental sustainability in ITE for teacher educators, trainers, institutions and future teachers alike. Several countries have introduced the concept of whole-institution approaches to sustainability in ITE. This is often done by focusing on the *competences* needed for change towards sustainability, rather than theoretical knowledge about sustainability. In Spain, for example, pre-service ECEC and primary teachers should acquire competences relating to environmental sustainability, such as the ability to foster student learning on the interactions between science, technology, society and sustainable development.

Table 1. Teacher education on environmental sustainability, EU-27

Teacher training on environmental sustainability	Member States																											
	AT	BE	BG	CY	CZ	DE	DK	EE	EL	ES	FI	FR	HR	HU	IE	IT	LT	LU	LV	MT	NL	PL	PT	RO	SE	SI	SK
Compulsory in ITE/CPD	○	○	○	○	○	○	○	○	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Present in ITE	●	○	○	○	○	○	○	○	●	○	○	○	●	●	○	○	○	○	●	●	○	○	○	○	○	○	○	○
Present in CPD	●		●	●	●	○	○	●	●	○	●	○	●	●		●	●	●	○	●		●	●	○		●	●	

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

In most Member States, CPD is a professional responsibility (European Commission, 2021c), and often involves sustainability at least as an optional component. CPD related

to sustainability can be offered as a separate topic or integrated systematically across courses. In Germany, efforts have been made to integrate environmental sustainability in a structured way in existing teacher training programmes rather than offering it additionally (ibid.). Cyprus also takes an integrated approach with all professional development courses on sustainability education being developed around the competences for systems-thinking, future literacy, participation, attentiveness, empathy, engagement, interdisciplinarity, action, based on the UNECE ESD competences (UNECE, 2012) and the Rounder Sense of Purpose competences model[12]. In several countries, CPD on sustainability issues in education is offered only in the context of natural sciences. This makes it difficult for teachers and educators to understand and treat learning for sustainability in a holistic way and to help *all* teachers to embed sustainability in their teaching practice.

'Time is a problem. Sustainability doesn't fit into my everyday teaching life'

'Teacher training needs to be supported by substantial public funding so that it is free and accessible to all teachers and available in their working time'

Lack of funding and time constraints remain major challenges in many Member States, preventing teachers from attending CPD, including on environmental sustainability. Making sustainability-related CPD more visible, accessible and attractive for teachers, e.g. by creating links to innovative pedagogies, could strengthen preparedness and competences of teachers (UNECEC, 2020). Linking CPD to career development can also motivate teachers to participate. In Croatia and Portugal, completing CPD on environmental sustainability allows teachers to gain points needed for career progression.

In the field of **higher education**, the *University Educators for Sustainable Development* (UE4SD) initiative, funded by the European Commission and running from 2013 to 2016, brought together 53 HEIs from 33 European countries with the aim of improving professional development opportunities for academic staff in order to reorient higher education towards ESD (Mulà, I. et al, 2017). The study revealed the following trends (Mader, M. et al 2013):

- education for Sustainable Development (ESD) is gaining importance in higher education and there is a growing recognition that university educators need to acquire ESD competences;
- university educators address sustainability issues, but do not always reflect on their pedagogical approaches;
- in many countries, university educators lack ESD professional development opportunities.

Only a few countries and institutions participating in the UE4SD project had 'significant staff development initiatives to enhance ESD in both the academic practice and leadership capabilities of university educators' (Mulà, I. et al, 2017). The strategies of nine countries[13] emphasised university educators' professional development for ESD competences whereas in 23 countries, no such need was acknowledged in either national ESD strategies, policies or legislative documents (Mader, M. et al 2013).

In many instances, institutional progress in sustainability depended on individual academics and their interest in building expertise and competences in ESD. Research and

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

[13] Cyprus, Greece, Spain, Serbia, Slovakia, Slovenia, Ireland, United Kingdom, Belgium.

specialist topics in sustainability were usually drivers for activities rather than 'critically reflective and innovative pedagogies that extend capabilities of staff as well as students' (UE4SD, 2014). Among the participating countries, only Slovakia and Latvia reported having many HEIs that support ESD competence development of academics, while in six countries this was the case for 'several' HEIs (Mader, M. et al 2013).

In many countries, academic teaching has traditionally received less attention than research, a trend that is often reinforced by the focus on research in higher education rankings and funding. While it is still rare for university educators to have or be required to have formal teaching qualifications, countries are generally placing more emphasis on developing the teaching competences of academic staff. However, this does not usually involve a *reorientation* of the academic system and its purpose as a whole, whereas learning and teaching for sustainability 'invites university educators not just to embed new elements into the existing system, but to alter that system' (Mulà, I. et al, 2017).

While academic educators generally acknowledge the importance of sustainability competences (Leal Filho, 2021c), and possibly even cover sustainable development in their research, teaching or in both, they rarely critically reflect on their own teaching or competences for sustainability (Mader, M. et al 2013). Yet, to help students develop those competences, it is vital for HEI educators to address both content and pedagogy for environmental sustainability and to have access to professional development that links both aspects.

Professional development for leadership

A key point from the consultation workshops was the need for training and support for educational leadership teams to support the mainstreaming of environmental sustainability in education. This, however, has been overlooked significantly in practice. Training the principals, rectors and other leaders of institutions matters, because they can further support staff and generate a positive organisational culture in relation to sustainability.

'Teaching environmental sustainability has to be accompanied by leadership and examples shown by institutions teaching it'

'Management has an important role to play in developing a culture of sustainability'

Challenges and barriers at institutional level

Regarding specific actions that education and training institutions should take regarding sustainability, respondents to the public survey called for more **environmental and climate change focused projects** (57%), new **learning opportunities for students** (57%) and **reviewing operations such as management of buildings and grounds, recycling, transport, procurement, etc.** (55%). Position papers highlighted the need for **sustainable schools and campuses** in terms of teaching and learning and operations of grounds and buildings. For this to be effective, all members of the educational community should be involved in decision-making. Appointing a 'sustainability coordinator' could help in overseeing sustainability-related activities, including the pedagogical approaches to sustainability. A number of papers also called for the EU to support higher education institutions in developing sustainability and green campus strategies. Here, interdisciplinary approaches as well as innovative and sustainable educational materials were called for. Further points raised in consultation workshops were the overloaded curricula and the general workload of leaders, educators

and students. This was seen as major barriers to additional, let alone more integrate, sustainability activities at institutional level.

'For impact we need to shift from events, day-based actions and short-term projects that are awareness-focused to behaviour-focused long-term programmes'

'The culture of the school has a significant impact on the type of sustainability education that is delivered'

The '**whole-school' or 'whole-institution' approach** (hereafter WIA) is a key transformative strategy to support learning for sustainability. WIA encompasses teaching and learning, planning and governance, active learner and staff participation, management of buildings and resources (e.g. energy, waste and water reduction) as well as partnerships with local and wider communities.

In many EU countries, WIA to sustainability take place through the global eco-schools programme of the Foundation for Environmental Education (see chapter 3). Schools taking part in the programme follow a seven step change process, with pupils and students playing an active role. How the programme is applied differs considerably, however, from country to country and from school to school, particularly with regard to the pedagogical approaches chosen (Boeve-de Pauw et al, 2017).

A teacher survey in the context of mapping national approaches across EU Member States showed that 52% of respondents perceived sustainability as being part of their school culture. However, most teachers listed waste management practices as well as the use of sustainable learning materials as *proof of a 'whole-institution' culture*, which indicates a restricted view of WIA. Teachers who identified WIA as lacking referred to the absence of a clear institutional vision and concrete actions from the school management as well as a reliance on the motivation of individual teachers without sustained support from management.

Sustainability initiatives in **higher education institutions** are driven by internal initiatives, through government incentives, or through collaborative networks of universities and other stakeholders. Lack of support from HEI administration is frequently reported among the challenges for implementing sustainability in the sector. Where less attention is paid to operational matters (Leal Filho et al, 2019) − such as sustainable energy generation on campuses or implementing wider environmental training efforts (Leal Filho et al, 2021b), pedagogical aspects, the teaching and learning of environmental sustainability, are likely to also be underdeveloped or lacking.

There is also growing interest in HEIs in adopting a sustainable vision or sustainable practices. While increasing attention is paid to nature in curricula, few overarching policies exist for the WIA approach. Therefore, the integration of environmental sustainability depends to a large extent on the resources and interest of the staff. Challenges relate closely to staff capacity, educators' awareness, resources, support from local municipalities and motivation towards the integration of WIA approaches (HUMUSZ (2016).

Lack of funding for sustainability in education and training is often associated with insufficient prioritisation at governmental level. At institutional level, in particular in *higher education*, funding gaps might appear due to a lack of national support or prioritisation or inadequate funding strategies. The survey on 'Greening in European higher education institutions' conducted by the European University Association, confirms lack of funding as the most common challenge for HEIs to promote environmental

sustainability (EUA, 2021b)[14]. Lacking or limited funding has many ramifications. If environmental sustainability is not prioritised in institutional frameworks, this not only weakens the possibility of accessing internal resources, but also often jeopardises the chances of receiving external funding (Leal Filho, 2021b).

Funding might predominantly be used to support core tasks rather than to strengthen sustainability. If sustainability-related tasks are not assessed, there is little incentive in pursuing them over well-established core tasks. Performance-based funding can inhibit take-up of sustainability, if it is not explicitly integrated in the performance agreement as in such cases institutions can focus on aspects that yield better funding. Such missing structural support then often results in highly engaged educators or institutional leaders either finding other sources of funding, or pushing environmental sustainability as an extra-curricular activity without institutional funding.

Policies and approaches at systems level

The majority of EU Member States have put in place strategies, policy documents or action plans on learning for environmental sustainability and/or equally viable and related concepts such as education for sustainable development and global competence. Education for environmental sustainability is generally well represented in other (non-sustainability specific) education strategies and policy documents, particularly in those related to primary and secondary level.

Strategic approaches targeting **early childhood education and care** are rare. In several cases, this is because regulations and frameworks for this sector are the same as for pre-primary and primary/secondary education or only universal recommendations are provided. Where specific legislation or strategies for pre-primary education exist, they are often broad and not targeting sustainability or environmental issues.

Recognising the importance of **vocational education and training** (VET) as an enabler for the development of competences and skills for the green transition, Member States increasingly introduce sustainability-relevant elements in VET action plans, funds and other linked activities.

Half of the Member States have **higher education** acts that address education and training for sustainability (UE4SD, 2014). Putting them into practice through action plans and other implementation measures needs to take into account, however, the more autonomous governance structures at HE level (UNECEC, 2019).

[14] Followed by lack of staff engagement, proper coordination and defined strategies.

Table 2. Strategies and policies on education for environmental sustainability across EU-27

EDUCATION POLICIES RELATING TO ENVIRONMENTAL SUSTAINABILITY	Member States																										
ECEC	AT	BE	BG	CY	CZ	DE	DK	EE	EL	ES	FI	FR	HR	HU	IE	IT	LT	LU	LV	MT	NL	PL	PT	RO	SE	SI	SK
Specific strategy	●	●	○				○				●	○		●						○			●	○			○
Part of other education strategies	●	●	●	●	●			●				○	●	●				●	○								●
Part of other policy documents	●																										
Primary/ secondary																											
Specific strategy	●	●	○	●	●	●	○	●		○	●	○	●	●	●	●	●				●		●	○	○	●	○
Part of other education strategies	●	●	●	●	●			●	●			●	●	●				○		●							●
Part of other policy documents	●																										
Higher education																											
Specific strategy	○	●	○		○		○	○			●	○		●			○			○			○			○	○
Part of other education strategies	●	●	○	○		●		●		○		○		○			○		●		●	○	○		○	●	○
Part of other policy documents	○							●												●							

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

Having in place dedicated policies at an institutional level is a clear enabler for advancing education and training for environmental sustainability. An exploratory study (Leal Filho et al, 2021b) based on the views of several universities worldwide concluded that even though the relations between governance and sustainability (through policies, certification, budget, staff training, and the existence of a sustainability team) are quite inconsistent across institutions, the existence of formal documents and commitments at national and institutional level is regarded as important and should guide their strategies.

In the first half of 2021, 305 higher education institutions from the European Higher Education Area took part in the European University Association survey, 'Greening in higher education institutions' (EUA (2021a). Results show that 61% of higher education institutions have a strategy in place for sustainability whilst 27% indicated that such a strategy is under preparation. The UN's Sustainable Development Goals (69%), as well

as national policies and initiatives (39%), provided guidance on framing these strategies. European policies and initiatives (16-17%) do not as yet strongly influence university strategies and actions for environmental sustainability (ibid.). There is scope therefore for EU level guidance to steer higher education strategies in contribution to EU goals and targets. The survey also identified institutional values (59%) and the engagement of leadership (56%), students (52%) and staff (51%) as key drivers.

Systematic inclusion of non-formal education is scarce in education policies related to environmental sustainability. Learning for environmental sustainability tends to be integrated in non-formal education through specific initiatives and cross-sector collaboration

Applying policies effectively on the ground is challenging. In over two thirds of Member States (Mulvik et al, 2021) implementation needs to be improved and better supported by awareness and capacity building, including targeted professional development for policy makers at national, regional and local level.

Collaboration and partnerships

When asked in the consultation survey whether education and training institutions are working with local and wider communities on environmental sustainability initiatives and programmes, 52% of the respondents said that this was indeed the case. A relatively high share, however, (16%) indicated that they did not know the answer.

On the extent and depth of collaboration, 36% of respondents indicated that education and training institutions collaborate **sometimes** (at least once per semester) and 35% a little (at least once per year). Collaborating 'a lot (continuously all year)' received the lowest number of responses (10%). The main challenges associated with collaboration relate to '**lack of funding for projects and partnerships'** (58%), '**lack of time in an already full curriculum'** (56%) and **'having longer-term cooperation** (e.g., tends to be limited to once-off events)' (48%).

Many position papers also highlighted the crucial role of collaboration and partnerships, including with key players in the local community such as youth associations, environmental and science centres, farms, parks, museums, libraries, as well as industry. Cooperation with local partners could help facilitate 'living laboratory experiences' outside of the busy school curriculum. Schools should also be encouraged to work with higher education institutions. Having boards or standing committees on sustainability composed of various groups (students, parents, educators, local community groups) was seen as a way to more sustained and effective partnerships.

'Collaboration will be more successful if it is integrated into educational programmes, rather than being an add-on'

'Providing a fertile ground for coordination and exchange between formal, non-formal and informal education will be key'

'Sustainability themes lend themselves perfectly to bringing people together'

'New technologies make it possible to connect citizens easily and effectively with the science community...and monitor biodiversity data on larger scales than ever before'

Across Europe and across education and training institutions, many different forms of collaboration between education institutions and NGOs or non-formal education institutions can be found on sustainability and environmental issues. However, an overall lack of coordination and effective management between stakeholders was identified as a challenge in many Member States. Inclusion of different stakeholders in a formalised way is less common, which in turn can affect the durability of partnerships. Transitory and constantly changing partnerships can undermine the potential for positive long-term impact.

Research suggests that inter-university networks and intersectoral initiatives are on the rise. Regional centres of expertise in sustainable development, led by universities networking with local stakeholders on awareness, education and capacity building, now number 180 globally (Sterling, 2021). Many universities have established transfer offices or transfer centres to support multi-stakeholder collaboration activities (Nölting et al, 2020). Multi-stakeholder, participatory and collaborative learning partnerships create opportunities for reflective and inclusive trust-building, which can foster the development of solutions and innovations (UNESCO, 2018).

Partnerships in early childhood education and care are often focused on integrating the elements of nature and sustainability into the play and learning of children. This results in an enhanced importance of NGOs and institutions focused on topics such as interaction with nature and animals in a playful manner. While businesses, universities, or other education institutions usually play a smaller role, their contribution can be very meaningful. Collaboration for forest kindergartens in Hungary and Austria usually involves ECEC institutions and programme providers such as national parks and forestry companies or governmental organisations, including local environmental organisations or even companies working in the tourism sector.

Monitoring and evaluation

Monitoring and evaluation frameworks on environmental sustainability, where they exist, are mostly implemented at national level by public authorities. Other organisations, such as NGOs focusing on sustainability and environmental education, also tend to play an important role in monitoring, especially on programmes prepared and coordinated by NGOs and the non-formal education sector. Cyprus, Czech Republic, Malta and Portugal have evaluation and monitoring frameworks specifically for sustainability.

Monitoring and evaluating the integration of environmental sustainability can also be a part of the quality monitoring and evaluation mechanisms of the general education system. The Luxembourg National Education Report ('Bildungsbericht'), published every three years, offers a unique and diverse insight into the country's education system. The 2021 edition focuses on digital learning and education for sustainable development. Regional or local rather than national authorities might be responsible for evaluation and monitoring. This is the case in Slovakia, where the evaluation of environmental education takes place through regional associations.

At international level, many EU Member States report progress on education for sustainable development (ESD) and related concepts within the framework of UNECE[15], the United Nations Economic Commission for Europe. In 2018, national implementation reporting covered 18 EU Member States. The self-reported data collected from the participating countries refers to take-up of ESD in a broad range of areas, including

[15] https://unece.org/environment-policy/education-sustainable-development

policies, regulatory and operational frameworks, assessment, whole-school-approaches and educators' development.

UNESCO has committed to monitoring progress in ESD of its members. Monitoring and evaluation was an integral part of the UN Decade of Education for Sustainable Development (DESD) during which the DESD Monitoring and Evaluation Expert Group developed a Global Monitoring and Evaluation Framework, including a set of indicators. Following the DESD, countries committed through the Global Action Programme for Sustainable Development (GAP) to align monitoring and data collection to SDG targets.

The 2016 Global Education Monitoring Report, commissioned by UNESCO, was dedicated to 'education for people and planet' (UNESCO, 2016). While stating progress in a number of areas related to SDG target 4.7[16], including curricula, textbooks, teacher education, activities outside the classroom, it also acknowledged that monitoring 'the core aspiration of target 4.7 – acquisition of knowledge and skills needed for sustainable development – is not easy' (ibid.). The wide range of ESD-relevant topics poses a challenge as well as developing relevant student assessment and surveys (ibid.). In addition, most assessment has been focusing on school students while adults and learners in other contexts have been underrepresented in monitoring (ibid.).

In general, monitoring and indicators have mainly targeted *inputs* (such as changes in curricula or the establishment of learning for environmental sustainability strategies) rather than measuring learning outcomes.

System-wide assessment through large-scale programmes like PISA[17], TIMSS[18] or PIRLS[19] plays an important role in education monitoring across the EU. Such assessment has grown in in the last two decades, prompting many countries to increase test-based accountability to measure learning outcomes. More recently, large-scale assessments are addressing learning for sustainability, highlighting, for example, the correlation between awareness on environmental and climate challenges and pessimism (Schleicher, 2021). According to research, there is a certain tension between what international large-scale assessments measure and socio-emotional, hands-on or place-based learning for environmental sustainability (Pizmony-Levy et al. 2021). A challenge will be to address potential shortcomings in large-scale assessment by better addressing the social and economic dimensions of sustainability and adapting for specific local contexts and circumstances (ibid.).

'What gets measured, gets done.'

'Measuring impact should not be limited to indicators like electricity or water usage - the changes in attitudes, values and behaviour of pupils and staff should also be measured'

[16] SDG 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.

[17] The Programme for International Student Achievement by the Organisation for Economic Co-operation and Development (OECD).

[18] Trends in International Mathematics and Science Study by the International Association for the Evaluation of Educational Achievement (IEA).

[19] Progress in International Reading Literacy Study by the IEA.

Support at Member States and EU level

The public survey asked how education and training systems in the Member States could best support education for environmental sustainability'. Most respondents chose **more funding to support education and training institutions and the non-formal sector to tackle environmental and sustainability issues** (62%). Almost 60% opted for **reviewing existing or developing new policies and strategies on education for environmental sustainability** (e.g., including learning environments, curricula, educator professional development and assessment, links to the jobs market). **Strengthening collaboration between different parts of the education and training system** (for example between formal and non-formal education, or between schools, vocational education and training and higher education) was chosen by 55%.

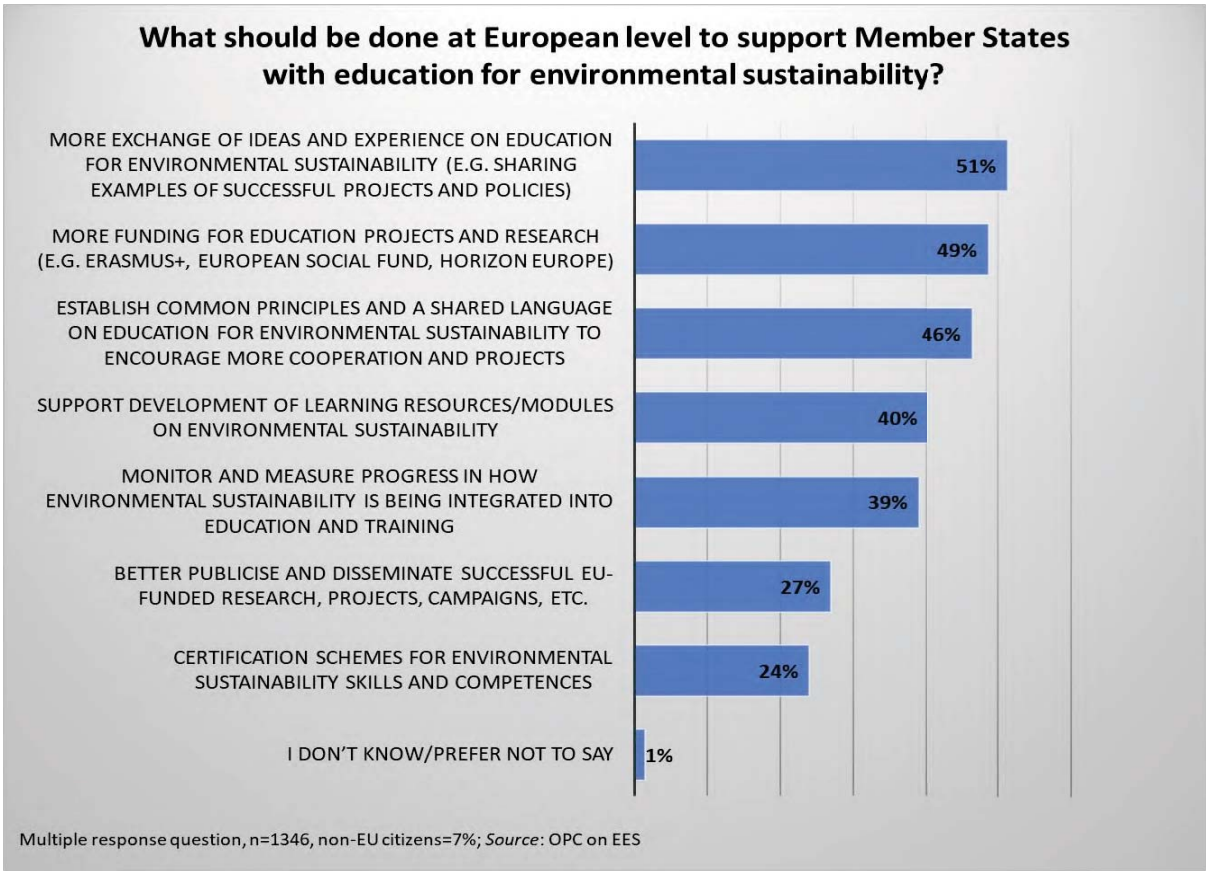
A number of position papers reiterated the need for increased investment in education in order to develop the skills that learners need for digital and green transformations and life and work in a globalised society.

'We need to lift ecological sustainability to be one of the main goals and motives of education at the national level'

'Investment in environmental education by the EU and its Member States would make education systems more effective, building resilience and forward-looking education and training systems'

On what should be done at European level to support Member States with education for environmental sustainability, the following three actions were seen as priority by respondents:

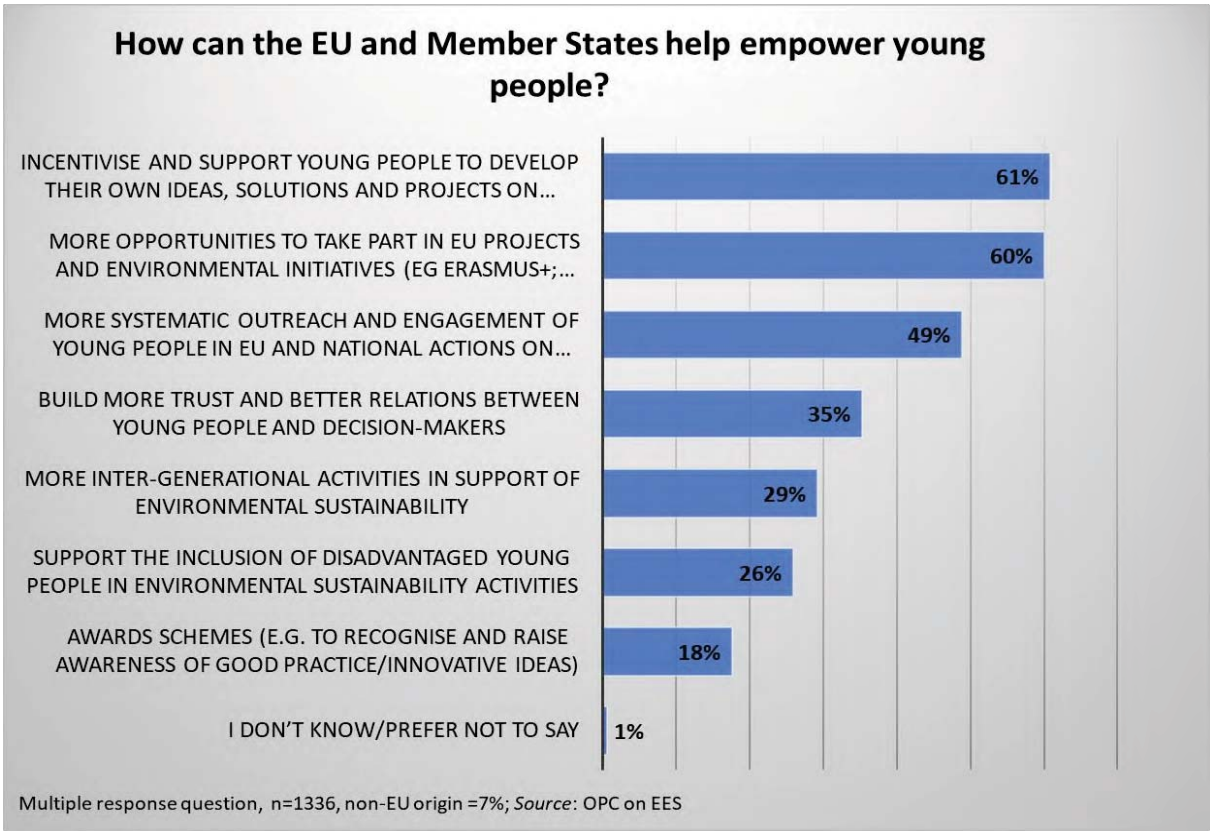
- **more exchange of ideas and experiences on education for environmental sustainability** (e.g., sharing examples of successful projects and policies) (51%);
- **more funding for education projects and research** (e.g., Erasmus+, European Social Fund, Horizon Europe) (49%).
- establish **common principles and a shared language on education for environmental sustainability** to encourage more cooperation and projects (46%).



Position papers called for green approaches and green skills to be promoted and developed through existing EU programmes (ESF+, Erasmus+, ERDF, Horizon Europe, Digital Europe, Life, etc.). Further research on green skills and the development of green practices and mindset to inform policy making was also identified as a priority. Position papers also supported the need to develop a shared understanding at EU level on education for environmental sustainability, green competences and whole-institution approaches. The development of the competence framework on sustainability was welcomed, with support for defining related learning outcomes.

Supporting youth engagement

Respondents were also asked how the EU and Member States could support young people to further engage with environmental sustainability. Priority was given by respondents to: **incentivise and support young people to develop their own ideas, solutions and projects on environmental sustainability** (61%). This was closely followed by **more opportunities to take part in EU projects and environmental initiatives** (e.g., Erasmus+; European Solidarity Corps, Education for Climate Coalition; eTwinning, European Climate Pact, European Alliance for Apprenticeships) (60%). A **more systematic outreach and engagement of young people in EU and national actions on environmental sustainability** (e.g., dialogue, consultation, feedback opportunities, including through apps, games, challenges) was indicated by 49% of respondents.



A number of position papers call for children and young people to participate more actively in school decision-making and organisation. This was seen as a way of supporting active citizenship and engagement in sustainability issues. Critical thinking skills can also be strengthened as young people can reflect on their own values and listen actively to the opinions of others. Using digital channels and social media networks was highlighted as crucial in reaching young people.

'The creation of permanent and systematic mechanisms to listen and adopt the views of the youth'

'The student population is often far more aware of environment issues than the population at large'

Key points from consultation and research

Respondents call for more guidance on how to change behaviour and take action in everyday life, and more opportunities to take part in decision-making related to environmental sustainability.

Environmental sustainability should be taught through a combination of different subjects and disciplines, rather than as a topic or module in a single subject.

Regarding support for educators, quality professional development opportunities are seen as the main priority for action.

There is a clear need to strengthen collaboration between education and training institutions and local and wider communities to make such cooperation more systemic

and continuous.

A lack of funding for projects and partnerships, together with a lack of time in an already full curriculum were highlighted as the two most important barriers for effective partnerships.

National education and training systems could best support learning for environmental sustainability by providing more funding and by reviewing existing or developing new policies and strategies on learning for environmental sustainability.

EU level support to Member States should focus on more peer learning, more funding for projects and research and on establishing common principles and a shared language on learning for environmental sustainability.

Young people need further support to develop their own ideas, solutions and projects on environmental sustainability. They would also benefit from more opportunities to take part in EU projects and initiatives.

Monitoring and indicators on learning for environmental sustainability and ESD have mainly targeted inputs such as strategies and changes in curricula rather than measuring learning outcomes.

3. Towards sustainability in learning: achieving lasting change

The increasing number of projects and programmes across Europe related to learning for environmental sustainability shows a growing interest and engagement in these issues. However, many initiatives remain limited in time and scope. Given the urgency of the climate and biodiversity crises, it is time for a step change and to move beyond isolated initiatives to deep and systemic change in education and training. For this to happen **environmental sustainability should be embedded in all education and training policies, programmes and processes and anchored firmly in the entire student learning experience.** Action is needed both vertically, individual to institution to systems level, and also horizontally, meaning all stakeholders in education and training need to work together in synergy for whole-systems change.

Short-term measures need to be continued or developed 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. It is important that learning and teaching for environmental sustainability is not viewed as an additional task or burden for educators to implement. Neither should it be viewed or treated separately to other education agendas of inclusion, quality, innovation, internationalisation and student-centred learning. Learning for sustainability has rich potential and is an excellent opportunity to make learning more relevant; to motivate learners and educators; and to develop competences increasingly needed for life and work.

The extensive consultations and the research gathered to prepare the Commission's proposal (see chapter 2) have highlighted a number of key principles and areas of focus. To fully embed environmental sustainability into education and training, action is needed on a range of different fronts which are detailed below.

Learning for environmental sustainability:

- Starts from early childhood education and care
- Takes a lifelong learning approach
- Creates supportive learning environments where the institution as a whole is active on sustainability
- Is learner-centred, engaging, positive and based on real-life experiences
- Supports educators, including leadership teams, to teach and act for sustainability
- Fosters collaboration and partnerships in local and wider communities
- Involves young people in meaningful ways
- Builds sustainability competences
- Is founded on strong policies

These nine interconnected areas are explored below with relevant examples provided from current policy and practice in Europe and beyond.

Learning for environmental sustainability starts early

Early years are formative years. They profoundly shape individuals' intellectual, psychological, emotional, social and physical interactions and relationships throughout their life. According to research, early years are also a crucial time window to develop a sustainability mindset and the concept of being an active citizen (Davis, 2015), within the family network and in local and wider communities (Elliot and Davis, 2018). Everything 'deeply lived, practised and felt in the early years of human development remains for the rest of one's life' (Didonet, 2015). Learning for environmental sustainability and acknowledging the right of children to participate in issues related to the environment and sustainable development (Fenton-Glynn, 2019) must therefore occur well before children start primary school (Siraj-Blatchford et al, 2010).

Given the extent of the ecological crisis and the potential for eco-anxiety[20], it is tempting and indeed well-intentioned to conceive of childhood as a period of carefree play and to shelter children as much as possible from the realities around them. However, research indicates that even very young children are adept at sophisticated thinking about social and environmental problems (Christensen, 2021), and that the earlier learning for environmental sustainability starts, the greater its impact can be. In fact, ideas about children and childhood over the past 40 years have significantly changed in terms of how we see children's development and their capabilities (Corsaro, 2005). Children are now perceived as active contributors and interpreters in their worlds, and as social actors as recognised in the United Nations Convention on the Rights of the Child[21].

Building on traditions in early childhood education and care

High-quality early childhood education and care (ECEC) has an enormous potential in developing pro-environmental values, attitudes and skills. In addition, ECEC can build on well-established traditions to integrate learning for environmental sustainability. Many pedagogies and practices – while not necessarily perceived or named as such – align fully with effective learning for sustainability: holistic and integrated approaches; outdoor learning; experiential and project-based learning that supports co-investigation and co-construction building on real-life local situations and problems that children identify; and authentic participation with parents and communities (Davis, 2015). Research even speaks of a 'pedagogical advantage' (Elliot and Davis, 2009) that ECEC has with regard to learning for environmental sustainability compared to other education sectors.

Play-based learning

Young children explore the world through play and play contributes to the development of cognitive functions, as well as to communicative and social skills that also contribute to building a child's future sustainability mindset. Close contact with nature is seen as foundational for learning and caring about nature. Exploring woodlands, getting wet feet, climbing rocks, building with sticks, running on grass, turning over rocks, following insects, and connecting with nature (Siraj-Blatchford et al, 2010) are essential for building a strong foundation of environmental stewardship (Chawla and Derr, 2012).

[20] Eco-anxiety (also known as eco-pessimism) refers to fear and worries about environmental damage and disaster based on the current and predicted future state of the environment and the consequences of climate change. See also https://www.ecoanxiety.com/

[21] https://www.ohchr.org/en/professionalinterest/pages/crc.aspx

Forest kindergartens or other early childhood education facilities with a strong nature component have become popular because of their positive impacts on children's well-being, dispositions and learning.

Beyond play-based learning

Many children and young people around the world are growing up in environments where nature is missing or severely compromised, whether in high rise apartments, urban slums or refugee camps. ECEC therefore needs to look far beyond nature-oriented education as a solution for todays' problems. While acknowledging the crucial role of children's close contact with nature, romanticised views of nature play and nature education in ECEC are often a product of an 'idealised' Western oriented childhood existence and no longer enough to deal with today's human-nature challenges (ibid.).

Applying innovative methods alongside more traditional approaches can further promote learning for environmental sustainability. This can include harnessing the potential of digital technologies. In Sweden, digital tools were successfully employed by teachers who used a picture book about waste collection to co-construct a project with their pupils involving handwritten letters and stories, tablets for picture taking and computers to create short videos about their learning (Johannesson et al, 2020).

Increasingly, early childhood educators are working with children on, for example, socio-political sustainability with a focus on poverty (Paujik et al, 2020) and socio-cultural sustainability, focussing on storytelling to strengthen understanding and respect for cultural heritage (Tzima et al, 2020). Such learning centres on children being recognised as leaders and change agents whose democratic and civic participation is vital to addressing the complexities and challenges across *all* sustainability dimensions: environmental, political, social, and economic. The multi-dimensional approaches enhance creativity, critical reflection and problem solving; recognition of multiple worldviews, values, and cultural traditions; ethically informed relationships between humans across the globe and between generations, and nonhuman species, and natural elements (Elliott and Davis, 2018).

Moving forward

Providing younger children with learning opportunities for environmental sustainability poses challenges and new opportunities. To strengthen the sector as a whole, and also benefit its sustainability performance and practice, it is necessary to:

- improve access to ECEC, in particular for disadvantaged groups such as low-income families, people with migrant backgrounds, those living in rural and remote areas;
- raise the status of ECEC teachers and improve their working conditions;
- improve initial and continuing ECEC educators' training, including on environmental and sustainability issues;
- invest in suitable facilities and working environments that enable exposure to nature;
- promote age-appropriate pedagogical approaches, with a focus on social and emotional learning;
- foster engagement with families, carers, and the wider community.

Learning environments

To enable children's regular contact with nature and its elements, facilities that are not close to nature can be 'naturalised' through small gardens, potted plants combined with regular exposure to nature through walks and excursions. Staff and children can actively engage in sustainable practices by 'greening' ECEC facilities and their operations. They can apply 'green housekeeping', including waste reduction, saving water and energy and thus create learning environments that are both supportive of, and supported by, sustainable practices. A whole-institution approach, involving all levels of governance and management of ECEC facilities and services, can systemically promote and support these practices.

Table 3. Examples of physical environments and teaching approaches to support learning for environmental sustainability

Examples of designing the physical environments and resources in ECEC	Examples of teaching approaches and pedagogies in ECEC
▪ Location close to natural environments such as parks ▪ Small gardens, potted plants, access to small animals ▪ Rainwater harvesting system ▪ A place where children sit and chat and do activities outside ▪ Opportunities for children to grow vegetables and fruits (at school) and taste what they have grown ▪ Information boards about the environment at school ▪ A space where natural materials are displayed ▪ Ethically sourced and/or repurposed, re-cycled items and material for play ▪ Visuals showing animals' life cycles and/or endangered animal species ▪ Spaces at school where solar energy is used, water harvesting practices, waste recycling ▪ Digital technologies to facilitate practice change such as online images, electronic timer lights etc.	▪ Recognise children's interests as the driving force for exploring nature play experiences ▪ Stimulate children's interest in protecting the environment ▪ Provide opportunities for children to talk about local and global environmental news ▪ Promote opportunities for discussing with children about values, about what sustainability means, and how could the Earth be a better place for all. ▪ Regular opportunities to be immersed in nature through extended walks and excursions ▪ Activities with children about water use, waste, energy consumption ▪ Promote active transport by considering how children come to the service each day: car, bicycle, walk, train etc. ▪ Promote opportunities for children's voices to be heard through civic participation in community events such as Earth Day, local media or sending letters to relevant authorities.

Source: own compilation based on Korkmaz and Guler Yildiz, 2017) and Davis, 2015.

Strong policies and motivated staff as key enablers

Re-orienting and updating policy and curricula to promote environmental sustainability and aligning with European and international sustainability policies and initiatives will offer guidance for ECEC professionals' sustainability knowledge and skills. Some countries

including Sweden and Finland, as well as Norway and Japan are already in the process of re-orienting curricula towards sustainability (Elliott et al, 2020).

The **EU quality framework for early childhood education and care**[22] can provide useful policy pointers for Member States on how to improve their ECEC systems. It sets out key principles for high-quality early childhood education and care, including by addressing children's social, emotional, cognitive and physical development and their well-being.

Successful learning for environmental sustainability will not be possible without qualified and highly motivated educators. Raising the status of the profession through investing in training, recruitment and support will benefit the sector overall, including in meeting sustainability targets. ECEC training courses on environment and sustainability need to familiarise future professionals with the nature play/learning paradigm while also trying to go beyond it and adopt other more transformative approaches.

Finland has developed a **strong policy vision** for sustainability in ECEC. According to the 2018 Finnish national core curriculum for ECEC, the goal of early childhood education is to develop the child's co-operation and interaction skills, promote peer activities and guide ethically responsible and sustainable activities, respect for other people, and membership of society. All activities should consider the need for an ecologically, socially, culturally, and economically sustainable lifestyle. Everyday choices and actions should reflect a responsible attitude towards nature and the environment, and early childhood education should promote sharing, reasonableness, sustainability, and the repair and re-use of resources.

The GemüseAckerdemie, meaning **Vegetable Academy**, aims to re-establish **connections between children and nature**. The programme supports teachers, school staff, volunteers and parents to help children learn about the theory of growing food and apply this knowledge by sowing, caring for and harvesting vegetables. The programme is designed to engage not only the children, but also their teachers and families. Annual impact reports show that participants feel a stronger connection with nature and understand and value their food more. The award-winning programme which began as a pilot in 2013 is now running in 400 kindergartens and schools in Germany, Austria and Switzerland, including in disadvantaged areas.
inherit.eu

Since the early nineties, **Denmark** has designed and implemented **forest kindergartens** across the country, which connect pedagogical approaches to nature with engagement in sustainable practices and interaction with nature. Children conduct all kindergarten activities outside in natural settings, depending on the surroundings of individual schools and the ideas and knowledge of the educators. Since the first forest kindergartens were established, their popularity has grown enormously. Today, one in ten Danish kindergartens are outdoors and the idea has spread to other countries.

Key points for early years learning for environmental sustainability

Learning for environmental sustainability needs to start from a young age as early years are crucial to develop a sustainability mindset and to foster environmental stewardship and active citizenship.

High-quality ECEC can foster pro-environmental values, attitudes and skills by building

[22] 2019/C 189/02

on well-established traditions, such as play-based learning, and by using the potential of innovative approaches and resources, including digital tools.

Children need ample opportunities to develop a connection with nature as well as opportunities for civic participation.

Successful early years learning for environmental sustainability requires strong policies that support whole-institution approaches; investment in learning environments, that enable regular exposure to nature; building staff capacity to apply sustainability pedagogies in their daily practice; strong links with families and the wider community.

Learning for environmental sustainability is lifelong

Putting our society and economy on a sustainable path provides new personal and professional opportunities for people but also requires continuous efforts to understand the complex nature of sustainability and the environmental crises and to develop the skills and understanding to address these challenges. Learning for environmental sustainability can and should therefore be lifelong; occurring throughout people's lives in many places and contexts covering the full spectrum of formal, non-formal and informal learning, from early years into older age.
How different forms and sectors of education and training can contribute to learning for sustainability is presented below. To help educators and institutions integrate futures thinking and other critical sustainability competences, the Commission has developed a sustainability competence framework to be used in a lifelong learning context (see chapter 4). Building these skills can help people to adapt, manage and contribute positively to a safer and more sustainable future.

Learning for sustainability in formal education

A large part of learning for environmental sustainability can and should take place in formal education and training[23]. **Early childhood education and care** has – as highlighted above – a major, albeit underdeveloped, role to play in developing a caring attitude towards nature and in building a sustainability mindset. **Schools** at primary and secondary level, including VET schools, have a large societal reach and ripple-on effects can occur with parents, families and the wider community. While the integration of sustainability in schools is more advanced compared to other education and training sectors, the huge potential of schools to advance learning for sustainability is not yet fully realised, with large differences across the EU (see chapter 2). The changes needed to fully embed environmental sustainability require a whole-of-system approach, that is based on the learner's experience and takes into account pedagogy and curriculum, support for educators, learning environments, including buildings and outdoor spaces, diverse actors, both in schools and outside and connection to local and wider community.

VET plays a key role in formal education and training for environmental sustainability, equipping learners with cross-cutting sustainability competences, such as systems thinking and futures thinking, as well as sector specific skills. The UNESCO Strategy for

[23] The Council of Europe refers to formal education as 'the structured education system that runs from primary (and in some countries from nursery) school to university, and includes specialised programmes for vocational, technical and professional training. Formal education often comprises an assessment of the learners' acquired learning or competences and is based on a programme or curriculum which can be more or less closed to adaptation to individual needs and preferences. Formal education usually leads to recognition and certification. https://www.coe.int/en/web/european-youth-foundation/definitions

Technical and Vocational Education and Training 2016–21 (UNESCO, 2016a) sets out a vision of 'transformative VET', which is based on economic development, equity and environmental sustainability. While the main function of VET is to build competences and train young people and adults, it increasingly involved in regional and local development and providing technology transfer to SMEs (Rosenfeld, 1998 and Toner and Dalitz, 2012). The Council Recommendation on vocational education and training for sustainable competitiveness, social fairness, and resilience[24] recognises that 'vocational education and training is a driver for innovation and growth and prepares for the digital and green transitions and occupations in high demand'. Greening VET requires a mind-set shift, from industry-centred thinking to sustainable development-centred thinking, both at system level and at the level of education and training providers and workplaces.

Higher education (HE), in all its diversity and through all of its roles and missions – learning and teaching, research and innovation, and service to society, has a major contribution to make in preparing and empowering our societies to be more environmentally sustainable, and to manage the impact of those changes. This is relevant in terms of equipping their graduates with the knowledge, skills and competences they need for a rapidly changing global context, directing research and innovation to manage the impacts and explore and design solutions with regard to climate change, and placing sustainability at the heart of community outreach. At the same time, higher education systems are themselves affected by climate change, with impacts on infrastructure and campus management, where they can also act as role models for environmentally sustainable practice and operations.

Expectations for higher education institutions (HEIs) to be leaders of change in the green transition are high, not least from many of their students who may be at the forefront of campaigning for a more environmentally sustainable society or global solidarity with regard to climate change. HEIs as 'learning laboratories' (Waas et al, 2012) or 'centers of sustainability innovation and excellence' (Clugston, 1999) require their activities to be 'ecologically sound, socially just and economically viable, and that they will continue to be so for future generations' (Waas et al, 2012). To achieve that, HEIs need to review and/or reevaluate their missions, curricula, research, community and campus operations priorities (Yarime and Tanaka, 2012).

Having strong leadership on sustainability, along with an engaged and committed academic community, may open opportunities for the students, researchers and staff to improve both their expertise on, and their contribution to, environmental sustainability across all of their programmes, at all levels. In addition, a higher education institution can have a recognised role in their city, region or even country, and become a role model in both educating their students and staff on environmental sustainability and offering upskilling and reskilling programmes, such as micro-credentials[25], to lifelong learners. Engagement on sustainability efforts opens opportunities for collaboration and networking across institutions and among them at the local, regional, national and international level, in addition to inspiring other institutions to follow similar strategic pathways.

Research and outreach, as specific university dimensions, have been playing an important role in education for environmental sustainability. Through initiatives in these areas, HE can address environmental sustainability and the SDGs through

[24] 2020/C 417/01

[25] A micro-credential is a qualification evidencing learning outcomes acquired through a short, transparently-assessed course or module. Micro-credentials may be completed on-site, online or in a blended format. The flexible nature of them allow learning opportunities to be opened up to citizens, including those in full-time employment.

interdisciplinary and transdisciplinary research, national and local implementation, capacity building, public engagement and cross-sectoral collaboration, among others (SDSN, 2020). At the same time, by advancing knowledge in these areas, research and outreach can support educational initiatives and contribute to a deeper and more comprehensive understanding of sustainability issues

Non-formal learning and sustainability

Formal educational systems alone cannot respond to the rapid and constant technological, social and economic change in society. Non-formal education[26] is an integral part of lifelong learning for sustainability, allowing young people and adults to acquire and maintain the skills, abilities and the outlook needed to cope with and adapt to a continuously changing environment.[27]

Non-formal education providers, including **local community groups, youth associations, the scouting movement**, **parks, farms, science centres, museums and libraries** hold considerable potential to bring environmental learning to wider audiences than those reached by formal education. In fact, participation in non-formal education and training surpasses participation in formal education and training among adults (OECD, 2019). On average across OECD countries taking part in the Adult Education Survey, 16% of 25-34 year-olds were taking part in formal education and training while 50% of the same age group were taking part in non-formal education and training. (OECD, 2019).

Non-formal education can contribute to learning for environmental sustainability both on its own as it sector and in terms of its relations with formal education. The absence of the structures and frameworks under which formal education operates can be a strength, as 'non-formal learning provides an opportunity for education to rely more on the natural process of learning, by allowing it to be active, volitional and internally mediated' (Heimlich, 1993). 'The value of non-formal education arises because the formal education system is adapting slowly to the socio-economic and cultural changes of the world in which we live' (Boeve-de Pauw and Halbac-Zamfir, 2020). Non-formal education is often based on hands-on, real-life experiences, teaching methods and pedagogies than formal education. Organisation and planning of learning in non-formal education is often taken on by the learners themselves, which support the more effective intrinsic, rather than extrinsic, motivation for learning (Norqvist and Leffler, 2017). Non-formal (adult) learning also plays a significant role in promoting social inclusion, active citizenship as well as personal development and well-being.

Non-formal education is therefore well-positioned to adapt to, and adopt, new topics, discoveries and initiatives for environmental sustainability and implement them in new or existing programmes at a faster rate than may be seen in formal education. Learners also have an opportunity to develop and follow their own interests outside of formal education which can boost their engagement and learning.

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[26] The Council of Europe (CoE) refers to non-formal learning 'as planned, structured programmes and processes of personal and social education […] designed to improve a range of skills and competences, outside the formal educational curriculum.' Non-formal education typically happens in 'youth organisations, sports clubs, drama and community groups'. Certification of non-formal education achievements is generally difficult. According to the CoE, non-formal education should also be: 'voluntary; accessible to everyone […] with educational objectives; participatory; learner-centred; about learning life skills and preparing for active citizenship; […]; holistic and process-oriented; based on experience and action; […]'. https://www.coe.int/en/web/european-youth-foundation/definitions

[27] See Council of Europe. Recommendation 1437 (2000), CM/Del/Dec(2000)698/3.1.

Initiatives, pedagogical methods and materials developed in non-formal education can inspire and complement work underway in schools and other formal education providers. The scouting movement, a voluntary non-political educational movement for young people, was quick to address the SDGs and produce teaching materials, both for their local units as well as to inspire actors in formal education (ibid.). As part of the reform of the Danish primary and lower secondary education, primary schools are required to work with local sports, cultural associations, life, leisure and club activities during the school day. Schools thus make connections with their local communities, and between the children's times and activities in and outside of the classroom (Ministeriet for Børn, 2016).

To foster uptake and impact of non-formal learning, including for environmental sustainability, **recognition and validation of non-formal education** need to be improved. Recognition of non-formal learning can improve access to formal education and make it more attractive for workers and employers to invest in non-formal education, such as on-the-job training, knowing that it can be recorded and built upon. Micro-credentials can be used to give visibility to non-formal learning and offer a flexible and accessible route for workers and learners to develop the skills they need. Increased investment in non-formal education is key to scaling and developing activities. This will positively impact the building of sector-specific expertise and capacity; the development of educational activities and materials by non-formal educational providers; and collaboration between non-formal and formal education providers.

A number of position papers submitted as part of the public consultation also pointed to the need to **mobilise local communities in urban areas** to promote learning for sustainability. This can help tackle the problem of people in cities and towns spending less time outdoors and losing connection with nature. 'Learning cities' can bring together local organisations, businesses, museums, science centres, libraries, schools and other formal and non-formal education providers to build awareness, understanding and engagement with climate change, biodiversity loss and other environmental issues. According to UNESCO a learning city is one that:

- effectively mobilises resources in every sector to promote inclusive learning, from basic to higher education;
- revitalises learning in families and communities;
- facilitates learning for and in the workplace;
- extends the use of modern learning technologies;
- enhances quality and excellence in learning;
- fosters a culture of learning throughout life.

The UNESCO Global Network of Learning Cities[28] supports and improves the practice of lifelong learning in member cities by promoting dialogue and peer learning, capturing good practice, fostering partnerships, providing capacity building, and developing tools and instruments to support learning cities.

All forms of learning, formal, informal and non-formal, need to be underpinned by the ability and willingness to learn in a life-long context, including for sustainability. It is crucial for individuals to develop learning to learn competences. The **LifeComp** Framework[29], developed by the Commission in 2020, can be a reference point for building personal, social and learning to learn competences.

[28] https://uil.unesco.org/lifelong-learning/learning-cities
[29] https://ec.europa.eu/jrc/en/lifecomp

Informal learning and sustainability

Informal learning[30], while not usually part of explicit policy design, plays a significant role for many people in developing awareness and understanding of the environment and sustainability. People learn from family, friends and neighbours, in local communities at work and through play, reading and sports. The mass media are a key player in informal education, for examples through films, documentaries and music. Mass-communication and social media play an ever increasing role in the lives of adults, young people and children. Informal learning can partly compete for attention and content with formal education and increasingly shape people's opinion and values. In the SEEd Youth Listening Project, a 2019 survey among more than 1700 mostly school-aged young people from the UK (SEEd. 2019), television and social media were named second and third most important sources of information for young people on sustainability and climate change after geography lessons.

While innovative practices and the use of digital media for learning are gaining ground, policy makers, education institutions and staff need to better reflect these realities so as to make the most of informal learning, connect formal and informal learning and be closer to learners' real-life experience. Media (including public broadcasters, social media, digital platforms and streaming services) can help learners and their families to understand climate change, biodiversity loss and sustainability. They can encourage young people to create and share content on environmental issues and share stories on how learners can take action within their local communities.

The vigour and engagement of young people around the world on environmental issues has triggered **intergenerational learning**, including by decision-makers. Youth-led action on climate and the environment has influenced and initiated policy measures for sustainability. The Green Deal acknowledges the motivation and input by young people as a driving force for designing and stepping up EU policies towards the green transition. In turn, and older people have much to contribute when it comes to sustainability and learning for sustainability. Given the central role of informal learning in any education process, **parents, carers, grandparents and families** need to have an active role in learning for the environment and sustainability. Including families in learning for sustainability, means to both build *on* their competences and *build* their competences. Tapping into the sustainability competences of parents, carers, grandparents and other relatives can lead to a richer learning experience. At the same time, it cannot be assumed that parents' will be able or willing to continue at home what has been learnt in ECEC facilities, schools or other education and training institutions. Therefore, helping parents and families to understand environmental challenges and how they can become agents of change can help promote a sustainability mindset across society.

European School of Sustainability Science and Research, a network of 62 European universities, is engaged on the nexus between research and education initiatives on environmental sustainability.
https://esssr.eu/

The European Youthpass is a tool to document and recognise learning outcomes from youth work and solidarity activities. The Youthpass is part of the European Commission's strategy to foster the recognition of non-formal learning. It is

[30] The Council of Europe refers to informal learning as 'a lifelong learning process, whereby each individual acquires attitudes, values, skills and knowledge from the educational influences and resources in his or her own environment and from daily experience. Learning in this way is often unplanned and unstructured.' https://www.coe.int/en/web/european-youth-foundation/definitions

available for all projects and activities within the Erasmus+: Youth in Action and European Solidarity Corps programmes.

The UN's **Youth Climate Movement** is a formalised international network of youth organisations that provide non-formal learning to inspire, empower and mobilise a generational movement of young people to take positive action on climate change.

The *Umweltberatung* in **Austria** (eco-counselling) has developed the Energy Efficiency Driving License, a tool for energy saving in private households, small and middle-sized enterprises and communities in order to meet the needs for climate protection and energy saving.

The **Young Reporters for the Environment programme** by the Foundation for Environmental Education combines formal, non-formal and informal learning. It runs in over 40 countries worldwide, supporting young people to explore and take action on environmental issues through photos, videos and news articles. Participants (11-25 year olds) are encouraged to become 'citizen journalists' investigating local environmental issues and solutions. Participants acquire a range of skills and competences through the programme such as communication skills, teamwork, critical thinking, civic engagement and leadership. National bodies coordinate the programme and young people can join either through their school, through non-formal education (e.g. youth group or summer camp) or as an individual. An international competition is held annually where young people identify a local environmental issue and put forward possible solutions.
https://www.yre.global/

An intergenerational green project which combines both aspects of learning from and by adults is being implemented in **Germany**, where older adults are trained over a period of two years to work with young children as nature ambassadors in ECEC facilities.

Key points for lifelong learning for sustainability

Learning for environmental sustainability needs to happen on an ongoing basis for learners of all ages, in and outside of formal education and training and in many different contexts and settings. This is vital to ensure that people adjust, adapt to and benefit from the opportunities of the green transition.

Formal education and training, from early years to adult education, has a key yet still underdeveloped role to play in learning for sustainability.

Non-formal learning can provide hands-on and innovative learning experiences and connect children, young people and adults to their local communities and issues.

Informal and intergenerational learning can be powerful in building knowledge, awareness and skills and mindset for sustainability.

Learning for environmental sustainability requires supportive learning environments

To be effective, learning and teaching for sustainability needs to be conceived around the entire experience offered to learners, in- and outside of the classroom, during dedicated learning time as well as beyond (e.g. on campus, outdoor areas, cafeteria, extra-curricular activities etc.). It also recognises experiences gained by learners through informal learning. A learner- and learning based approach goes beyond changing pedagogical practice to understanding all actors, including educators, as learners, and all institutions as learning organisations (Sterling, 2001).

Mobilising the institution as a whole

The 'whole-institution' approach (WIA) is an established concept that enables schools, HEIs and other institutions to respond to new and complex challenges. It helps organisations move from isolated examples of effective practice by individual teachers or teams of teachers to continuous, and sustained change across the institution as a whole.

Viewing schools as learning organisations is a useful frame that can help schools and systems plan for and effectively embed sustainability. It is a concept of a school community that encourages and enables teachers and school leaders to improve both their pedagogical and their organisational practices concurrently through local collaborative research, networking and continued professional development. Such schools do not exist in isolation; they are linked and embedded within a learning system where decision-makers can learn from the developments that are taking place in and around schools (European Commission, 2021a).

WIA for sustainability is a key transformative strategy which involves the inclusion of sustainable practices and processes across the organisation: governance; teaching and learning design; campus and facilities management (e.g. conserving water and energy, providing healthy food, minimising waste and providing green and healthy school grounds); active student and staff engagement as well as cooperation with partners and the broader communities and students (UNESCO, 2016b). Promoting a whole-institution approach is one of the commitments in UNESCO's Berlin Declaration on Education for Sustainable Development[31].

The following enabling factors can help ensure an effective and durable whole-institution approach and develop a culture of sustainability:

Vision and planning. Including sustainability in the organisation's vision, mission statement and core operations can be impactful and can support implementation, monitoring and quality assurance.

Shared leadership. Education leaders have a key role to play in raising awareness, motivating and involving all staff as well as parents and students in developing a shared vision for sustainability. However, a 'heroic' leadership style is not sustainable over time (Abrahamsen and Aas, 2016). Shared or distributed leadership (Bennell, 2015) means that both educators and learners are involved in planning and decision-making. This helps foster a feeling of ownership towards sustainable practices, and can help build student and staff competences.

[31] https://en.unesco.org/sites/default/files/esdfor2030-berlin-declaration-en.pdf

Adaptability. Adaptability refers to the way in which institutions adapt to internal and external demands or opportunities for change. An effective educational organisation can respond to these demands and by doing so, improve.

Initiative and an open-minded attitude of key actors (preferably several) within the institution. WIAs need educators to innovate and the buy-in of leadership teams to turn into lasting and empowering bottom-up initiatives. Without a person – a 'change agent', – or the commitment of the leadership team, however, the WIA initiative may not trigger change. Broad stakeholder engagement can promote transparency, trust, shared responsibility and ongoing reflection on how to improve on a continuous basis.

Student engagement. Integration of sustainability topics at the operational level can be an important pedagogical tool for skills development. Participation in school elections and having a student body that participates in decision making, for example, can foster active citizenship (Saha and Print, 2010).

Evidence and evaluation. Gathering, analysing and using a range of qualitative and quantitative data is important to create a holistic picture of the education institution and to develop clear strategies. Self-evaluation has emerged as a key mechanism to support whole-institution approaches to change and innovation.

Aligning the education institution as a whole with sustainability is a **long-term process**. Institutions therefore require support to design, monitor and evaluate sustainability strategies and/or embed sustainability in existing processes and measures. Education leaders need a sufficient level of autonomy for decision-making in order to facilitate innovation and change.

Education and training institutions can also be supported to take part in eco-certification programmes which can bring environmental, educational and economic benefits. Such support could include agencies or bodies to support whole-school approaches; mentoring and networking of schools; templates and guidance and financial support. Labels, award schemes and digital badges can also serve to recognise and incentivise action on sustainability.

Traditionally, **higher education institutions** are structured around faculties and departments that are autonomous to varying degrees. This can undermine institution-wide approaches to sustainability. Consequently, the higher education landscape is still characterised to a large extent by individual sustainability projects and sustainability issues being addressed in individual courses (Rieckmann and Bormann, 2020).

As with other education and training sectors, a whole-institution approach in higher education is conducive to transformative learning for a more environmentally sustainable future (Leal Filho et al, 2018). This approach should integrate teaching and learning, research, community engagement and all aspects of campus operations, and facilitating cooperation among all study areas and actors – leaders, academic and other staff, students and the local and wider community.

Whole-institution approaches at school level

The **Eco-School Programme** is the largest and best-known global environmental education programme for educational institutions, in which environmental and ESD related competences and activities are evaluated at institutional level through the

awarding of a 'Green Flag' and 'Green Key'. The programme is run by the Foundation for Environmental Education. To become part of the programme and be recognised as an eco-school, schools must implement the following steps:

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

The Eco-Schools programme is now being expanded to higher education.
https://www.ecoschools.global/seven-steps/

In **Cyprus**, the Schools Sustainable Environmental Education Policy (SEEP) is an official whole-institution programme adopted by the majority of primary and secondary schools in the country. SEEP focuses on ensuring that sustainability becomes part of school planning. The issues included in the SEEP are agreed by the institution as a whole, and students and staff engage with the environment and sustainability through the curriculum's thematic units. School self-evaluation measures impact at a pedagogical, organisational and social level, and the outcomes form the basis for longer-term implementation.

An example of a **whole-institution approach** to greening in the VET sector is the Sustainable Vocational Education and Training Koning Willem College in the Netherlands. This institution renewed its vision as a 'village' with a circular eco-system, integrating sustainability in curricula, pedagogy and school facilities. The college has electric cars, bicycles, solar panels, green insulation, and sustainable heating and ventilation and an 'energy transition house' acts as a knowledge and practice centre.

Whole-institution approaches in higher education

41 European Universities, comprising more than 280 higher education institutions, and **funded through Erasmus+ and Horizon Europe**, integrate environmental sustainability across their missions, policies and operations:

Una Europa comprises eight leading research-intensive universities from all corners of Europe - Freie Universität Berlin, Università di Bologna, University of Edinburgh, Helsingin Yliopisto, Uniwersytet Jagielloński w Krakowie, KU Leuven, Universidad Complutense de Madrid and Université Paris 1 Panthéon-Sorbonne. Una Europa partners are united by a joint commitment to sustainability and share an aspiration for the 'sustainable university' as an institution that rises to meet global and societal challenges. Una Europa institutions develop communities, opportunities, spaces, and projects to meet these challenges.

The *Una Europa Focus Area on Sustainability* brings together the academic communities of the eight partner universities to work on joint innovative formats for education and research, including a joint Bachelor, a Micro-Module and a continuing education certificate in the area of sustainability. Workshops and training opportunities enable inter-disciplinary groups of doctoral candidates from partner institutions to exchange on aspects related to sustainability.

A *Task Force on Sustainability and Climate Protection*, led by Freie Universität Berlin, has been established to connect sustainability experts and professional staff across all Una Europa partner universities. The Task Force is currently developing a joint *Sustainability*

and Climate Protection Strategy, which will set concrete targets and ambitious objectives in the areas of governance, teaching and community engagement, operations as well as healthy and resilient communities.
https://www.una-europa.eu/

Launched in 2008, the **Austrian Sustainability Award** was designed to raise awareness of and connect sustainability initiatives in higher education institutions. The award seeks to recognise longer-term processes and improvements, rather than individual or one-off projects. Prize categories include curriculum and instruction; research; student initiatives; communication and decision-making and regional and international cooperation. The award is run jointly by the Federal Ministry of Education, Science and Research and the Federal Ministry of Climate Action, Environment, Energy, Mobility, Innovation and Technology. The popularity of the award is growing year on year and increasingly groups of universities work together on joint project submissions.

Investing in green and sustainable infrastructure

Learners' physical surroundings[32], whether inside buildings or outdoors in grounds and campuses, have received more attention in recent years (Barrett et all, 2019), some liking them even to 'the second teacher' (Sanoff, 2001). Learning environments can significantly impact pedagogical practice and student learning in a positive or negative sense (Barrett et al, 2019). However, the basic structure of teaching spaces has evolved relatively little over the past century' (Sanoff, 2001).

There is a pressing need to adapt **physical sites of learning** (e.g. school and university buildings and campuses) for the digital and green transitions. Education infrastructure accounts for 8% of education expenditure in EU Member States and is the largest share of international and national financial investment in education. However, in the EU, many education institutions are poorly equipped for 21st century learning. Buildings and grounds often need basic renovation and investment in energy efficiency and sustainable digital infrastructure. It is crucial to ensure that the potential of all learning spaces, physical and digital, is used effectively and that schools, campuses and other education institutions can provide sustainable, efficient, healthy and resilient learning environments for all.

More flexible and innovative learning spaces can enable educators to guide student discovery, facilitate their learning and the development of new skills and competences, and to promote curiosity, innovation and autonomy. Supporting green facilities can help raise awareness among learners, parents and the local community and can boost knowledge and competences on how to save energy in buildings, reduce CO2 emissions and contribute to reducing the environmental footprint. The Green Free School (Den Grønne Friskole), one of around 200 eco-schools in Denmark, is made entirely from sustainable materials and places experiential learning and eco-pedagogy at the heart of its syllabus (Clasper, 2020).

[32] The OECD defines 'educational spaces' as 'a physical space that supports multiple and diverse teaching and learning programmes and pedagogies, including current technologies; one that demonstrates optimal, cost-effective building performance and operation over time; one that respects and is in harmony with the environment; and one that encourages social participation, providing a healthy, comfortable, safe, secure and stimulating setting for its occupants. In its narrowest sense, a physical learning environment is seen as a conventional classroom and, in its widest sense, as a combination of formal and informal education systems where learning takes place both inside and outside of schools. (Manninen et al., 2007).

Putting education and training infrastructure to **multi-functional use** (e.g. community associations using school or campus infrastructure during evenings or at weekends) can also support lifelong learning for sustainability, and strengthen collaboration and partnerships with the local community. In Lithuania, schools facilities are used at weekends for extracurricular activities or as space for youth organisations. In Malta, schools serve as spaces for volunteering on a regular basis.

The EU supports Member States' efforts to upgrade existing and invest in new school buildings though a number of funding programmes, including InvestEU (the Social Investment and Skills Window), European Regional and Development Fund (ERDF) and the Recovery and Resilience Facility (RRF) (for further information on funding programmes see chapter 5).

Latvia has supported the renovation and development of schools and multifunctional community centres in economically and socially disadvantaged areas. Small rural schools were facing closure due to demographic decline, growing migration and resulted in decreasing numbers of students. To prevent school closure and increase the quality of education provision, schools were 'opened up'. While maintaining and expanding their typical functions, schools added adult education activities, specific services for young children and their families, activities supporting entrepreneurship and increasing employability potential through partnerships and civic participation.

Key points for supportive learning environments

To fully embed sustainability into education and training, learning and teaching for sustainability should be conceived around the entire experience offered to learners, in- and outside of the classroom, during dedicated learning time and beyond.

Whole-institution approaches to sustainability are vital for deep and transformative change. This requires vision and planning, shared leadership, adaptability and active engagement of staff and student engagement.

Self-evaluation and using a range of qualitative and quantitative data can support whole-institution approaches to change and innovation.

In the EU, many educational buildings and grounds are poorly equipped for 21st century learning. Renovation and investment is urgently required.

The potential of all learning spaces needs to be leveraged to provide sustainable, efficient, healthy and resilient learning environments for all.

Learning for environmental sustainability is engaging and positive

Practical, hands-on and real-world learning for sustainability can show a positive way forward and help overcome negative perspectives and feelings about the future. Learning and teaching that addresses – to an equal extent – hands, hearts and minds (Sipos et al, 2008), is the basis for transformative learning that can enable us to 'see the world

differently' (Sterling, 2001)[33]. Sustainability in education and training is therefore not simply a topic to be added to the curriculum but concerns itself just as much with the *how* of learning and teaching. Integrating a futures perspective is crucial to ensure that learning does not remain *about* sustainability but engages learners *for* sustainability.

The following section provides a snapshot of methods, approaches and pedagogies that can foster sustainability and enrich learning in general. Positive impacts can include boosting student motivation; critical thinking, creativity and decision-making skills as well as fostering responsible citizenship (Hicks, 2012). It highlights the tremendous potential and opportunity of learning for sustainability to make all learning more engaging and relevant; to motivate learners and educators and to develop competences increasingly needed for life and work.

Active and interdisciplinary learning

Learning for environmental sustainability requires knowledge and skills from different fields in an integrated manner, hence it is **interdisciplinary** (Annan-Diab and Molinari, 2017) and therefore relevant for educators of *all* subjects. Promoting **interdisciplinary, participatory, real-life and project-based** approaches is not sector-dependent, but can advance learning for environmental sustainability in all settings and with learners of all ages.

Research shows that learning is more effective when it is **collaborative** (Schnitzler, 2019) and collaborative practices can be integrated in all subjects and in a variety of settings. **Forest, earth pedagogies and eco-pedagogy** in particular can foster learners' personal relationship with nature, encouraging them to experience being part of an interconnected system (Misiaszek, 2018). Forest and earth pedagogies are usually combined with outdoor learning and improve both cognitive and affective relations with nature as well as collaboration. Statistically significant gains in ecological understanding, environmental values and attitudes have been found with such approaches, while qualitative results indicate changes in behaviours, knowledge and attitudes (Manoli et al, 2014).

Sciences and science education have traditionally played an important role in advancing environmental education and learning for sustainability. They will continue to do so in concert with all subjects needed for the green transition. And while scientific knowledge does not lead necessarily to positive action and sense of agency, students' environmental awareness is associated with their science competences. PISA 2018 showed that those 15-year olds that scored highest on questions on environmental science were the most familiar with complex environmental issues. In contrast, students with lower achievement in science, 'often reported an almost naïve optimism that the environmental challenges will go away in the future' (Schleicher, 2021).

The goal of the European Green Deal is to turn climate and environmental challenges into opportunities and make the transition just and inclusive for all. While not all solutions will be and should be scientific and technological, many of the European Green Deal policy areas are STEM[34] intensive. Active and engaging learning for environmental sustainability

[33] Transformative learning uses new information to change learners' perspectives, beliefs, and behaviours through reflecting what we know and do not know. This approach includes the ability to integrate, connect, confront and reconcile multiple ways of looking at the world.

[34] STEM: Science, technology, engineering and mathematics.

can potentially increase interest and motivation to study STEM in school, VET and higher education and pursue careers in STEM and sustainable development.

To encourage learners to recognise and make links between the social, economic and environmental dimensions of sustainability (IDoS, 2019), STEM learning can be enhanced through a STEAM approach. **STEAM**[35] uses interdisciplinary pedagogies, removing traditional barriers between subjects and connects STEM education with arts, humanities, and social sciences. It encourages the blending of knowledge in STEM and non-STEM fields of learning and study. Learning and teaching are contextualised in political, environmental, socio-economic, and cultural challenges, thereby connecting to real-world problem solving, collaboration, inquiry and critical thinking. STEAM focuses on innovation and the process of designing solutions to complex problems, including with innovative technologies. The approach can also strengthen links and interaction between formal, non- formal and informal learning and build links to the world of work. Despite the positive educational outcomes associated with the STEAM approach, it is not yet widely implemented across Europe (Eurydice, 2011). **Enquiry-based learning** and **citizen science**[36] are key science pedagogies that can further support learning for environmental sustainability, while **science literacy**, including observation and experimentation, curiosity and critical thinking, is crucial to approach sustainability in an innovative way.

In **VET**, a teaching approach of note is **sustainable entrepreneurship** (Schaltegger and Wagner, 2011). Sustainability and entrepreneurship share the concept of longevity – that is, ensuring goods, values or services that are long-lasting; preserving current resources for future generations (sustainability) and developing unique solutions for the long run (entrepreneurship) (Greco and de Jong, 2017). Sustainable entrepreneurship can be defined as 'the discovery, creation, and exploitation of entrepreneurial opportunities that contribute to sustainability by generating social and environmental gains for others in society' (Shepherd and Patzelt, 2011).

In **higher education**, a study with 390 researchers from European HEIs has shown that one of the most effective approaches to promote learning for environmental sustainability is **fostering eco-justice and community relations**, followed by **place-based environmental education** and **traditional ecological knowledge** (Lozano et al, 2019). In addition, **practical and community-related pedagogical approaches** can be instrumental in developing sustainability competences (ibid.).

The **EU STEM Coalition** is an EU-wide network of national or regional organisations that coordinate and implement strategies and policies for better STEM education in Europe.
https://www.stemcoalition.eu/

The **platform eu-citizen.science** gathers projects and resources and forms a community around a diverse range of fields, including biodiversity, ecology and environment, geology and earth science.
https://eu-citizen.science/

The **Climate Academy** at the European School II in Brussels is a two-year multidisciplinary programme offered to students aged 14-18. By combining different subjects, interests and skills, students learn about the climate crisis in a systemic way. Activities have included making documentary films, podcasts and a mural at the

[35] STEAM: Science, Technology, Engineering, Arts and Mathematics

[36] Citizen science actively involves the public in scientific research that generates new knowledge or understanding. Trough citizen science people share and contribute to data monitoring and collection programs.

school on climate change. The Academy brings together students with high potential in science and arts and develops their social entrepreneurial skills to design and manage projects with local and global impact. In the words of one student: 'rather than rendering us hopeless, it invigorates me to work for justice, climate justice all over the world and for future generations.'
https://www.climateacademy.eu

The **EU project VET4LEC** examined ***inclusive VET in the low-energy construction sector***. It found that deeper knowledge and understanding of energy efficiency, higher technical skills, and a holistic approach to the building process is required. For this to happen inter-disciplinarity, broad occupational profiles and cross-cutting skills, including problem solving and communication are necessary.
https://www.fiec.eu/our-projects/completed-projetcs/vet4lec

Promoting nature-based and outdoor education

Learning *in* nature and not only *about* nature can help learners develop a connection and a caring attitude towards nature and support sustainable behaviour. Research indicates that environmental knowledge alone has little impact on pro-environmental behaviour (Otto and Pensini, 2017). In fact, between knowledge and connectedness to nature, the latter has the strongest relation to ecological behaviour. Research with primary children showed that while connectedness with nature explained 69% of the variance in ecological behaviour, environmental knowledge only accounted for 2% (ibid.).

Developing empathy for nature and acquiring knowledge about nature are closely related. Learning about natural phenomena can increase awareness that all living things are interrelated and spur a closer connection with nature. Thus, when coupled with an emotional connection to nature, ecological attitudes and ultimately behaviour will be more solid (ibid.).

There is strong evidence that being in nature not only enhances ecological attitudes and actions, but learning outcomes and personal development in general (Bilton, 2010). Exposure to nature positively influences 'perseverance, problem-solving, critical thinking, leadership, teamwork and resilience' (Kuo et al, 2019). The effect of nature on attention, self-discipline and motivation is such that green views from windows can lead to improved learning outcomes for students (ibid.).

The relationship between early childhood education and care and outdoor learning is especially strong. Being outdoors has traditionally been part of a child's daily routine, including in kindergartens and other ECEC facilities. Childhood is the time for discovering and making sense of the world, including the natural world around us. The sense of wonder and the natural curiosity that most children display for their surroundings are often heightened through contact with nature. Combining nature experience with play is among the most effective ways of learning at an early age and provides a strong foundation for further social, emotional and cognitive development. In addition, promoting outdoor experiences at an early age, is likely to be beneficial for developing environmental stewardship. The more frequently children are in contact with nature, the stronger the impact on knowledge and behaviour appears to be (Otto and Pensini, 2017).

Despite the benefits, children are spending less and less time outdoors. Between 1971 and 1990, there was a 50% reduction in the time children spent playing outside (Hillman et al, 1990). In 2016, 12,000 parents in 10 countries participated in a survey which found that children aged 5 to 12 spend on average less than one hour a day playing

outside (Martinko, 2016). Common challenges identified by ECEC facilities and schools to outdoors activities include (Rooney et al, 2019):

- Health and safety concerns as well as legal barriers (e.g. restrictions on preparing food outside, or on eating self-grown vegetables)
- Minding and supervising learners outside
- Lack of time - additional preparation, paperwork and other efforts required
- Parental concerns and/or a lack of understanding regarding the value and benefits of learning outdoors
- Weather conditions
- Lack of funding/limited budget for improving outdoor spaces
- Inclusion – working with children with special needs
- Lack of teacher experience with outdoor education

Educators are bringing nature and nature-based approaches into formal education in many ways, including through school gardens, green campuses, plants or green walls in the classroom, holding class outdoors, excursions into nature, collaboration with nature-active partners (e.g. nature centres, farms, forests, zoos and aquariums). Not all of these require substantial amounts of funding. Many, however, do need more time and space than is often provided in educational institutions and curricula. Allowing more time and space for learning in outdoors settings can benefit learners and educators alike, improve educational outcomes, and create strong incentives for positive action for the environment and sustainability.

The **Erasmus+ project *Take me out*** has developed guidance and material for outdoor education and learning, including a handbook for teachers with case studies on outdoor education; online modules for teachers and outdoor teacher standards.
Early years' professionals should:

- be passionate about being outside;
- understand the importance, significance and benefits of outdoor education in kindergarten;
- be able to apply techniques and safe practices associated with various outdoor activities
- be interested in gaining practical experience in outdoor activities and learn about best practices on an ongoing basis;
- have a basic knowledge of natural sciences, are able to identify known plants and animals, know natural phenomena

http://takemeoutproject.eu/about-project/

Curricula and educational programmes

With the UNESCO-led Berlin Declaration on Education for Sustainable Development[37], over 80 ministers and vice ministers and 2 800 education and environment stakeholders committed in May 2021 to taking concrete steps to transform learning, including by making environmental and climate action a core curriculum component by 2025. Policy

[37] https://en.unesco.org/sites/default/files/esdfor2030-berlin-declaration-en.pdf

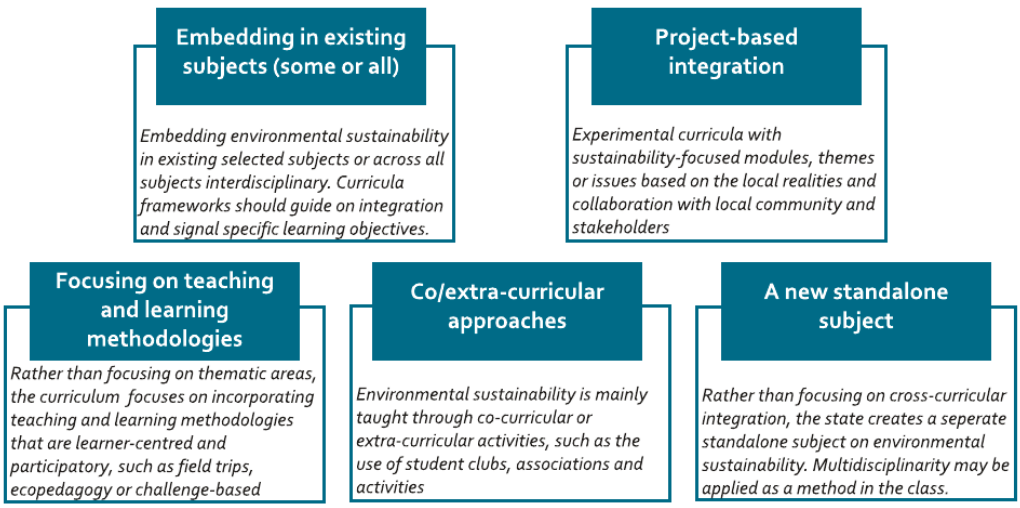
steering and political support are indispensable to ensure and sustain broad commitment to enable transformative change of education and training for sustainability. At the same time, there is an inevitable time lag for desired policy changes to become classroom practice. Research indicates that it can take from 8-14 years for education reforms to achieve their desired results (Borman et al, 2003).

Reviewing and reforming education and training curricula for sustainability, requires policy makers and stakeholders to set out and develop relevant learning content and objectives. For each of the 17 SDGs, UNESCO has set out learning objectives which are structured around cognitive, socio-emotional and behavioural learning, and include suggested topics as well as examples of learning approaches and methods (UNESCO, 2017). An accompanying resource bank provides relevant material for each SDG for educators at pre-primary, primary and secondary education levels[38].

Addressing sustainability in a comprehensive manner needs sufficient time allocation in the curricula; an in-depth understanding of the topic from multiple perspectives, at local and global levels and learning across all learning dimensions - cognitive, social and emotional - to develop sustainability competences. A further consideration is providing targeted, flexible access to relevant education and training. Workers, learners and job-seekers require upskilling and reskilling that support their needs and can be easily accessed. During the pandemic, there has been a significant uptake in online and/or short learning opportunities leading to micro-credentials, a development which is expected to continue. Education and training providers should consider the development and use of micro-credentials as part of their offer for learning opportunities for environmental sustainability.

The figure below shows different approaches by Member State to integrating the environment and sustainability in curricula.

Figure 2. Approaches to learning for environmental sustainability in curricula



Source: Mulvik et al, 2020

Effective curriculum integration that fosters learners' skills requires local adaptation, collaboration and partnerships, quality teacher professional development, suitable resources and support. Throughout Europe, school plans that focus on enhancing

[38] https://en.unesco.org/themes/education/sdgs/material

sustainable development in the curriculum and classroom through projects and/or the promotion of voluntary schemes for ESD recognition and certification are becoming increasingly popular (UNECE, 2016). Care is needed, however, to not let useful collaboration between teachers and outside experts/partners diminish or replace the necessary investment and support for developing the sustainability competences of teachers (Keddie and Holloway, 2019).

In **Italy**, from the 2020/2021 school year, environmental sustainability has been introduced as part of the compulsory civic education curriculum in primary and secondary education. The three pillars of the curriculum are: Citizenship and Constitution, Digital Citizenship and Sustainable Development. In primary and lower secondary, competences include: taking care of oneself, the community and the environment; fair and sustainable development, respecting the ecosystem and conscious use of environmental resources. In upper secondary competences include: respecting, caring for, preserving and improving the environment; assuming the principle of responsibility and participating in public life as active citizens.

In 2018, **Ireland's** National Council for Curriculum and Assessment (NCCA) carried out a study to map existing curriculum frameworks against competences for sustainability and to identify opportunities for teaching and learning the UN's SDGs. Since then, the NCCA has been working to integrate opportunities and linkages to the SDGs in new and redeveloped curricula. A new Politics and Society curriculum has been introduced in upper secondary education where students undertake a citizenship project.

The VET system in **Romania** introduced the Local Development Curriculum which is developed by the school in partnership with companies and is tailored to local labour market trends and needs.

To build sustainability competences and green skills, the **Finnish** National Agency for Education is working to develop a set of optional courses in Technical and Vocational Education and Training (TVET). A network of TVET-institutions, financed by the National Agency, has created a study unit on Global Education and Voluntary Development Work which is offered to a number of vocational education sectors. A new unit on Climate Responsibility is being offered in 2021.

The **German** standard job position on environmental protection and sustainability, which is part of all new VET curricula, encompasses a set of six core skills and competences which apprentices across *all* sectors should acquire during their apprenticeship. These are:

- Avoiding operational burdens on the environment and society in the apprentice's own areas of responsibility;
- Using materials and energy in economic, environmental and social ways;
- Complying with environmental-protection rules;
- Avoiding waste, engaging in recycling or disposal of substances and materials;
- Developing proposals for sustainable action in the area of work;
- Cooperating for economic, environmental and social sustainable development and communicating with the target group.

Aligning and redesigning student assessment

Defining and measuring flexible and adaptable learning outcomes for environmental sustainability can support the visibility and delivery of environmental sustainability learning and provide clear evidence of related competences. Given the attention placed on high-stakes[39] exams in many countries, developing and implementing *summative assessment*[40] of learning for environmental sustainability could help to scale learning and teaching in this domain (UNESCO, 2018). However, summative examinations, in particular if high-stakes, can undermine innovative education programmes and approaches, including by 'teaching to the test' or by significantly narrowing the curriculum (Looney, 2009).

To better reconcile innovation with assessment, including for education for environmental sustainability, policy makers, institutions and practitioners can:

- identify and promote existing innovative approaches to assessment and examinations;
- rethink alignment between standards (for assessing students, curricula and testing);
- use multiple measures of student and school performance to evaluate quality and outcomes;
- create a better balance between high-stakes examinations and school empowerment (ibid.).

Rather than seeing student assessment solely as a tool to measure student achievement, policy makers and practitioners consider it increasingly a tool for learning (looney, 2009). Seen as such, assessment has a 'formative' role – 'allowing teachers to identify gaps in student learning and to adapt teaching appropriately' (ibid.).

To be able to fully appreciate the complexity of sustainability, a range of assessment methods can be used to measure students' learning outcomes, from summative to formative assessments, self- and peer-evaluation. *Formative student assessment*[41] is especially conducive to innovative teaching methods, including for environmental sustainability. It is also supportive of a lifelong learning approach which requires learning-to-learn competences and self-assessment skills (ibid.).

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[39] *National or regional assessments* 'are tests of student achievement, but are conducted primarily to evaluate the performance of a system as whole, to hold schools accountable for student results, and/or to provide feedback to schools and teachers. *Summary assessments* include examinations with civil effect for students, for example, graduation/completion of a programme, or formal admission to vocational or upper secondary school, or university' (Looney, 2009).

[40] Summative assessments 'include tests and examinations that seek to provide summary statements of student achievements and capabilities. Summary assessments may be conducted at the end of a unit of study, to determine student readiness for promotion from one grade to the next' (Looney, 2009).

[41] Formative assessment 'refers to the frequent, interactive assessment of student understanding and progress to identify learning needs and adapt teaching. Formative assessment differs from summative assessment in that the information gathered is used to shape improvements, rather than serve as a summary of student achievement' (Looney, 2009).

Table 4. Assessment approaches to measure sustainability competences (by frequency of use)

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

Source: Authors

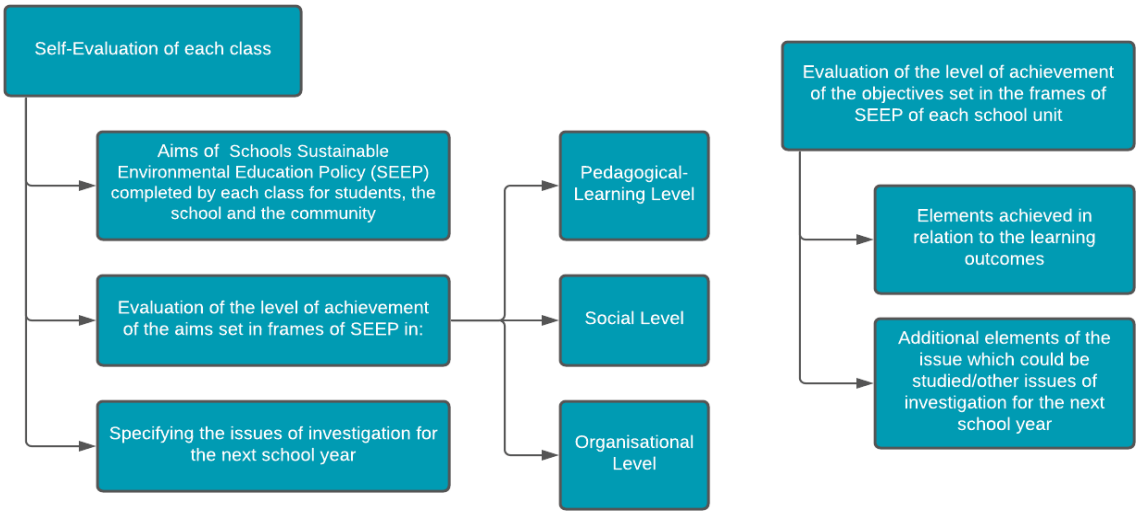
As higher education institutions tend to have a large degree of autonomy, assessment strategies and frameworks for knowledge and competences related to environmental sustainability tend to vary widely across institutions, and can depend to a large extent on the importance given to environmental sustainability in institutional strategies and by its leadership.

Institutional assessment

Internal and/or external review and quality assurance mechanisms of education and training organisations can also focus in part sustainability.

School self-evaluation and the diagnosis of school needs, insight and understanding followed by action for improvement and review can be effective in implementing whole-institution approaches for sustainability. School self-evaluation has been shown to lead to greater sensitivity about areas in need of improvement. The process of school self-evaluation allows teachers to develop a perspective beyond their own classroom, particularly when they are involved in decision-making. In addition, policy makers can provide various tools, guidelines and approaches, adapted to local contexts and needs, which can support schools in their self-evaluation and organisational development. Human and financial resources and time also needed to conduct effective school strategies for sustainability.

Figure 3. Evaluation of ESD School Plan in Cyprus



Source: UNECE (2014). Questionnaire for 2014 Informal Country Reporting on the Implementation of the Priority Action Areas.

In **VET**, it is useful to refer to the updated EQAVET Framework[42] stating that the goals and objectives of VET should be described for the medium and long terms, and linked to European and Sustainable Development Goals taking into account environmental sustainability considerations.

Assessment and evaluation strategies across the **higher education** institution can measure the extent to which environmental sustainability is included in programmes and the impact of such inclusion. Self-evaluation by students and staff can also be a useful tool for evaluation.

In **Hungary**, self-assessment through the *Green Kindergarten* system is available for all kindergartens on a voluntary basis. ECEC facilities can obtain the title of 'Green Kindergarten' following a 20-point system of criteria and indicators. Primary, secondary, vocational schools and dormitories for school students can obtain the national *Eco-school* title following successful self-assessment on the basis of a variety of criteria and indicators.

In **Slovakia**, the National School Inspectorate carries out inspections every year to evaluate the level and implementation of environmental sustainability as a cross-cutting topic. It randomly selects schools across Slovakia and publishes official reports on its inspections.

In **Estonia**, while national examinations for school education cover cross-

[42] https://ec.europa.eu/social/main.jsp?catId=1536&langId=en

curricular topics and topics related to learning for sustainability, universities tend to use various assessment approaches, including testing, grading, projects and portfolios to assess student sustainability competences.

In **Finland**, complying with sustainable development values when planning their activities is an assessment criteria for ethics in the vocational sector.

Involving students in meaningful ways

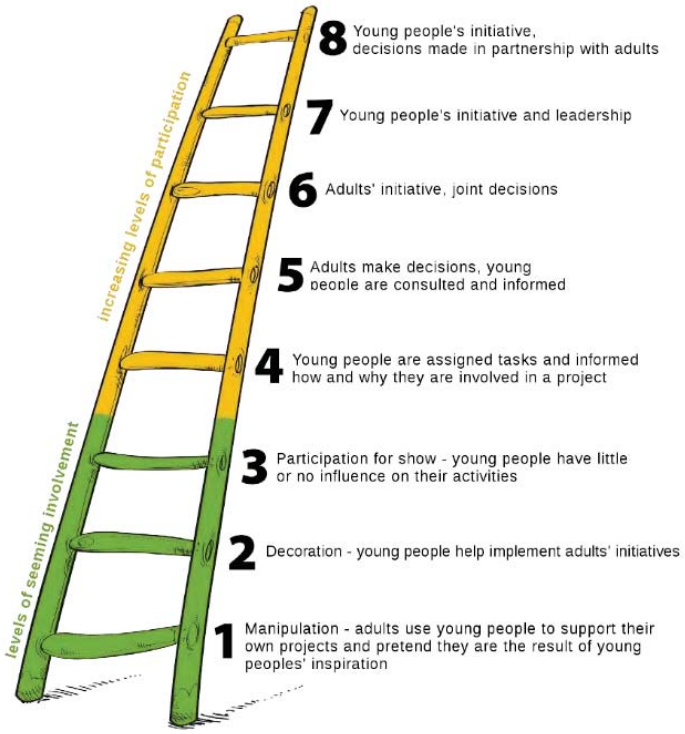


Figure 4. Hart's model of student involvement

Pedagogical research focuses increasingly on the positive impact of student participation on learning for sustainability. Students have been in many cases a driving force, advocating for sustainability to be included in schools' visions and strategic plans (Mulvik et al, 2020). Conversely, not including students in the development of school policies and actions, limits student engagement on these issues (Kelsey, 2003 and Schröder et al, 2020). Schools that welcome active student participation will be more successful in shaping and putting into practice education for environmental sustainability than schools with a more administrative, top down approach where students are considered as 'passive' players (Kelsey, 2003). Based on Roger Hart's model (Hart, 1992), figure 4 shows the various levels of involvement of young people from superficial involvement to co-decision making responsibility.

Student agency can contribute to developing learners' feelings of 'ownership' towards sustainability (Gayford, 2008), which is crucial for positive action. Student-led sustainability projects can shift hierarchies and improve engagement and action for sustainability (Vare, 2021). Involving students in meaningful ways requires learner-centred pedagogies; providing guidance and support to educators, and flexibility at the education institution.

In **France**, all lower and upper secondary schools elect **'eco-delegates'** who develop and support sustainability initiatives in their schools. Students elect at least two delegates (one male, one female student) and the elections are compulsory. Eco-delegates are described as being 'co-pilots and ambassadors' of sustainability related projects in the schools. They lead sustainability projects, inform students and

encourage them to get involved. The elections and eco-projects carried out throughout the year help students to become actively involved in making schools more sustainable. Self-assessment and prior learning recognition tools are available to support the 'eco-delegates'. The programme is run by the Ministry of Education. A 2030 'green school award' has also been launched to support the best projects carried out in schools.

EkoSkola in **Malta** aims to provide young people with opportunities to voice their opinions on matters that directly or indirectly influence their present and future. One such forum is the Eco-Schools Parliamentary sessions during which students engage in discussions on sustainable development with the country's Members of Parliament. During the session, ideas voiced by young people are collated in a parliamentary motion. This initiative gave rise to formal meetings of students with the Permanent Committee on the Environment and Planning.

The need to increase students' engagement towards sustainability in higher education in Europe and beyond is part of the rationale behind the **Green Office Movement**. The movement aims at having student-led and staff-supported sustainability offices to promote sustainability practices and education. Strategies recommended by the movement to increase student engagement include:

- Workshops and sustainability events: promotion of training events on different sustainability topics – to cover all teaching areas and students' interests;
- Challenges or competitions: either between faculties/courses or students groups, this strategy mobilises the academic community to consider different and more diverse strategies for sustainability education;
- Summer school programmes on sustainability: this strategy is known to have great beneficial outcomes to education, and by offering creative and multidisciplinary programmes, students can become sustainability agents in their contexts.

https://www.greenofficemovement.org/

Potential of digital technologies to support learning for sustainability

The COVID-19 crisis and the temporary closure of educational buildings and campuses in 2020 and 2021 saw digital technologies and tools being used at an unprecedented scale in education and training. The forced shift to emergency remote teaching brought a new awareness and understanding of the benefits, constraints, challenges and risks of using educational technologies for teaching and learning. The consultations showed that for many teachers there were new opportunities to connect with learners on sustainability using digital tools and platforms. For example, eTwinning projects were started on ocean health, healthy eating and well-being. New connections were made with local communities, including libraries and museums who provided digital resources and platforms. Yet many spoke of the constraints of not being able to continue existing partnerships and projects and that hands-on activities and field trips were cancelled.

Technology and nature may seem for some, however, as two opposing forces, with increased screen time taking children and young people away from nature. Technology also has an environmental impact and there is a need for students to learn about the environmental footprint of technology use.

Similar to any area of learning, digital technologies, when used in purposeful and accessible ways, can enhance learning for sustainability. Digital technologies can potentially support innovative pedagogies and resources; increase student motivation;

facilitate communication and collaboration; and offer flexibility on how, where and when learning takes place. Digital technologies can also support citizen science (e.g. monitoring environmental changes locally using apps) while virtual field trips, labs and museums can allow for immersive and experiential learning experiences. Technology can also enable pre-service and in-service educator professional development by allowing access at scale to online training courses, resources or communities of practice on the environment and sustainability.

Recent research also points to the growing possibilities of using technology in outdoors learning (e.g. mobile phones, drones, tablets, augmented reality)[43]. There are key arguments in research for, and also against, such an approach (Hills and Thomas, 2020). Technology is seen by some as a distraction and can diminish the experience of learning outdoors by placing a barrier between the learner and outdoors. Others point to the potential of technology to enhance learning and connect learners with each other and with nature, for example taking pictures in nature and reflecting and sharing these afterwards with their peers. Hills and Thomas put forward a conceptual framework to help facilitators to critically evaluate whether and how technology could enhance or impact negatively on the learning experience. The framework takes into account pedagogical considerations (e.g. facilitator and student digital skills, resources available); affordances of digital technology (e.g. threats and opportunities) and consequences of decisions (e.g. distractions, technology allowing for new tasks).

Overall, in the consultations to prepare the proposal, the role of digital technologies in learning for sustainability was seen as an area which is currently underexplored. There was a clear call for further research and sharing of good practice in this field.

GLOBE (Global Learning and Observations to Benefit the Environment) is an international science and education programme connecting students, citizens, teachers and scientists from 126 countries. Students and the public at large conduct scientific observations and data collection using smartphone apps (e.g. testing water quality in rivers, air pollution and observing weather patterns). Interactive maps and visualisations systems support the analysis, interpretation and presentation of research findings. Training modules and resources for teachers are available through the programme.
https://www.globe.gov/

Key points for engaging and positive learning for sustainability

Learning for environmental sustainability requires interdisciplinary approaches, integrating knowledge and skills from different fields.

Forest, earth pedagogies and eco-pedagogy can foster learners' connection to nature and improve learning outcomes. Participatory, real-life and project-based learning can help build sustainability competences in all phases and stages of education and training.

Sciences and science education have traditionally played an important role in advancing environmental education and learning for sustainability. Further emphasis should be given to the 'STEAM' approach which removes traditional barriers between

[43] On outdoor learning and technology see also the report from the international conference on ICT and Outdoor Learning August 2021 organised by the Centre for School and Outdoor Education, Slovenia in August 2021 https://www.csod.si/stran/programme

subjects and connects STEM education with arts, humanities, and social sciences.

Effective and comprehensive learning for sustainability requires an understanding of the topic from multiple perspectives and levels; cognitive, social and emotional learning and sufficient time allocation in the curricula.

Defining and measuring learning outcomes for environmental sustainability can boost the visibility and delivery of environmental sustainability learning and provide clear evidence of related competences.

Active involvement of students, e.g. through student-led sustainability projects, can improve engagement and action for sustainability.

The role of digital technologies in learning for sustainability is an area which is currently underexplored. More research and sharing of good practice is needed to explore the tensions and opportunities of using digital tools and technologies to learn about and for the environment.

Learning for environmental sustainability requires capacity building of educators and leadership support

Teachers and trainers are powerful agents for the educational response needed for the green transition. Whatever their discipline or sector, all educators are sustainability educators who need to support their learners in preparing for a more sustainable future. Educators require time, space and trust to adopt pedagogies and practices that enhance sustainability learning in their context; to approach sustainability education in interdisciplinary ways, work in teams and help develop a culture of sustainability within the institution.

Many of the key findings on capacity building of academic staff on environmental sustainability from the recent study by the European University Association (EUA, 2021a) could apply to educators in any sector and setting of education and training:

- **Community of practice**: through meetings, mailing lists or newsletters, staff members can form groups to share ideas, provide learning opportunities and even undertake pilot projects, which could later be scaled to department, faculty or university/institution level;
- **Continuing professional development**: staff should have opportunities for training on sustainability, to understand its relevance to their role and context; such opportunities should be recognised as professional development – and can support their career - and also act as knowledge and awareness-raising initiatives;
- **Institutional incentives, recognition and rewards**: acknowledging the efforts of staff is fundamental for motivation and to recognise their key role in the institution's sustainability journey. This may be achieved through certification or career progression for instance. Incentives can also be used to counter reluctance or hesitation to participate in sustainability efforts.

Pedagogical modules and resources on sustainability, including on assessment, can help teachers adapt their teaching methods for sustainability and use new tools and materials in a range of settings, both in- and outdoor. Guidance on identifying eco-anxiety and eco-pessimism is vital so they can help their pupils and students to overcome feelings of overwhelm and fear and develop critical thinking and media literacy skills. Teachers can

also benefit from accessing centres of expertise, for example, centres for environmental education, industry, local authorities, youth organisations and NGOs.

Embedding sustainability in initial and continuing professional development

Research and experience provide us constantly with new findings on learning for environmental sustainability. Thus, educators need to be able to learn, un-learn and re-learn on an ongoing basis. Helping their learners to build sustainability competences in innovative and engaging ways requires that educators develop their own knowledge, skills, attitudes and values for sustainability and develop the pedagogical competence and confidence to teach it.

Designing quality professional development for environmental sustainability raises many issues which need further discussion and research. These include the provision of training in diverse settings, including in nature, environmental centres, companies, public bodies; assessment with regard to sustainability of learners, educators and institutions; creation of mandatory elements of learning for environmental sustainability in educators professional development as well as their reflection in competence frameworks.

Stakeholders during our consultations suggested that training be designed in a more open way, in non-educational settings and with or delivered by external organisations. On-site training, for example, in companies, outdoors, in labs and other settings and following training with or by industry, environmental and other organisations can benefit both parties. It can provide educators with real-life examples, help non-educators understand the needs and challenges of the education system and help both to better acknowledge and advance their respective roles with regard to learning for environmental sustainability.

With regard to **school education**, policymakers can strengthen the alignment of initial teacher education (ITE) with strategies and policies on learning for environmental sustainability. Making learning for environmental sustainability an integral, which means in most cases, obligatory, part of ITE will benefit integration of environmental sustainability across education and training and increase take-up and commitment in continuing professional development (CPD).

The inclusion of educators in developing policies is a key element for gaining a better understanding of teacher experiences and diverse needs and developing strategies, including on ITE and CPD, that are accepted and implemented. More research is needed in working structures of teachers and how they could enable the implementation of new initiatives.

The European Commission's report on Teachers in Europe[44] offers relevant insights for CPD, which are applicable also in the area of learning for sustainability (European Commission et al, 2021):

- Teachers tend to participate in a wider variety of training opportunities in countries where time for CPD is defined for every teacher.
- In the countries where schools are required to have a CPD plan, teachers tend to participate in more varied CPD.

[44] The reference group are lower secondary teachers.

- Teachers who had the possibility of taking paid study leave for a week or longer perceive lower levels of tension between CPD and their work schedule.

When designing ITE and CPD for sustainability, it is important that teachers can benefit themselves from methods and approaches that are conducive to learning for sustainability, including learner-centred, experiential, project-based and place-based learning. If teachers engage in active learning themselves, it can help them apply it in their practice.

School-based CPD and collaborative schemes, where teachers define their own training needs and CPD happens at the school site, have been proven particularly impactful for teachers' own learning (Boeskens et al, 2020). Such approaches, which align well with a whole-institution approach to sustainability, focus more directly on classroom practices and the actual needs of teachers and their student at that school (ibid.). Peer-to-peer learning and mentoring are other highly effective and relevant forms of CPD which have gained traction in recent years (ibid.). The 2020 Council conclusions on European teachers and trainers for the future[45] call on Member States 'to provide impactful and research-based continuing professional development opportunities for teachers and trainers, based on collaboration, peer observation and peer-learning, guidance, mentoring and networking'. They also highlight that 'is beneficial to offer various training models, including face-to-face, virtual, blended and work-based learning'. Supporting teacher training centres, agencies and NGOs that provide CPD as well as guidance on and tools for online learning, to increase their outreach to teachers would also be beneficial.

In Luxembourg, education for sustainable development (ESD) is being implemented in **VET**, and integrated in teacher and trainer CPD (INFPC, 2016). In Slovakia, a pilot scheme on environmental educational in the Banská Bystrica region resulted in the development of educators competences for outdoor learning. Learnings from the pilot will support the development of methodologies for teachers and the in-service training course 'environmental education for sustainable development'. Building on findings from pilot programmes, Germany is also exploring the inclusion of key competences for sustainability in continuing vocational training of training personnel (Cedefop, 2021).

In **higher education**, a stronger focus on teaching supported by professional development for academic teaching staff is of particular importance to develop students' sustainability competences and skills. The more complex environmental themes (e.g. climate change or curriculum greening) require teaching staff to develop new, and update, their competences, both in terms of content, teaching approaches and engagement with students.

In this regard, the UE4SD project[46], mapped a range of leading practice examples across Europe of professional development in higher education for sustainability. The examples demonstrate diverse ways of increasing the competences and capacities of academic teachers and of transferring them to their teaching practice. Key lessons from the examples include (UE4SD, 2015):

- The most common types of professional development initiatives benefit from cooperation within existing university networks; they include international, national and institutional programmes and activities.
- A wide variety of pedagogical approaches are applied in professional development initiatives, ranging from participatory approaches and team-based learning to action research and project-based learning.

[45] 2020/C 193/04

[46] See also chapter 3.

- An important factor in changing the culture of teaching and learning is to open up space for critical debate and to build a supportive environment to review and rethink educational content and approaches; particularly through a whole-institution approach.
- The overall impact of professional development initiatives in terms of number of educators reached differs depending on the type and scope of the activities. All can have a positive effect on educators and their students.
- The role of financial and non-financial support is important for the availability of professional development opportunities for university educators.

Non-academic staff also benefit from training, not only to support the development of sustainability efforts on campus, but also to become leaders in their sectors and contexts. By involving all staff, sustainability leadership and sustainability teaching can become competences to support education and can promote good practices across all parts and processes of the organisation.

Educators' professional development can benefit from competence models and frameworks for sustainability competences. A reference point for many HEIs across Europe and beyond has been the UNECE framework of ESD competences (UNECE, 2011). Over time, several other frameworks defining competences for sustainability in higher education have been developed and attempts have been made to converge them 'toward an agreed-upon reference framework' (Brundiers, K. et al, 2021).

Actions at EU level provide opportunities for developing interdisciplinary cross-country approaches to key topics of education for environmental sustainability, development of pedagogical approaches and tools, guidelines for assessments or competence frameworks. Educators are also provided with opportunities for networking and peer-learning as well as developing sustainability competences. The Erasmus programme with its cross-cutting green dimension offers a range of supports for educators, including through the Erasmus+ Teacher Academies, the eTwinning community and the School Education Gateway.

In VET, the Osnabrück Declaration on vocational education and training as an enabler of recovery and just transitions to digital and green economies[47] was adopted by Ministers in charge of vocational education and training of the Member States, the EU Candidate Countries and the EEA countries, the European social partners and the European Commission. It points to the training and professional development of teachers, trainers and guidance counsellors as key to enabling the green transformation.

In **Bulgaria**, all pre-service teachers for preschool and primary receive ecological training in the form of an 'Ecopedagogy' course as part of their bachelor's degree. The course enables them to master the basic concepts in the field of ecology of human development and approaches to environmental education.

In 2013 a teacher education programme was launched in **Estonia** to help formal and non-formal educators to implement active learning methods and cross-curricular approaches on the environment and sustainability. Schools attend courses on sustainability in teams, typically two or three teachers of different subjects and one school leader. At the end of the course the team work together on a school-wide project related to sustainability.

[47] https://www.cedefop.europa.eu/files/osnabrueck_declaration_eu2020.pdf

ÖKOLOG is a school programme and network supported by the **Austrian** Federal Ministry of Education, Science and Research. The approximately 600 ÖKOLOG-schools and 10 ÖKOLOG-university colleges of teacher education focus on environmental, social and ecological issues, a whole-institution approach and student engagement. This long-running programme has impacted thousands of learners and communities. ÖKOLOG has also developed a **competency compass** for teachers which covers: developing attitudes towards the environment and sustainability; build up, reflect on, pass on environmental knowledge; evaluate, decide, act; and methodical and didactic approach.

Career progression and new roles for educators

Encouraging and motivating teachers to take part in CPD related to sustainability is crucial, including by linking it to career progression and development. The close link between CPD and career development is underlined by the fact that single-level career structures for teachers where advancement depends on years of service tend to put less focus on CPD. Only three out of 14 countries in Europe with single-level career structures include CPD as a criterion for salary progression (Mulvik et al, 2021). Reversely, more than half of the countries with multi-level career structures consider CPD for career progression (ibid.).

The European Commission's 2020 policy guide on *Supporting teacher and school leader careers* (European Commission, 2020c) provides findings and pointers on rethinking and redesigning educator career paths. Based on established models in different European countries, it identifies several types of teacher and school leader career paths which also apply to, or can be adapted to learning for environmental sustainability[48]:

- *Moving upwards* (by gaining a position of increased decision-making and responsibility, e.g. teacher to school leader; school head of a larger school);
- *Moving up and along* (by becoming a more competent teacher or school leader;
- *Moving sideways* (by taking a different – temporary or permanent – role within school, e.g. sustainability coordinator);
- *Changing contexts* (by making a choice to work in a different context, e.g. become school leader of an innovative green school, move from urban to rural school);
- *Adding layers of system* (by networking/contact with local, regional or national stakeholders, which requires broader expertise e.g. teacher as a project leader of a regional initiative for learning for environmental sustainability; school head acting as advisor to ministry on learning for environmental sustainability);
- *Moving in and out* (by looking beyond the immediate school community e.g. a temporary post with a sustainability NGO; becoming a researcher on learning for environmental sustainability; changing profession to become a teacher; school head returning to classroom teaching).

Further support measures could include embedding sustainability criteria in teaching and learning award schemes.

In higher education, the allocation of specific roles to promote sustainability is also recognised as important for leadership, motivation and particularly to inform teaching and learning. National frameworks allowing for more flexibility in academic career

[48] The different paths are not exclusive and may be experienced at the same time, or one after the other.

development could support educators to engage in and be rewarded for sustainability education.

Role of leaders and shift to distributed leadership

The role of principals for educational development and change management in schools and other education and training institutions has received growing attention in recent years (Hattie, 2008). School leaders play a key role in improving school outcomes by motivating and supporting the capacity building of staff, as well as influencing the school climate, culture and environment (Pont et al, 2008).

School leaders are 'key intermediaries between the classroom, the individual school and the education system as a whole' who bridge the gap between policy and practice, link their institution to its environment, and can contribute to improving student learning (ibid.). They have a crucial role in driving forward whole-school or whole-institution approaches. School leaders need pedagogical, managerial and leadership competences (European Commission, 2020cb). While leadership is complex and depends on contextual factors, certain personal attributes are beneficial: maintaining mutual respect and the attitude of being a team player; being able to look to the future; being open to new models, the capacity to innovate, and change-management skills; and appreciating the value of life-long learning (ibid).

Successful leaders of sustainable schools display attributes that characterise effective school leaders in general. In addition, they put sustainability at the heart of their school, embedding it in all operations within and outside of the school. It is typical for leaders of green schools to use sustainability to advance other education agendas, including improving basic skills such as literacy and numeracy (Jackson, L. et al, 2008), or introducing interdisciplinary learning and teaching beyond matters of sustainability (Leo, U.; Wickenberg, P., 2013). They also look outwards beyond the school context and have an optimistic worldview. Personal conviction and values seem to be strong drivers for leaders to develop sustainability within their institutions (Jackson, L. et al, 2008).

To effectively implement learning for sustainability, school leaders have, and clearly communicate, a vision for sustainability to learners and staff. Communication should not be limited to documents, such as school development plans but be present throughout school life, including in individual encounters such as performance appraisals with teachers (Leo, U.; Wickenberg, P., 2013).

Distributing leadership responsibilities among different members of the school community appears to be especially effective for fostering learning for environmental sustainability (Jackson, L. et al, 2008). In this way, more staff can actively participate in and shape the school's strategy, thus reducing the burden on school leaders while at the same time embedding sustainability more deeply across the whole school (ibid.).

Given the crucial role of school leaders for supporting their staff and institutions to advance on sustainability, it is important that current and potential school leaders receive support and development opportunities to effectively fulfil their responsibilities. With the exception of a few countries, leadership rarely features in ITE (European Commission, 2020c). CPD for school leaders or potential school leaders is more widely available, yet far from being a systemic feature. Several European countries have invested in specific training programmes and institutions, including Norway, France, Denmark or Albania (ibid.).

Identifying and selecting future school heads might be facilitated by defining the competences expected of school leaders. In Europe, the Czech Republic and Norway have developed specific competence frameworks for school leaders (ibid). Reviewing and designing competence frameworks for school leaders with a view to include sustainability leadership can help embed sustainability across all schools.

Developing leadership in higher education is especially important given the exposed role of HEIs to generate cutting-edge sustainability research and link it to societal practice. In addition to their expertise in research and teaching, HEIs are seen as trusted and neutral actors in the public sphere and can possess therefore considerable prominence and influence (SDSN Australia/Pacific, 2017). A European University Association survey (EUA, 2021a) highlights that support for governance and engagement in driving forward strategies and actions for environmental sustainability in HEIs, are both key and need to be improved across European HEIs.

Academic leadership can support mainstreaming learning for environmental sustainability by focusing on:

- effective engagement amongst higher education leadership;
- strategic practices for environmental sustainability and the impact on their institutions;
- whole-institution approaches to sustainability;
- leadership dynamics that share responsibilities by including academic and administrative staff, researchers, project leaders, as well as student leaders.

The most effective leaders in HE 'listen, link and lead' (in that order) and 'model, teach and learn' (SDSN Australia/Pacific, 2017). This means listening actively with a disposition for change and a set of options, linking received feedback to a concrete strategy and actively helping staff in applying that strategy while showing flexibility to adapt it (ibd.).

As with school leadership, selection, including by defining expectations, criteria and competences with regard to HE leaders, is crucial. This might necessitate revising selection procedures and/or reviewing how prospective leaders are identified (ibid.). Likewise, professional development opportunities and networking for HE leaders will greatly benefit HEIs sustainability agendas. The Sustainable Development Solutions Network's guide for universities, HEIs and the academic sector (SDSN Australia/Pacific, 2017) can help HEI leaders to introduce and improve SDG implementation across their institution.

Beyond formal roles

Leadership for sustainability is not limited to formal institutional leadership roles. Increasingly, education and training systems try to identify ''system leaders', who have been successful in their own schools and are in a position to support other local schools, or, indeed, become involved in an even wider network' (European Commission, 2017). Such system leaders can be school principals, but also teachers or other staff. Working effectively with change leaders, including for sustainability, means (ibid.):

- identifying change leaders;
- bringing them together (or working through self-organisation);
- making them visible and providing support.

Key points for capacity building of educators and leadership support

Whatever their discipline or sector of education, all educators are sustainability educators who need to support their learners in preparing for a more sustainable

future.

Educators require time, space and trust to adopt pedagogies that enhance sustainability learning; to approach sustainability education and training in interdisciplinary ways, work in teams and develop a culture of sustainability within the institution.

Environmental sustainability should be embedded in all initial teacher education programmes; continued professional development programmes and teacher professional standards and frameworks in order to support educators' competence development with regard to sustainability.

Educators require opportunities and incentives to take part in professional development programmes related to sustainability, for example by linking them to career progression and development and creating roles for educators such as sustainability coordinator.

Education leadership teams should be supported in managing organisational change with dedicated professional development and guidance for their roles.

Leadership for sustainability is not limited to formal institutional leadership roles. Change leaders can be found in many different parts of the education system, in teaching or non-teaching roles.

Learning for environmental sustainability fosters collaboration and partnerships

Cross-sector collaboration

Cross-sector collaboration and partnerships on sustainability can provide expertise, resources and a real-world context for learning. Through partnerships with, for example, NGOs, industry, centres of environmental education, farms, parks, forests, zoos, museums and libraries, learners can experience and test their skills with real-life problems and develop a more holistic view of environmental sustainability. The potential of cross-sector collaboration builds on the recognition that the most robust and sustainable solutions will come from designing with (and not just for) the communities most affected. Such an approach can move beyond impacting individuals to impacting entire communities regarding more sustainable knowledge and lifestyles. Nature-based projects such as a river clean-up can help foster social inclusion and empower communities in a collaborative way. Another effective measure is to open up formal education spaces to the local community for people to meet, exchange views on sustainability and connect with nature.

In the EU, there has been a growing emphasis on the benefits and potential of collaboration between informal, non-formal and formal education as well as cross-sectoral partnerships between the public and private sector and/or civil society. A dedicated strand under the Erasmus+ programme fosters cooperation among organisations and institutions and many projects have had a strong focus on cross-sector collaboration as a way to strengthen learning for environmental sustainability. *Calls for collective action, mobilising business, social partners and stakeholders to commit to*

working together, in particular within the EU's industrial eco-systems, is one of the five building blocks in the European Skills Agenda for Sustainable Competitiveness, Social Fairness and Resilience[49]. Cross-sector collaboration and partnerships are about utilising the roles, knowledge and responsibilities of public, private and non-profit actors to reach innovative solutions and results, which could otherwise not be obtained.

To deepen understanding of global sustainability challenges, educational institutions and educators should foster partnerships at the local, national and international level (UNESCO, 2018). Such partnerships can take various forms but usually include:

- collaboration with parents and communities;
- collaboration with other education and training institutions (nationally or internationally), e.g., school networks, university alliances and labels;
- collaboration with other stakeholders (businesses, NGOs)

Collaboration between schools and NGOs or other non-formal learning institutions can provide significant benefits, by building on the expertise of the non-formal learning institution and connecting it to the curriculum and reach of the formal education and training institution. In Estonia, schools can apply for financial support to visit environmental and nature centres. Across the EU, international school labels that actively promote collaboration and support schools in establishing and maintaining partnerships with non-school actors have become popular and well integrated into the national systems in many Member States.

With regard to **VET**, a multi-stakeholder Pact for Skills[50] was launched during the European Vocational Skills Week in 2020. The Pact involves large-scale partnerships in strategic industrial eco-systems identified in the European Green Deal. Through the Pact, the Commission encourages stakeholders to work together and pool financial and other resources to develop, strengthen or upscale learning initiatives. Partnerships are also extremely important in anticipating employment and skill needs and identifying suitable responses to the green transition challenges in a timely manner. Career services, including career guidance and Public Employment Services have an important but currently underdeveloped role to play.

In the **higher education** area, the European Commission's University-Business Forum has taken place in Brussels every two years since 2008, offering a platform for networking, exchange of ideas and good practices by bringing together higher education institutions, companies, business associations, public authorities and policymakers. In recent years, sustainability has been one of a central theme of this university-business collaboration.

There are a number of higher education partnerships established at international and European level, which contribute to furthering environmental sustainability. In addition to the members of the European Universities Initiative, the Copernicus Alliance and European Network on Higher Education for Sustainable Development[51], aim to enable European higher education institutions and their partners to jointly identify challenges in higher education for sustainable development and spearhead development of processes, tools, and knowledge to address these challenges from a whole-institution perspective. Further partnerships include the Global University Network for Innovation[52], the Global

[49] COM(2020) 274 final.

[50] https://ec.europa.eu/social/main.jsp?catId=1517&langId=en

[51] https://www.copernicus-alliance.org/

[52] https://www.guninetwork.org/

Universities Partnership on Environment and Sustainability[53], the Higher Education Sustainability Initiative[54], Higher Education for Sustainability Development[55], Mainstreaming Environment and Sustainability in Africa[56] and University Educators for Sustainable Development[57].

Community engagement

Community engagement refers to the development of mutually beneficial partnerships between higher education institutions and stakeholders in their local or wider communities to address societal needs. Higher education institutions can play a key role in the development of their cities and regions, contributing to development strategies or cooperation with businesses, the public and voluntary sectors or supporting public debate on societal issues. Voluntary and community work can also be an effective way to help students gain practical experience and skills. Outreach beyond the academic community in local languages should be incentivised and rewarded, including as part of career development.

Sweden established the Swedish International Centre of Education for Sustainable Development (SWEDESD) in 2006. Today, SWEDESD is a well-established research and development environment at Uppsala University offering reflexive tools for implementation and scaling of education for sustainable development. SWEDESD supports integrated collaborative research and development projects in Sweden and abroad through high-level panels, research seminars and conferences, workshops and forums for practitioners, research circles and various venues for dialogue and collaboration. SWEDESD also offers training courses for teachers in schools and at universities, as well as for teacher educators, policy makers and project leaders.

As part of the *Together for the Alps* project, the Triglav National Park Public Institution in **Slovenia** works to raise awareness about climate change adaptation and mitigation and the importance of biodiversity conservation for the general public, particularly primary schools in the community.

In the **Erasmus+ project** *Partnership for Biodiversity Protection in Viticulture in Europe* nature conservation organisations, farmer/winegrower associations and local farmers worked together to create high quality reskilling for winegrowers to protect, enhance and promote biodiversity in vineyards. The success factors in the project were the direct involvement of members of the target group together with specialists in the field of nature protection. Partners could draw on each other's knowledge and experiences that made the training materials produced more relevant, understandable and adaptable for the target group to fit the teaching to their local conditions.
https://www.bodensee-stiftung.org/en/partnerschaft-zum-schutz-der-biologischen-vielfalt-im-weinbau-in-europa-2

To assess and demonstrate the value that a university can bring to its communities and the value that communities bring to a university, tools such as *TEFCE*, developed as part of an **Erasmus+ project**, can be of support. TEFCE supports higher education institutions to reflect on community engagement and identify good

[53] https://www.unep.org/es/node/10655
[54] https://sustainabledevelopment.un.org/sdinaction/hesi
[55] https://www.iau-hesd.net/
[56] https://www.unep.org/fr/node/10690
[57] https://www.ue4sd.eu/

practice.
https://www.tefce.eu/project

Centres of Vocational Excellence (CoVEs) bring together a wide range of local partners, such as providers of vocational education and training, employers, research centres, development agencies, and employment services. They aim to develop 'skills ecosystems' that contribute to regional, economic and social development, innovation, and smart specialisation strategies. In this context, green skills play a key role. Of the seven CoVEs selected under the 2020 call for Erasmus+ pilot projects, three focus on green topics (GREENOVET - European VET Excellence Platform for Green Innovation; Three-level Centres of Professional Excellence: Qualification, Entrepreneurship and Innovation in the Green Economy; European Platform for Urban Greening).

Promoting active citizenship through innovative methods is an **Erasmus+** *Strategic Partnership for Higher Education* that involves Czechia, Norway, the Netherlands, Finland and Malta. The project aims to use active citizenship, gamification and geoparticipation to help students to become agents of change, regarding climate change. Students learn to approach climate change as wicked problem and they develop know-how on how to communicate about these issues in a way that sets people up for action.

Key points for collaboration and partnerships

In the EU, there has been a growing emphasis on the benefits and potential of collaboration on sustainability. Partnerships bring together informal, non-formal and formal education and training as well as cross-sectoral partnerships involving the public and private sector and/or civil society.

Cross-sector collaboration and partnerships on sustainability can provide expertise, resources and a real-world context for learning.

Community projects on the environment and sustainability can help foster social inclusion and empower communities in a collaborative way.

Higher education institutions can play a key role in the development of their cities and regions regarding sustainability.

Learning for environmental sustainability empowers youth

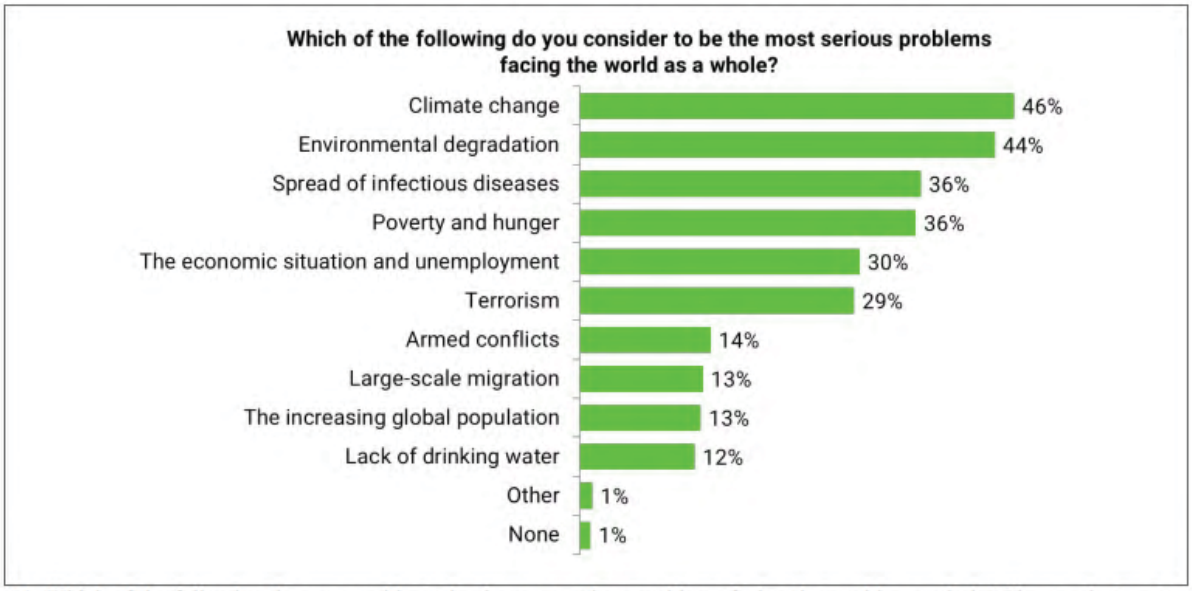
Young people have been vocal and active demanding change and calling on public authorities to act urgently to protect the climate and environment for current and future generations. Many young people are engaged with environmental sustainability issues as individuals, in their communities, nationally and even internationally. They find creative and innovative solutions to tackle climate change and environmental degradation. And they are shaping the present and future as citizens, consumers and decision-makers.

Today's younger generations have a strong contribution to make. Young people's education levels have steadily risen in the last decades and many are skilled in using digital technologies and social media. These competences are crucial for the digital and green transition. Supporting young people to use and improve their green and digital competences and ensuring that young people's voices are taken into account in policy

making on the environment, climate change and beyond is crucial to ensure better, more inclusive and more pluralistic processes and solutions for the whole of society.

Young people's concerns

Young Europeans consider climate change and environmental degradation to be the most serious problems facing the world. These are the findings of a survey of more than 22 000 young people (15 to 35 years old) carried out in 23 EU countries in October and November 2020 (Dunne and Bijwaard, 2021):



Q1. Which of the following do you consider to be the most serious problems facing the world as a whole? Please select up to three answers.
Base: All respondents (n=22,377)

Source: Dunne and Bijwaard, 2021.

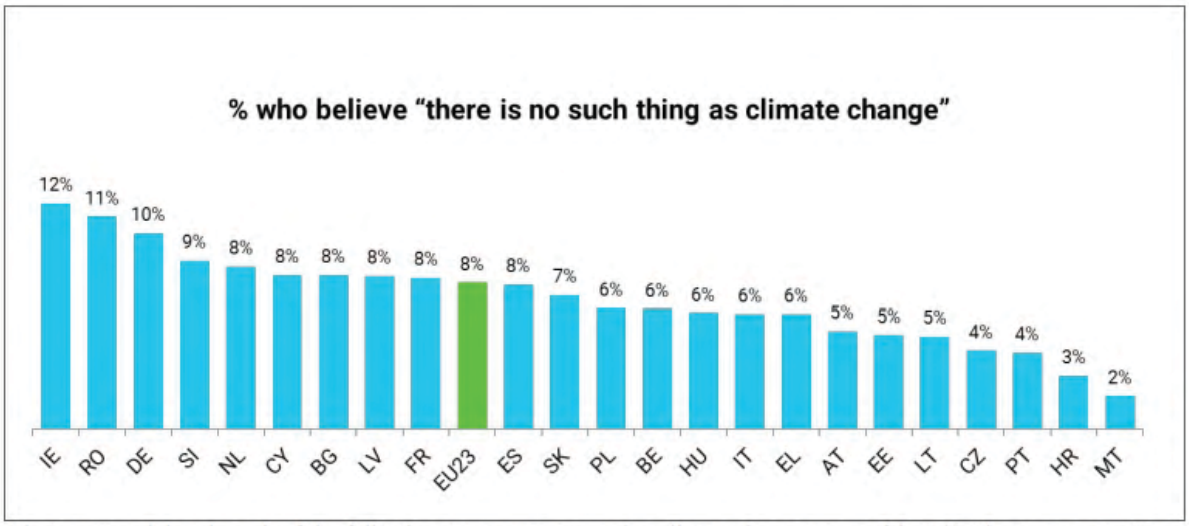
Regional differences can be noted, however. In Spain and Portugal, 71% and 63% of young people respectively, are very or extremely worried about climate change, while this is the case for only 23% in Czechia and Latvia. Overall, young people in southern European countries are more worried about climate change than their peers elsewhere in Europe, which may be related to more visible weather extremes in their regions.

The concerns of young Europeans are mirrored on a global scale. A study on climate anxiety and young people, published in the journal Lancet Planetary Health polled 10 000 16 to 25 year olds in 10 countries (Hickman et al, 2021). It found that nearly six in 10 young people were very or extremely worried about climate change[58]. Three quarters of higher education students[59] who were polled in an international survey of Students Organizing for Sustainability (SOS) in 2020, agreed that 'worried' best described their feelings about climate change and their future (SOS, 2021).

A lack of awareness is not the root-cause of eco-anxiety among young people. Results from the OECD's PISA exercise in 2018 showed that 79% of 15-year olds are fully aware of climate change and global warming (Schleicher, 2021). The 2020 EU survey confirms

[58] The study covered Australia, Brazil, Finland, France, India, Nigeria, the Philippines, Portugal, the UK and the US. See Hickman et al, 2021.
[59] Over half coming from the EU.

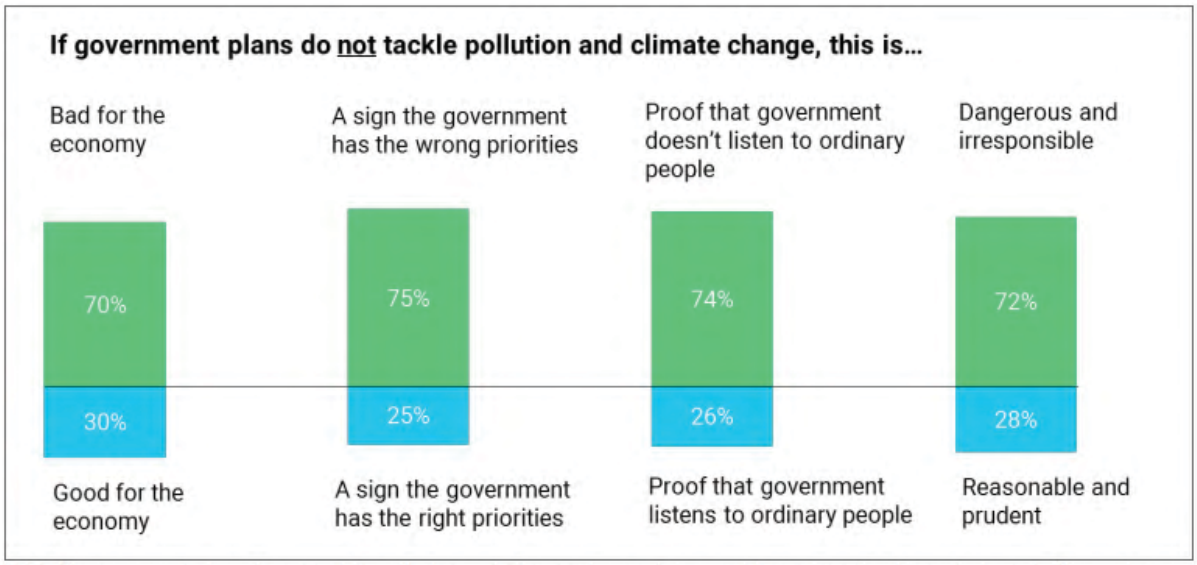
that climate deniers among young people are in fact a small minority, close to nine out of ten young Europeans (86%) agree with the statement that *climate change has had an impact on every ocean and every continent over the past few decades*. 83% consider humans and human activity to be the main cause of climate change:



Q8. In your opinion, is each of the following statements concerning climate change true or false? % who answer "true" to "there is no such thing as climate change"
Base: All respondents (n=22,377)

Source: Dunne and Bijwaard, 2021.

Over 50% of the respondents in the above-mentioned Lancet study felt sad, anxious, angry, powerless, helpless, and guilty and rated the governmental response to climate change negatively (Hickman et al, 2021). European youth largely agree that governments should tackle environmental degradation and the climate crisis:



Q12. If government plans do not tackle pollution and climate change, how would you describe this on balance? Please choose the statement from each pair that best reflects your view
Base: All respondents (n=22,377)

Source: Dunne and Bijwaard, 2021.

Many young people have clear views on what needs to change. More than three quarters (77%) agree that 'our consumption habits are not sustainable if we want to preserve the environment', while only 38% think that national governments 'should focus on helping the economy to recover first and foremost, even if that means taking some actions that will be bad for the environment' (Dunne and Bijwaard, 2021).

The role of education and training in engaging youth

Education and training systems and institutions have a duty to respond to the growing youth voice on the climate and biodiversity crises. They need to offer opportunities to learn for environmental sustainability in different settings and contexts in order to empower and engage youth and boost the skills and competences needed for the green transition. To achieve this, education and training systems should involve young people in designing solutions related to sustainability education.

At present, many young people consider that school is failing to give them an adequate understanding of climate change, the environment and how to live and act more sustainably (European Commission, 2019). According to the experiences of higher education students who participated in the SOS survey (SOS, 2021), tertiary education is the sector that has encouraged them the most so far to 'think and act to help the environment and other people'. However, only 26% of respondents thought that sustainable development has been covered in depth by their course (ibid.). This is of concern as Europe cannot afford wasted talent or disengagement of young people when it comes to initiating and contributing to positive change in society. Involving students in meaningful ways in education and training requires learner-centred pedagogies and can ultimately contribute to developing learners' feelings of 'ownership' towards sustainability (Gayford, 2008), which is crucial for positive action.

To ensure a just and inclusive green transition, it is key to involve young people from all backgrounds. Young women, highly educated and those living in urban environments tend to be more engaged with sustainability actions and behaviours (Dunne and Bijwaard, 2021). Very often, socio-economic disadvantage and democratic exclusion are related: people, including young people, who struggle with disadvantage can be less active citizens and are more likely to distrust public institutions.

Along with a better coverage of issues relating to sustainable development in curricula, young people are eager to learn how to bring about change for themselves and for and with others. Non-formal learning providers, such as youth organisations or environmental bodies have developed many resources for young people to learn about the challenges related to the environment and climate and to inspire, engage and train young people for change and leadership on sustainable development. Youth4Climate's Educational Toolkit[60] is but one example that covers learning about and acting for the climate from many angles.

The EU actively supports youth participation and creates opportunities for young people to exchange experiences and become active citizens. The EU Youth Strategy guides the EU's work on and with young people through the EU Youth dialogue and the European Youth Coordinator. From 2014 to 2020 more than 500,000 participants have gained experience and skills abroad through youth exchanges and volunteering offered through the Erasmus+ and the European Solidarity Corps programmes.

[60] https://www.connect4climate.org/sites/default/files/files/publications/Y4C%20Educational%20Toolkit%20-%20FINAL_revised-2_compressed.pdf

In the frame of the recovery from the COVID-19 crisis, 2022 is the **European Year of Youth**. It is organised with the participation and involvement of young people to recognise and discuss challenges encountered by young people in the EU and to work together to identify solutions. Environmental sustainability is a key theme of the Year.

The **German youth forum youpaN** consists of 30 elected young people between 16 and 30 who actively participate in national decision making and vote on how education can become sustainable. youpaN plays a key role in implementing the German national action plan on education for sustainable development.
https://youpan.de/

To support young people to engage in and shape a digital and green transition that is just and inclusive, the Commission has published **A Toolkit for Youth Participation in the Just Transition Fund.** It sets out principles and methods of successful youth participation and provides a range of good practice examples.
https://ec.europa.eu/regional_policy/sources/docgener/guides/youth_just_transition_en.pdf

The **Futures Forward Academy** in Gibraltar, launched in January 2021, supports young adults with the 'capabilities, mindsets, and networks' to make a positive difference. The 5-month programme is open to young people aged 20-30 who are currently in leadership roles. Participants attend workshops, lectures and webinars and complete an action project and study trip abroad. The programme is designed to build collaboration through peer learning, whilst challenging established ideas of leadership and practice. A range of environmental issues are explored through the programme always linking learning to social and economic contexts.
https://www.futuregenerations.gi/news/futures-forward-academy-30

Key points for youth empowerment for environmental sustainability

Young people have been especially vocal and active demanding change to protect the climate and environment. Many young people are active on sustainability and the environment, finding positive and creative ways to engage with these issues.

A large majority of young people in Europe and the world worry about climate change, environmental degradation and their future. They expect governments, companies and education and training institutions to take action.

Education and training has an important role to play to engage youth for environmental sustainability. However, so far many young people consider that schools and universities are not preparing them adequately to address sustainability challenges.

To address young people's concerns and expectations, education and training systems should involve young people in designing solutions related to learning for environmental sustainability and provide opportunities for them to learn in a holistic way.

Learning for environmental sustainability builds competences and skills

Education and training for sustainability has the potential to be a catalyst for change among young and adult generations, through the acquisition of sustainability competences (Bianchi, 2020). Identifying the right competences to address sustainability challenges, empower citizens to be better geared towards *changing* our way of living – individually and collectively –, and make more sustainable choices has become more important than ever (ibid.).

Building on key competences

Since the early 2000s, many European countries have shifted curricula from a knowledge- to a competence-based approach. A competence-based curriculum requires interactive and student-centred teaching methods, while promoting a more interdisciplinary and (cross-curricular) approach to education. It is participatory and inclusive, recognising learners as individuals with diverse background and learning experiences acquired through informal or non-formal experiences. At the institutional level it fosters collaboration with other education institutions and external stakeholders, such as from local community, non-governmental organisations, and businesses. This in turn helps fine tune students' learning to the needs of a rapidly changing economy and society.

The 2006 Council Recommendation on Key Competences for Lifelong Learning identified a set of key competences necessary to work and live in the 21st century. Updated in 2018, the Council Recommendation has been a reference for many Member State reforms and has also led to other competence frameworks being developed at European level. The Recommendation specifies eight key competences:

- Literacy competence
- Multilingual competence
- Mathematical competence and competence in science, technology and engineering
- Digital competence
- Personal, social and learning to learn competence
- Citizenship competence
- Entrepreneurship competence
- Cultural awareness and expression competence

All competences are considered equally important, as they 'overlap and interlock; aspects essential to one domain will support competence in another'[61]. Furthermore, the Recommendation adds a series of cross-cutting themes relevant to all key competences such as critical thinking, problem solving, teamwork, communication and negotiation skills, analytical skills, creativity, and intercultural skills. The eight key competences are developed in a lifelong learning perspective, from early childhood throughout adult life, and through formal, non-formal and informal learning in all contexts, including family, school, workplace, neighbourhood and other communities.

[61] https://ec.europa.eu/education/education-in-the-eu/council-recommendation-on-key-competences-for-lifelong-learning_en

Defining competences for sustainability

In the 2018 *Council Recommendation on Key Competences*[62], sustainability is integrated as a cross-cutting theme in all eight key competences rather than as a standalone competence. Several key competences share elements that are important for sustainability: the personal, social and learning to learn competence; the civic competence; the competence in science, technology and engineering; and the entrepreneurship competence. Other cross-cutting competences relevant for sustainability include: critical thinking and reflection; creativity; collaboration; initiative-taking and problem-solving; taking responsibility; empathy, compassion and solidarity.

A standalone competence framework which combines relevant components of key and cross-cutting competences can help identify the right competences to address sustainability challenges, empower citizens to be better geared towards *changing* our standards of living, and make more sustainable choices (Bianchi, 2020). The new European Sustainability Competence framework (see chapter 4) therefore defines a set of specific and cross-cutting competences for sustainability.

A common thread in all sectors and settings of education and training needs to be the **futures dimension** of learning for sustainability. Education and training has always aimed at preparing learners for the future. Futures thinking, in the context of sustainability, however, concerns itself with new ways of thinking about the future to change societal and economic models to achieve sustainability. Such an approach needs to be further strengthened in learning and teaching. Whereas the past and present are generally well covered in curricula, the future is less so and educators are often less familiar with how to teach this dimension (Hicks, 2012). Embedding futures thinking into lifelong learning and designing learning with a view to possible future(s), can unlock potential and benefit learning at individual and collective level: 'It is a process which is transforming the way people relate to their future, helping to cultivate dreams, inspire hope and lead to action plans for a more sustainable future' (Tilbury, 2011).

Developing professional skills for the green transition

There is no commonly agreed definition on the exact skills required for the green transition (Bianchi, 2020). Cedefop, the European Centre for the development of Vocational Training, defined green skills in 2012 as 'the knowledge, abilities, values and attitudes needed to live in, develop and support a society which reduces the impact of human activity on the environment' (Cedfop, 2012). From a labour market perspective, both occupation-specific technical skills (e.g. to monitor waste treatment equipment), and more cross-cutting professional skills (e.g. digital skills), that enable workers to design, develop and implement new processes, products and services to support a sustainable and resource-efficient economy, are needed. These are not necessarily new skills but to a certain extent skills that already exist in traditional occupations (e.g. STEM skills, problem solving skills). VET systems need to equip learners with these skills but also ensure that workers who are already qualified in an occupation receive additional training throughout their career to acquire new occupation-specific skills that needed for the green transition.

The *Council Recommendation on vocational education and training for sustainable competitiveness, social fairness and resilience*[63] defines reform principles for VET at

[62] 2018/C 189/01
[63] 2020/C 417/01

national level including its role in supporting innovation, growth and the digital and green transitions. It calls on Member States to adapt and expand the offer of VET, especially for adults, by fostering the acquisition of entrepreneurial, digital and green skills. It also calls for the embedding of environmental and social sustainability in programmes and organisational management of VET institutions.

The renewed *European Alliance for Apprenticeships*[64] is encouraging new pledges to incorporate the acquisition of skills for the green transition and the development of robust digital competences in apprenticeships. It targets economic sectors that will be on the front line of the green transition.

The Commission is working to support the acquisition of skills for the green transition in the *Skills Agenda*[65] by:

- Defining a taxonomy of skills for the green transition, which will allow the statistical monitoring of the greening of professions.
- Agreeing with Member States a set of indicators to allow monitoring and statistical analysis of developments in green skills.
- Developing a European competence framework on sustainability.[66]
- Supporting the development of a core green skills set for the labour market to guide training across the economy with a view to creating a generation of climate, environment and health conscious professionals and green economic operators.
- Helping to integrate environmental and climate considerations into school, higher education, vocational education and training, as well as professional training.

The **Erasmus+ project** *SolarCV*, which ran between 2015 and 2018 with 16 organisations from five EU Member States, aimed to address the skills needs for Concentrated Solar Power (CSP), an emerging technology in the solar energy sector. The project created an e-learning platform, including an e-simulator, with training materials for formal VET training on CSP. The e-simulator is an innovative tool, combining e-learning with advanced teaching methods based on plant operation experiences. The project also developed an EU Competence Profile and an EU CSP CV standardising the skills set for the CSP sector at EU-level. A methodology for validating non-formal learning in the field of CSP was also developed.
http://solarcv.org/

The **Skills Labs** in **Greece** aim at preparing teachers to foster the development of soft skills, life skills and technology and science skills among students of pre-primary, primary and lower secondary education. The Skills Labs are organised around four main cycles: (a) Better living − Well-being, (b) Environmental consciousness, (c) Interest and action — Social consciousness and responsibility, and (d) Creation & innovation — Creative thinking and initiative.
http://iep.edu.gr/el/espa-2014-2020/epimorfosi-ton-ekpaideftikon-stis-deksiotites-meso-ergastirion-mis-5092064

In **Slovenia** environmental awareness is one of the 10 key competences in vocational and technical upper secondary education programmes included in the 'catalogues of knowledge' to guide the preparation of general subjects and professional modules in VET programmes.

[64] https://ec.europa.eu/social/main.jsp?catId=1147
[65] https://ec.europa.eu/social/main.jsp?catId=1223&langId=en
[66] See chapter 4.

Key points on building competences for sustainability

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.

The new European Sustainability Competence framework (detailed in chapter 4) defines a set of competences for sustainability for all learners.

Occupation-specific green skills and cross-cutting professional skills, including digital skills are needed to enable workers to design, develop and implement new and more sustainable processes, products and services.

Learning for environmental sustainability is founded on strong policies

Policies which are well-defined and based on a clear vision are key enablers of learning for environmental sustainability. Sustainability is a complex field and education and training systems are in themselves complex, involving multiple layers and a range of different organisations and actors. This double complexity presents a heightened challenge for policy design and implementation as it requires systems thinking with regard to both sustainability *and* education and training systems.

Adapting current practices and systems is a first step to effectively embedding environmental sustainability into education and training. It means fitting the topic of sustainability into the existing education and training system without modifications to the system itself. It is essentially education *about* sustainability, which is primarily content-focused and achieved by adding on, for example, components or modules to the curriculum or to teacher training.

Learning and teaching *for* sustainability will, however, require policy design and implementation that concerns itself not only with the 'what' but also the 'why' and the 'how' of learning. Designing policies for education and training for sustainability need to consider the purpose of education, the chosen content (curriculum) and assessment, the learning environment and the pedagogies in an integrated and dynamic manner and leading to transformative changes. The following policy approaches to embedding environmental sustainability in education and training, or a combination thereof (see chapter 3), are in place in many EU countries:

- including it into general education and training strategies and policy documents;
- specific strategies for learning for environmental sustainability, either sector-specific or in a life-long learning perspective;
- mainstreaming learning for environmental sustainability into non-education policies (e.g. economic strategies).

All approaches need to be backed by smart policy design which takes into account existing policy, educational governance and institutional settings, and institutions, policy

and societal context[67]. Including key stakeholders, e.g. teacher unions, early on in the policy process will have long-term benefits. Constructive alignment of policy planning between curricula, resources, assessment and teaching is necessary, including by identifying specific targets and actions to be taken at both institutional and individual levels. Collaboration with civil society, private companies, and academia is important to create policy and strategies that are embedded in practice and consensus-based to ensure wider influence and scale-up (Biggs, 2003).

To achieve transformative change in all segments of society, integrating education into *all* policy documents relating to sustainable development (i.e., non-educational policies such as transport, industry, research policies, etc.) is crucial (Glavic, 2020 and UNESCO, 2020). In Denmark, for example, education for environmental sustainability, has been included in key economic policy documents, aligning it actively with green growth planning.

In **Spain**, the *White Paper on Environmental Education* (Libro Blanco de la Educación Ambiental en España) was introduced in 1999. It has since then served as a guide to define the objectives and principles of environmental education in Spain and encouraged its uptake in the education system. Legislation from 2014, has mandated a national climate change curriculum in primary and secondary schools in the areas of applied sciences, geography, and geology, as well as in other courses such as ethics, scientific culture, and environmental science. Some of the major themes studied include climate, hydrography, natural vegetation, and content about weather and climate. In 2020, the White Paper was updated through the *Environmental Education Action Plan for Sustainability* (Plan de Acción de Educación Ambiental para la Sostenibilidad, PAEAS).

The **Netherland**'s *national plan on Education for Sustainable Development* ('DuurzaamDoor') is based on multi-stakeholder participation, co-creation, social innovation and transformative learning as underlying concepts. Education features as a separate area alongside biodiversity, water, circular economy and other policies. There are three cross cutting areas in education: curriculum and whole-school approach; integral decision-making for sustainable development, and regional co-operation supporting grassroots activity.

In **Slovakia**, the green education fund, managed by the Slovak Environment Agency (SEA) and financed from the State budget and private companies, has been active since 2017 in supporting environmental education offered by non-governmental organisations at national and regional level. SEA's concept paper for the development of environmental education and public awareness actions by 2030 foresees 46 measures in four areas (capacity building, education supply, further development of the Environmental Education Centre and national coordination). The plan addresses the development of environmental educational programmes for kindergartens, primary and secondary education, including secondary VET and the development of interactive digital tools in cooperation with schools.

[67] 'For instance, if a new curriculum requires the use of high technology equipment which schools cannot afford, the policy may fail to be implemented unless some budget is available at the national or local level' (Viennet and Pont, 2017).

Monitoring and evaluation

Measuring impact and implementation of learning for environmental sustainability is essential. Monitoring helps 'ensure ongoing relevance and effectiveness of ESD efforts; guide planning and reorienting of […] programmes; increase understanding of ESD progress, and improve decision-making and action-taking […]' (Tilbury, 2007). If based on participatory methods, monitoring can also contribute to peer-learning among stakeholders (ibid.).

The scope and approaches that characterise learning for environmental sustainability pose specific challenges for monitoring and evaluation. For example, education that fosters strong links with the local community and is highly contextual, will be difficult to compare at regional, national or international level. Interdisciplinary, hands-on and socio-emotional learning does not necessarily align with test-based summative student assessment, which often serves monitoring purposes.

A focus on subject content and written tests and examinations in many education systems can also pose a challenge for measuring learning outcomes related to environmental sustainability. It can also discourage educators from applying the more innovative and hands-on approaches that are considered particularly suitable for environmental sustainability. In addition, it could lead to an over-emphasis on cognitive learning outcomes over developing the much-needed socio-emotional competences and learner agency.

Effectively evaluating novel concepts and competences such as exploratory and futures thinking that encourage learners to imagine and create what does not yet exist, is especially challenging. It is very difficult, if not impossible, to capture such concepts with pre-defined targets and indicators (UNESCO, 2018).

Measuring the impact of learning in the field of sustainability is directed at learning outcomes, including knowledge, skills and attitudes that learners develop with regard to sustainability. Such monitoring can help strengthen and adjust policies, learning processes and practices to further improve learning outcomes. Ultimately however, it needs to targets a wider dimension: sustainable living (UNESCO, 2018). Outcome measurement and impact indicator levels that relate to effects on the wider economy and society beyond those directly affected by the intervention are rare. Studies have identified a need to extend measurement to this wider level and capture outcome effects that indicate lasting changes and deeper impact (Waltner et al, 2018).

Current monitoring processes in the area of learning for environmental sustainability are mainly *input-oriented*. Inputs, including policies, programmes and curricula, educators development, are obviously related to learning outcomes but cannot be equated with them. Having holistic, multipronged approaches (UNESCO, 2018) to monitoring learning for environmental sustainability will best capture the broad scope and ambitions in this area.

In practice, national and international monitoring can build on work developed during the UN Decade in Education for Sustainable Development (DESD) and the Global Action Programme for Sustainable Development (GAP). The Global Monitoring and Evaluation Framework developed for the DESD included 'questionnaires, research reports, stakeholder engagement, longitudinal assessments and a self-reporting process and portfolio of evidence' (Tilbury, 2009). To evaluate dimensions such as socio-emotional learning, pedagogies that foster e.g. exploratory and futures-thinking or local aspects of learning for environmental sustainability, methods such as 'classroom observation,

interviews, focus groups, ethnographies, forms of social action research' (UNESCO, 2018) can help.

To capture the lifelong learning scope and ambition of learning for environmental sustainability, it will be important to widen the current focus of monitoring pupils and students, in particular, at secondary level to both younger and older generations. Moving beyond formal learning and even beyond education to measuring impact in the wider economy and society requires more research, but also creative thinking and innovation (ibid.).

As more and more countries include environmental sustainability in their education and training policies and systems (UNESCO, 2019), there is significant scope and need to develop and improve the evidence base for effective learning for environmental sustainability supported by national and international level monitoring. Together with the EU Member States, the European Commission, will explore impact assessment and indicator development at EU level to support Member States in their efforts to embed environmental sustainability in education and training.

The Monitoring and Evaluation of Climate Change Education (**MECCE**) project aims to develop a set of new monitoring indicators and datasets alongside a repository of global case studies to generate an understanding of quality climate change education. MECCE is an international project involving 80 academics and organisations worldwide.
https://sepn.ca/mecce/

Key points on policies

Learning and teaching for sustainability requires policy design and implementation that concerns itself not only with the 'what' but also the 'why' and the 'how' of learning. Well-defined policies based on a clear vision are key.

Given the complexity of sustainability and of education and training systems, systems thinking is required for effective change.

Policy planning for curricula, resources, assessment and teaching must be well aligned and specific targets and actions for institutions and learners should be defined.

Collaboration with civil society, the private sector, and academia is important to create policy and strategies that work on the ground. Including key stakeholders early on in the policy process will have long-term benefits.

Integrating learning into all policy documents relating to environmental sustainability and the green transition is crucial.

Monitoring and impact assessment are mostly input oriented. Coordinated and coherent monitoring at institutional, national, European and international levels on learning outcomes for environmental sustainability need to be further researched and developed.

4. The European sustainability competence framework

This chapter contains excerpts from the report by the European Commission's Joint Research Centre on the new European sustainability competence framework (GreenComp). The full report, published in January 2022, is available on the website of the Joint Research Centre[68] and should be cited as: *Bianchi, G., Pisiotis, U., Cabrera, M. (2022). GreenComp – The European sustainability competence framework. Luxembourg: Publication Office of the European Union*.

The European sustainability competence framework, *'GreenComp'*, is a reference framework on sustainability competences at EU level. The new framework has been developed by the European Commission using a mixed method research process, involving background studies and extensive consultations with experts in sustainability, education for sustainability and lifelong learning.

The *GreenComp* framework unpacks and defines what sustainability as a competence entails. Users of the framework are encouraged to adapt it to learners' needs, backgrounds and situation, including the education level and age of the learner, the learning setting and the local context. A shared understanding of sustainability competences can act as a catalyst for learning for environmental sustainability by supporting education and training institutions to develop, review and adapt their vision and practices with regard to sustainability.

As a reference tool, *GreenComp* can serve a wide range of purposes including curricula review; design of teacher education programmes; (self-) assessment/reflection, policy development, certification, assessment, monitoring and evaluation. Furthermore, the proposed model can complement and strengthen existing international, national, regional and local efforts to capture and define sustainability competences.

Description of the framework

GreenComp consists of four competence areas:

- Embodying sustainability values,
- Embracing complexity in sustainability,
- Envisioning sustainable futures, and
- Acting for sustainability.

These four areas are each broken down into three competences, making a total of 12 competences. Competence areas and competences are shown in table 1:

[68] https://ec.europa.eu/jrc/en/greencomp

Table 1[69]. Descriptors of sustainability competences

AREA	COMPETENCE	DESCRIPTOR
1. Embodying sustainability values	1.1 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
	1.2 Supporting fairness	To support equity and justice for current and future generations and learn from previous generations for sustainability
	1.3 Promoting nature	To acknowledge that humans are part of nature; and to respect the needs and rights of other species and of nature itself in order to restore and regenerate healthy and resilient ecosystems
2. Embracing complexity in sustainability	2.1 Systems thinking	To approach a sustainability problem from all sides; to consider time, space and context in order to understand how elements interact within and between systems
	2.2 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
	2.3 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
3. Envisioning sustainable futures	3.1 Futures literacy	To envision alternative sustainable futures by imagining and developing alternative scenarios and identifying the steps needed to achieve a preferred sustainable future
	3.2 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
	3.3 Exploratory thinking	To adopt a relational way of thinking by exploring and linking different disciplines, using creativity and experimentation with novel ideas or methods
4. Acting for sustainability	4.1 Political agency	To navigate the political system, identify political responsibility and accountability for unsustainable behaviour, and demand effective policies for sustainability
	4.2 Collective action	To act for change in collaboration with others

[69] The numbering of tables and figures in this chapter corresponds to the original publication.

	4.3 Individual initiative	To identify own potential for sustainability and to actively contribute to improving prospects for the community and the planet

In Table 1, competence areas and competences are numbered for ease of reference. However this does not imply a sequence of acquisition nor a hierarchy. All 12 competences are equally important: learners are encouraged to develop all of them.

The four competence areas are tightly interrelated: sustainability as a competence encompasses all four taken together. The 12 sustainability competences are also interrelated and interconnected, and should be treated as parts of a whole. While we encourage learners to acquire the 12 competences, they do not need to acquire the highest level of proficiency in all 12, nor have the same proficiency across all of them. Indeed, *GreenCo*mp implies that sustainability as a competence is made of 12 building blocks.

Competence areas and competences

1. Embodying sustainability values

The competence area '**Embodying sustainability values**' encourages us to reflect on and challenge our own personal values and world-views in terms of unsustainability, and sustainability values and world-views. This area advocates equity and justice for current and future generations, while supporting the view that humans are a part of nature.

Socioecological problems are wicked problems, because they involve interlinked complex systems, such as the natural systems and the social systems including technological, political and economic systems. Our understanding of such complex problems lies, at least in part, in normative assumptions of the world, and in how we interpret social, political and ethical decisions[i].

Knowledge is often seen as value-free[ii], which is based on the idea that it only stems from rigorous evidence-based processes that lead to objectivity, precision, acceptability and universality[iii]. Yet, our rationality is limited as our values and world-views shape our perception and understanding of the world at all times, including our perception and understanding of sustainability problems[iv]. While descriptive knowledge explains reality through facts, normative knowledge on sustainability aims to identify how the world should look[v].

Sustainability competences such as systems thinking and futures literacy are useful when linked to sustainability values, as otherwise such competences could be used for unsustainable actions[vi,vii]. By fostering sustainability values such as equity and justice for current and future generations and preservation and restoration of nature[viii], learning for environmental sustainability can help shape a more sustainable future for communities and societies.

When learners are encouraged to reflect and question knowledge acquisition, assimilate it, and put it into practice, transformative learning takes place[ix]. Such learning involves cognitive (head), psychomotor (hands) and affective (heart) domains[x] and encourages reflection, questioning and action. Transformative learning is learner-centred, therefore promoting student agency[xi].

1.1 Valuing sustainability

Descriptor (1.1): *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*

Valuing sustainability aims to foster reflection on values and perspectives in relation to concerns for sustainability. In this context, learners can articulate their values and consider their alignment with sustainability as the common goal.

Valuing sustainability could be defined as a meta-competence, since its primary aim is not to teach specific values, but make learners realise that values are constructs and people can choose which values to prioritise in their lives[xii].

Valuing sustainability enables learners to reflect on their way of thinking, their plans, and their actions. It asks them whether these cause any harm and are in line with sustainability values and thus contribute to sustainability. It offers learners an opportunity to discuss and reflect on values, their variety and culture-dependence.

Examples of knowledge (K), skills (S) and attitudes (A):

K: *knows the main views on sustainability: anthropocentrism (human-centric), technocentrism (technological solutions to ecological problems) and ecocentrism (nature-centred), and how they influence assumptions and arguments;*

S: *can articulate and negotiate sustainability values, principles and objectives while recognising different viewpoints***;**

A: *is prone to acting in line with values and principles for sustainability.*

For example: Given the apparent tensions between sustainability and consumerism based on the use of natural resources, everybody should be able to contemplate the impact that fast fashion or taking flights for a weekend getaway would have at system level (SDG 12).

1.2 Supporting fairness

Descriptor (1.2): *To support equity and justice for current and future generations and learn from previous generations for sustainability*

Supporting fairness is about promoting equity and justice among present and future generations, while learning from past traditions and actions. Starting from the premise that human health is intrinsically linked to planetary health, this competence can help learners understand that environmental quality is linked to equity and justice[xiii]. Access to green spaces can reduce health-related socio-economic inequalities[xiv]. Environmental equity and justice imply, therefore, human equity and justice.

Yet *supporting fairness* is not only about promoting environmental justice and equity to improve human health. In line with the competence 'promoting nature', supporting fairness is also about taking into account the interests and capabilities of other species and environmental ecosystems, as well as the importance of preserving nature for future generations and for nature itself.

Supporting fairness as a competence can be fostered by promoting responsibility in collaborative activities and teamwork, while acknowledging and respecting other view points[xv].

Examples of knowledge (K), skills (S) and attitudes (A):

K: *knows that ethical concepts and justice for current and future generations are related to protecting nature;*

S: *can apply equity and justice for current and future generations as criteria for environmental preservation and the use of natural resources;*

A: *is committed to respecting the interests of future generations.*

For example: The 'Stop Ecocide Foundation' initiative has been drafting a law on offences against the environment, or ecocide, which is defined as 'unlawful or wanton acts committed with knowledge that there is a substantial likelihood of severe and widespread or long-term damage to the environment being caused by those acts'[70] (SDGs 14, 15, 16). Examples of ecocide include deforestation of the Amazon or the killing of protected species.

1.3 Promoting nature

Descriptor (1.3): *To acknowledge that humans are part of nature; and to respect the needs and rights of other species and of nature itself in order to restore and regenerate healthy and resilient ecosystems*

Promoting nature is about developing empathy towards the planet and showing care for other species. This requires knowledge about the main parts of the natural environment (geosphere, biosphere, hydrosphere, cryosphere and atmosphere) and the close links and interdependence between living organisms and non-living components. Knowledge about natural phenomena can spur us on to more closely connect with nature, which in turn can motivate further learning about sustainability.

Promoting nature fosters a healthy relationship with the natural environment and aims to ignite in people a feeling of connectedness that can help contrast the psychological distress and negative emotions that children and young people worldwide experience due to climate change[xvi] and can help improve their mood and mental health[xvii].

The 'nature deficit disorder' conveys the human costs of alienation from nature: i) decreased use of the senses, ii) attention difficulties, iii) higher rates of physical and emotional illnesses, iv) a rising rate of myopia, v) increased child and adult obesity, and vi) increased vitamin D deficiency[xviii]. Research indicates that to overcome the 'nature deficit disorder' not only do we need to be *in contact with* nature, but we also need to *feel connected to* nature[xix]. While the former involves physical interaction with the natural environment mainly at surface level, the latter concerns our feelings and views resulting from meaningful relationships being developed and the internalisation of our experiences in the natural environment, e.g. with animals, plants or places. Such internalisation can, in the long term, promote restoration of nature[xx].

Examples of knowledge (K), skills (S) and attitudes (A):

[70] https://www.stopecocide.earth/legal-definition

K: *knows that our wellbeing, health and security depend on the wellbeing of nature;*

S: *can assess own impact on nature and consider the protection of nature an essential task for every individual;*

A: *cares about a harmonious relationship existing between nature and humans.*

For example: The Nature Conservancy – a global environmental non-profit organisation – believes that helping young people build relationships with nature (SDG 4) is critical to ensure a more sustainable future (SDGs 15, 3, 11). The Nature Lab, the Nature Conservancy's youth curriculum platform, provides educational resources for different age groups to teach them how nature works and how young people can contribute to its conservation[71].

2. Embracing complexity in sustainability

The competence area **'Embracing complexity in sustainability'** is about:

- empowering learners with systemic and critical thinking, and encouraging them to reflect on how to better assess information and challenge unsustainability;
- scanning systems by identifying interconnections and feedback; and
- framing challenges as sustainability problems which helps us learn about the scale of a situation while identifying everyone involved.

Technological change, digitisation, and globalisation have increased our society's complexity and accelerated socioecological problems such as climate change and loss of biodiversity. Environmental challenges are interconnected and interlinked to economic activities and societal lifestyles[xxi]. The operation of our economy, contained within our society (see Figure 1), depends on our planet which has limited resources and boundaries[xxii].

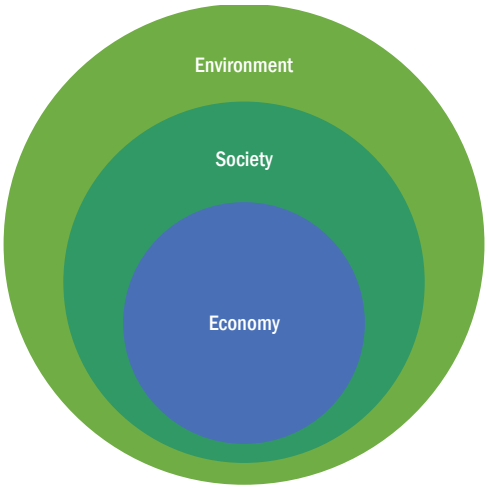


Figure 1. Interconnectedness of economy, society and environment

[71] The Nature Conservancy educational resources that promote nature are available at https://www.nature.org/en-us/about-us/who-we-are/how-we-work/youth-engagement/nature-lab/

Learning for environmental sustainability enables learners to be better equipped to see connections and links between specific issues and environmental change[xxiii]. Health is a fundamental human right, and access to a 'safe, clean, healthy and sustainable environment' is also now recognised as a human right[72]. However, minority groups and families with a lower income are often exposed to polluted environments, which in turns affects their health and wellbeing. Identifying the connections between environmental issues and income inequality, which may look unrelated at first superficially, can help us correctly frame such challenges as a sustainability problem and take preventive or mitigating actions.

2.1 Systems thinking

Descriptor (2.1): *To approach a sustainability problem from all sides; to consider time, space and context in order to understand how elements interact within and between systems*

Equipping learners with *systems thinking* is necessary to understand complex sustainability problems and their evolution. *Systems thinking* allows us to understand reality in relation to other contexts (local, nation, global) and fields (environment, social, economic, cultural). It is critical for advancing sustainability. Thinking in systems enables learners to identify feedback mechanisms, intervention points and interactive trajectories. *Systems thinking* can be understood as a tool for evaluating options, decision-making and taking action[xxiv]. It is based on the assumption that parts of a system act differently when taken apart from the system. In fact, contrary to this, fragmentary thinking, i.e. analysing parts in isolation, instead of the whole interconnected system, increases short-termism and could lead to an oversimplification of sustainability problems, which may not correspond to reality.

Examples of knowledge (K), skills (S) and attitudes (A):

K: *knows that every human action has environmental, social, cultural and economic impacts;*

S: *can describe sustainability as a holistic concept that includes environmental, economic, social, and cultural issues;*

A: *is concerned about the short- and long-term impacts of personal actions on others and the planet.*

For example: Green technologies often promise positive outcomes for sustainability, yet they may have unintended consequences when scaled up to the system level (e.g. loss of biodiversity and increased competition for land due to biofuel production)[xxv]. Without a comprehensive understanding of complex problems and potential solutions, such consequences could be difficult to identify (multiple SDGs).

2.2 Critical thinking

Descriptor (2.2): *To assess information and arguments, identify assumptions, challenge the status quo, and reflect on how personal, social and cultural backgrounds influence thinking and conclusions*

[72] https://www.ohchr.org/EN/NewsEvents/Pages/DisplayNews.aspx?NewsID=27635&LangID=E

Critical thinking is considered fundamental for learners 'to cope with uncertainty, complexity, and change'[xxvi]. Critical thinking is a high-level cognitive process, which includes several skills needed for evaluating and understanding information regarding sustainability problems. This enables learners to broaden their views without taking information and information sources for granted. Eventually, learners should be comfortable when acquiring and integrating information from different disciplines[xxvii]. A critical outlook allows learners to challenge, and change, their values, perspectives and understanding of the world[xxviii].

Critical thinking can help empower learners to become more responsible and actively cooperate in creating a sustainable world. More specifically, stepping up critical thinking will help them go beyond just passively understanding sustainability concepts[xxix]. It will help them develop the ability to reflect and assess theories and assumptions.

Examples of knowledge (K), skills (S) and attitudes (A):

K: *knows sustainability claims without robust evidence are often mere communication strategies, also known as greenwashing;*

S: *can analyse and assess arguments, ideas, actions and scenarios to determine whether they are in line with evidence and values in terms of sustainability;*

A: *trusts science even when lacking some of the knowledge required to fully understand scientific claims.*

For example: A critical understanding of how fast fashion (SDG 12), poor labour conditions (SDGs 8, 10), solid waste accumulation (SDGs 11, 12) and pollution (multiple SDGs) are interrelated and underpin each other can help learners i) define the class of problems they need to deal with, ii) identify those involved, iii) adopt different perspectives, and iv) identify paths for possible solutions.

2.3 Problem framing

Descriptor (2.3): *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*

Problem framing is the process of identifying actual or potential sustainability problems. It involves defining and structuring sustainability problems based on their complexity and those mainly involved. Understanding the nature of the actual or potential problems we are trying to define, e.g. from simple to wicked problems, can be a major obstacle.

Experts have identified four types of problems, based on how well defined both the problem and solution to address it are[xxx] (see Figure 2). Differentiating between these four types of problem can help identify appropriate solutions.

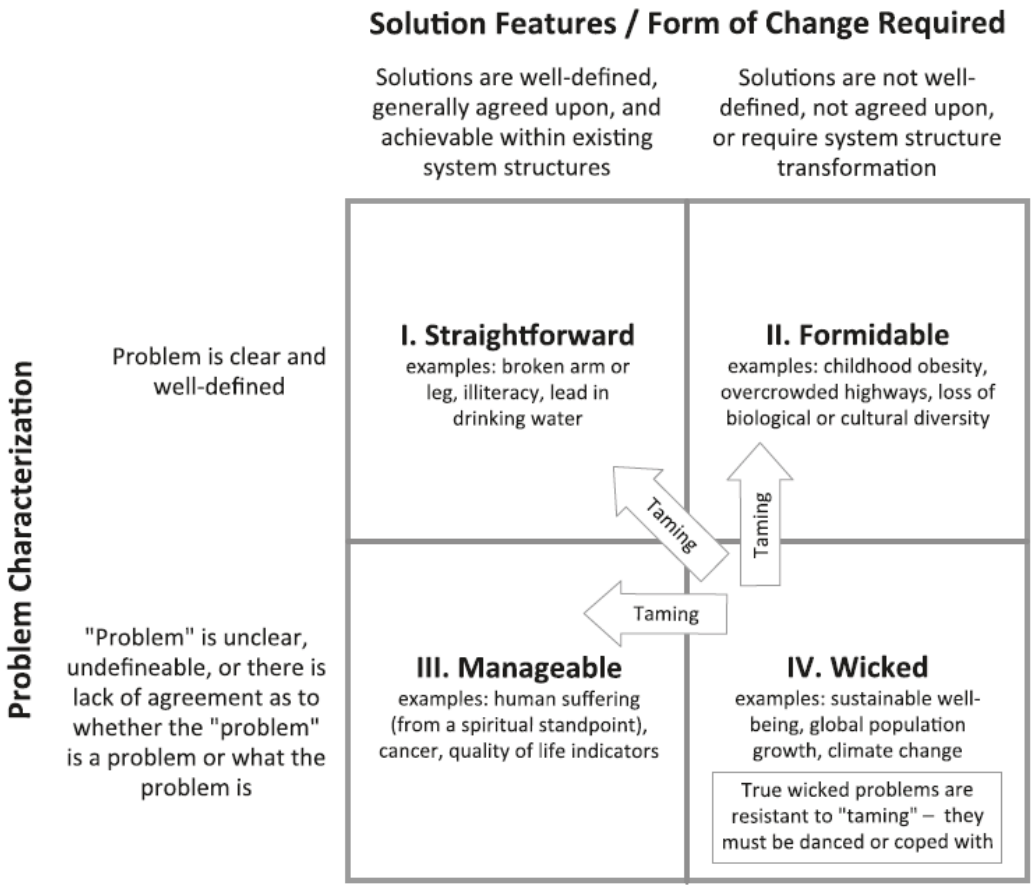


Figure 2. Problem characterisation and change required [Source: Glasser, 2018]

This process also entails determining whether the current situation is already a problem or has the potential to become one in the future.

Most fundamentally, *problem framing* defines what is challenging about a given situation and identifies the best action to address it, which involves systems thinking. In essence, *problem framing* helps define goals and the direction the problem solving process should take[xxxi]. While sustainability problems are complex and often cannot be solved, appropriate steps can be taken either to anticipate and prevent them, or to mitigate and adapt them to an already existing problem.

Problem framing can help identify situations and frame them as current or potential problems for sustainability in a given context. This requires a critical understanding of socioecological systems. In turn, *problem framing* can help contextualise and define a sustainability problem in a given geographical and temporal context.

Examples of knowledge (K), skills (S) and attitudes (A):

K: *knows that to identify fair and inclusive actions, it is necessary to look at sustainability problems from different stakeholder perspectives;*

S: *can establish a transdisciplinary approach to framing current and potential sustainability challenges;*

A: *listens actively and shows empathy when collaborating with others to frame current and potential sustainability challenges.*

For example: The decline of bees and other pollinating insects can, for instance, be framed as a problem related to food production security requiring technical solutions in terms of agricultural management (SDG 12) as opposed to a problem with maintaining the renewal of nature threatened by the overuse of its resources (SDGs 15, 12).

3. Envisioning sustainable futures

The competence area **'Envisioning sustainability futures'** enables learners to visualise alternative future scenarios and identify actions to achieve a sustainable future. It is essential that learners acquire the competence of 'adaptability' while coping with uncertainty about the futures and trade-offs in sustainability. Applying creative and transdisciplinary approaches to our way of thinking can foster a circular society and encourage learners to use their imagination when thinking about the future.

Learning for environmental sustainability encourages people to move away from looking for certainties but rather think about possibilities. It is fundamental that learners understand the future as open and something that can be shaped collectively. This requires the ability to analyse the present time and understand that it comprises complex systems interacting and influencing current and future trajectories, which in turn are influenced by our values, world-views and experiences.

Creativity, imagination and being aware of our emotions and intuitions can inform our ability to envision alternative futures[xxxii]. Learners are encouraged to use a combination of 'logical analysis and disciplined imagination'[xxxiii]. Information from several disciplines and traditions has the potential to help people make more informed plans and decisions in a complex society[xxxiv]. This can help learners identify steps and explore plans to collectively shape a resilient and regenerative planet.

Therefore, learners are advised to think of a wide range of possible future outcomes and envision alternative future scenarios for sustainability. By becoming comfortable with the notion of multiple futures, learners can acknowledge:

i. the uncertainty about the future as a given, rather than assuming or denying it;

ii. that it is impossible to know what will happen and thus the idea of trying to control what will happen will be rejected;

iii. that they need to identify probable, alternative, and preferred futures;

iv. that they need to influence and shape the trajectory towards a (collective) preferred future.

3.1 Futures literacy

Descriptor (3.1): *To envision alternative sustainable futures by imagining and developing alternative scenarios and identifying the steps needed to achieve a preferred sustainable future*

Futures literacy empowers learners to create their visions for a sustainable future by providing them with the knowledge, skills and attitudes to understand the futures as a

variety of alternatives. Research commonly differentiates between three approaches in order to understand the futures:

- expected future, i.e. what we expect to happen based on what it is happening today and what we know, e.g. business as usual;
- alternative future(s), i.e. what will happen may differ from expectations, e.g. creation of green jobs that currently do not exist;
- preferred future, i.e. we may envision a sustainable future for us, our community and our planet, and identify the steps and actions needed to achieve that future[xxxv], e.g. a circular economy.

Through *futures literacy*, learners can anticipate, prepare and invent as changes occur[xxxvi]. *Futures literacy* encourages learners to i) use their imagination when thinking about the future, ii) tap into their intuitions and creativity, and iii) assess the possible steps needed to achieve their preferred future. By using real-life experiences, learners can be taught in futures methodologies that adopt qualitative and/or quantitative research methods.

Examples of knowledge (K), skills (S) and attitudes (A):

K: *knows the difference between expected, preferred and alternative futures for sustainability scenarios;*

S: *can envisage alternative futures for sustainability that are grounded in science, creativity and values for sustainability;*

A: *is aware that the projected consequences on self and community may influence preferences for certain scenarios above others.*

For example: Prompting 'futures literacy' as a life skill for students and educators (SDG4) is the mission of the global non-profit organisation Teach the Future. Thanks to their resources for lifelong learning, learners can imagine more sustainable futures, where, for example, communities have access to clean water, clean energy and healthy food (multiple SDGs including 6, 7, 2).

3.2 Adaptability

Descriptor (3.2): *To manage transitions and challenges in complex sustainability situations and make decisions related to the future in the face of uncertainty, ambiguity and risk*

Adaptability is about being flexible and able to adapt to new situations and adjust in order to accommodate changes in our complex world[xxxvii]. It is essential that learners be able to cope with uncertainty about the future and the ambiguity of wicked sustainability problems and how they may evolve. *Adaptability* should provide learners with the ability to cope with trade-offs in sustainability e.g. environmental impacts and social outcomes as well as economic aspects. Moreover, learners should feel empowered to consider options and make decisions even when facing contradictions and risks in terms of the future[xxxviii].

People can learn in order to acquire knowledge, which may result in them changing their opinions and behaviour, and learning to manage their emotions[xxxix]. For cognitive adaptability, this might involve better teaching people about the significance of a

changing climate. For behavioural adaptability, this might involve promoting positive and constructive actions among young people that support and sustain the environment, such as saving energy, recycling, harnessing clean energy, controlling water use, and encouraging others at home and at school to do the same things.

Examples of knowledge (K), skills (S) and attitudes (A):

K: *knows that human actions may have unpredictable, uncertain and complex consequences for the environment;*

S: *can take into account local circumstances when dealing with sustainability issues and opportunities;*

A: *is willing to discontinue unsustainable practices and try alternative solutions.*

For example: Young people play a central role in driving the adaptation agenda. On 22 January 2021, young people from over 115 countries launched 'Adapt for our Future' a global youth call to action on adaptation. This call initiative aims to prepare younger generations for the transition towards green and climate resilient development[73] (SDG 13).

3.3 Exploratory thinking

Descriptor (3.3): *To adopt a relational way of thinking by exploring and linking different disciplines, using creativity and experimentation with novel ideas or methods*

Exploratory thinking aims to foster creativity in order to envision alternative futures. By tapping into different disciplines, traditions and cultures in a transdisciplinary manner, exploratory thinking can help learners create future visions for a circular economy (SDG 12) and society (SDG 11). To move away from linear production and consumption patterns to circular ones, we need a combination of creative thinking and experimentation with new ideas and new approaches.

As innovations that help achieve a circular economy will change our society, they will also entail new ways of social interaction and new cultural practices. For example, online platforms for people to swap clothes, share cars, and avoid food waste.

Exploratory thinking therefore requires cognitive processes and for people to use their intuition. The issues covered and the pedagogical approaches taken in education on sustainability encourage learners to develop abilities in creative thinking, according to assertions emphasising the close links between the two[xl].

Examples of knowledge (K), skills (S) and attitudes (A):

K: *knows that sustainability problems must be tackled by combining different disciplines, knowledge cultures and divergent views to initiate systemic change;*

S: *can synthesise sustainability-related information and data from different disciplines;*

A: *is committed to considering sustainability challenges and opportunities from different angles.*

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[73] The call for action is available at https://klimaatadaptatiegroningen.nl/en/young-people-call-on-world-leaders-to-adapt-for-the-future

For example: 'Reduce, reuse, recycle' is well-known concept in relation to the circular economy, and an exploratory thinking approach can help turn waste into a precious resource. The Eco-Schools programme has developed a number of 'trash hack' ideas that can help explore the issue of waste from different perspectives[74] (SDG 12).

4. Acting for sustainability

Acting for sustainability encourages learners to take action at individual and collective level to shape sustainable futures, to the extent possible. It also invites learners to demand action from those responsible to make change happen.

The last four decades have been warmer than any preceding one since 1850[xli] and given the increase in human activities, this trend is unlikely to revert unless we take action to achieve systemic transformations.

Necessary transformations for sustainability are not only enabled by technological changes, but also by cultural and social changes, as well as behavioural shifts and institutional reforms[xlii]. As such, a plethora of stakeholders at local level must be actively engaged to shape and achieve global transformations for a more sustainable planet[xliii][75]. Individuals make everyday decisions, which have impacts and consequences for sustainability, whether they are, e.g. students, consumers, producers, employees, policymakers, or representatives of organisations or communities. Altogether, these individuals can work together to create new paradigms that can lead to global sustainability[xliv] through their individual initiatives, engagement and collaboration at community or regional level, or through global partnerships to achieve the SDGs.

A sustainable planet cannot be achieved by small, one-off actions on their own; a consistent and long-term approach is required[xlv]. For example, decisions on which type of mobility (SDG 11) we use or about what energy providers we use for our home and office buildings (SDG 7) will have an impact on the environment. In particular, circular products are made to last longer and be easier to repair by increasing their durability, reusability, upgradability and reparability[xlvi] (SDG 12).

Acting for sustainability should, however, include as its enabling counterpart the willingness of the decision-makers to share their capacity to make decisions, so that the activities of learners can have an actual impact.

Examples of action that people can take individually, within their communities[xlvii] include: voting for candidates who support the environment, volunteering, meeting local council members, launching capacity-building programmes and initiating collective action.

Learning for environmental sustainability can help us, as individuals, to identify steps, mechanisms, and actions and, as a *reflective, determined and caring*[xlviii] society, to reduce our impact on the environment (environmental footprint[76]). Furthermore, it can help us increase our positive contributions to the environment[xlix]. Learning for environmental sustainability can help equip all individuals with knowledge, skills and attitudes to think, plan, and take or request action for sustainability (SDG 4 target 4.7).

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[74] https://www.ecoschools.global/trash-hack-ideas

[75] For example, the JRC is currently developing innovation strategies for sustainability (S4), a new generation of development strategies for cities, regions and countries building on and substantially extending the smart specialisation approach. See more at: https://s3platform.jrc.ec.europa.eu/s4

[76] People can calculate the environmental impacts of their consumption patterns at https://eplca.jrc.ec.europa.eu/ConsumerFootprint.html

4.1 Political agency

Descriptor (4.1): *To navigate the political system, identify political responsibility and accountability for unsustainable behaviour, and demand effective policies for sustainability*

Political agency is the capacity to positively influence the collective future, by mobilising those at political level to take action for change. Political agency requires the capacity to analyse the context, spot possible avenues to move the sustainability agenda forward, and identify key stakeholders that can be brought on board to help achieve sustainability.

Political agency can be focused towards advocating for a change in norms, rules, regulations, and institutional commitment for sustainability. However, it can also be directed towards the market and can push for green innovation or the promotion of lifestyle and behavioural changes. The green transition is one of the EU's top strategic priorities, and the role of governments in meeting the associated challenges has become increasingly important. Many Europeans demand action to tackle sustainability problems from those responsible for making and implementing policies, who are ultimately responsible for our future and that of future generations. When asked who is responsible for tackling climate change, Europeans from 17 Member States ranked national governments first, while those from five Member States ranked business and industry first, and those from the other five Member States ranked the EU itself first[lxxvii].

P*olitical agency* empowers learners to become agents of change and allows them to take part in a discussion that affects their futures. Furthermore, it shows learners that small actions can have widespread global repercussions and that by engaging others with ideas, activities, and conversations that trigger reflection, everyone can contribute to political agency.

Examples of knowledge (K), skills (S) and attitudes (A):

K: *knows policies that assign responsibility for environmental damage (e.g. 'polluter pays');*

S: *can identify relevant social, political and economic stakeholders in one's own community and region to address a sustainability problem;*

A: *demands political accountability for unsustainable behaviour.*

For example: Grassroots examples of young people, who have been especially vocal in demanding political action by governments, include the Friday for Future movement[77] and Extinction Rebellion[78] (SDGs 13, 16).

4.2 Collective action

Descriptor (4.2): *To act for change in collaboration with others*

Collective action as a competence stems from recognising that the role communities and civil society organisations play in achieving sustainability is fundamental[lxxviii]. *Collective action* calls for coordination, collaboration and cooperation among peers. By acting

[77] https://fridaysforfuture.org/

[78] https://rebellion.global/

together and working to achieve the same goal, people can find opportunities and meet challenges to contribute effectively to solving sustainability problems at the local level. Taken together, this will have an impact at the global level.

C*ollective action* develops learners' 'ability and will to take part in democratic processes concerning man's use of and dependence on natural resources in a critical way'[lii].

Examples of knowledge (K), skills (S) and attitudes (A):

K: *knows how to work with diverse participants to create inclusive visions for a more sustainable future;*

S: *can create transparent, inclusive and community-driven processes;*

A: *is willing to engage with others to challenge the status quo.*

For example: Collective action in the digital age has increased and is enabled through technology, e.g. the European Education for Climate Coalition[79], a digital platform that enables members of a community of practice to decide collectively, act collaboratively, and co-create solutions for sustainability (SDG 13).

4.3 Individual initiative

Descriptor (4.3): *To identify own potential for sustainability and to actively contribute to improving prospects for the community and the planet*

Individual initiative relies on someone knowing what types of actions are possible, having confidence in their own potential to influence change (internal locus of control), and being willing to act[liii].

Recognising what types of action are possible and being aware of one's own potential in terms of sustainability problems are the first steps someone needs to take in order to seize the initiative as an individual. However, individual initiative does not only rely on opportunities for action and someone's self-awareness and self-efficacy. It also has a strong attitudinal aspect – the willingness to act.

Individual initiative nurtures the entrepreneurial mindset of individuals and empowers them take the initiative in their lives[liv]. By taking action in their personal sphere, individuals can act as agents of change and role models, inspiring their peers to try to achieve sustainability. This could also help debunk myths on behaviour related to sustainability, e.g. a sustainable lifestyle is more expensive than a non-sustainable one, and of a lower quality.

Furthermore, *individual initiative* encourages people to take preventive action when certain actions or inaction may have damaging consequences for human health and all life forms (precautionary principle)[lv]. Rather than waiting for evidence in order to act, in case of uncertainty it may be advisable to act because it may be too harmful, or too late, to wait for evidence to emerge[lvi, lvii].

Examples of knowledge (K), skills (S) and attitudes (A):

K: *knows that preventive action should be taken when certain actions or inaction may damage human health and all life forms (precautionary principle);*

[79] https://education-for-climate.ec.europa.eu/community/home

S: *can act promptly, even in the face of uncertainty and unforeseen events, keeping in mind the precautionary principle;*

A: *is confident about anticipating and influencing sustainable changes.*

For example: Courses, such as 'Knowledge to Action' as part of the International Master's programme in Environmental and Sustainability at Lund University, offer learners a hands-on opportunity to interact in real-world settings with those at societal level such as municipalities, organisations, companies and third sector organisations while taking part in a project that promotes sustainability[80] (SDGs 16, 13).

Conclusion

GreenComp offers a definition of what it takes to think and act sustainably, both individually and collectively. Similar to other EU competence frameworks, *GreenComp* is non-prescriptive and can and should be adapted to suit the needs and context of the learner. It provides a conceptual reference model that everyone involved in lifelong learning can use for various purposes, such as raising awareness on the importance of learning for environmental sustainability; designing learning opportunities aimed at developing sustainability competences and assessing where one stands in supporting learners to develop sustainability skills.

[80] Projects developed in the 'Knowledge to Action' course are available at https://www.lumes.lu.se/article/2019-knowledge-action-projects and include information on different competences developed in such an experiential learning activity.

5. Implementing and monitoring the Recommendation

The aim of the Recommendation is to help EU Member States in their efforts to embed learning for sustainability in education and training systems and to boost cooperation on these issues at European level. Follow-up of the Recommendation will be supported through a number of existing and planned EU policies, programmes and platforms. These are detailed below.

Existing and planned EU initiatives

The **Communication on achieving the European Education Area by 2025**[81] identifies support for the green and digital transitions as one of the major challenges to address in EU policy cooperation in education. The Communication highlights the need for new skills and competences for the green economy as well as sustainable education and training infrastructure. Supporting the green and digital transitions in and through education and training is also a priority of the **Council Resolution on a strategic framework for European cooperation in education and training towards the European Education Area and beyond (2021-2030)**[82]. It stresses the need to reorient education and training systems to achieve the changes needed for the green and digital transitions and equip learners with the competences to live, work, and act towards sustainable development. The Commission will report on the use of the Council Recommendation in the context of the strategic framework for European cooperation in the area of education and training.

Under the strategic framework, a series of **working groups** has been established. These groups support policy making at the EU and national levels by offering a forum for exchanging experience and good practice. A **new Working Group on Schools will focus specifically on learning for environmental sustainability** and will support the follow-up to the Council Recommendation. The group will bring together government experts from EU Member States and partner countries on learning for environmental sustainability well as social partners, civil society and representatives of international bodies including UNESCO. The group, which will start its work in January 2022, will explore topics including innovative and transformative pedagogies for environmental sustainability; curriculum and assessment; sustainability related competences; teacher professional development; whole school approaches to environmental sustainability; partnerships; digital technologies supporting green education; green infrastructure in education and supporting policies for environmental sustainability and monitoring progress. The group will also look at the follow-up to the European sustainability competences framework.

Similarly, the **Working Group on Higher Education** will prioritise the development, implementation and sharing of good practice on environmental sustainability in the higher education sector. It will be guided by both this Council Recommendation and the upcoming European Strategy for Universities.

Both the upcoming **European Strategy for Universities** and the upcoming proposal for a **Council Recommendation on 'Building bridges for effective European higher education cooperation'** will promote more effective and deeper transnational

[81] COM(2020) 625

[82] Council Resolution 2021/C 66/01

cooperation as a crucial element to tackle *inter alia* the challenges related to the twin digital and green transitions and to building a sustainable future.

In addition, the proposal for a **Council Recommendation on a European approach to micro-credentials for lifelong learning and employability**[83] calls on Member States to use micro-credentials to support the development of learning provision in environmental sustainability.

The new **Erasmus+ Teacher Academies**[84] will support networking and collaboration between teacher education institutions in Europe, including universities, teacher training colleges and course providers. The Academies will develop joint projects to improve the quality of initial teacher education and to develop teachers' professional competences throughout their careers. Building on existing innovation and effective practice within national teacher education systems, the Academies will provide learning opportunities to teachers, including courses, modules, opportunities to take part in exchanges and communities of practice. A priority area in the call for proposals is learning and teaching for sustainability, e.g. the development of innovative curricula; teaching methodologies and learning modules linked to EU priorities on environmental sustainability and the transition to a circular and green economy[85].

The **Zero Pollution Action Plan**[86] foresees communication activities with partner organisations, including educational kits, the promotion of dedicated zero pollution activities for the general public, students and vulnerable groups, complementing activities such as tailored EU training modules for healthcare and other social care sector workers to improve their capacity to deal with environmental risks.

The **EU Youth Strategy 2019-2027**[87] focuses on three core areas: 'connect, engage and empower'. It encourages cooperation between all EU countries on all issues concerning young people. Goal 10 of the strategy states the need to create a society where 'all young people are environmentally active, educated and able to make a difference in their everyday lives'. As part of the strategy, the **EU Youth Dialogue** with policy makers is organised in 18-month work cycles. Each cycle focuses on a different theme set by the Council of Youth Ministers. The **European Youth Coordinator** works closely with different youth stakeholders to give youth a voice in shaping EU policies. Her role is to raise up, inside the Commission, key messages shared by young people.

The **EU Youth Dialogue**[88] connects young people and youth organisations; policy and decision makers and experts, researchers and civil society bodies. It serves as a forum for reflection and consultation on the priorities, implementation and follow-up of European cooperation in the field of youth.

Following the announcement by President von der Leyen in her 2021 State of the Union address, **2022 will be the European Year of Youth**[89]. The Year will be supported by €8 million from Erasmus+ and the European Solidarity Corps. Activities organised as part

[83] https://ec.europa.eu/education/education-in-the-eu/european-education-area/a-european-approach-to-micro-credentials_en
[84] https://www.schooleducationgateway.eu/en/pub/latest/news/erasmus-teacher-academies.htm
[85] https://erasmus-plus.ec.europa.eu/programme-guide/part-b/key-action-2/teacher-academies
[86] https://ec.europa.eu/environment/strategy/zero-pollution-action-plan_en
[87] https://europa.eu/youth/strategy_en
[88] https://europa.eu/youth/get-involved/eu%20youth%20dialogue/what-eu-youth-dialogue_en
[89] https://ec.europa.eu/commission/presscorner/detail/en/ip_21_6648

of the Year will help raise awareness of the many positive opportunities that the digital and green transitions can bring for young people - in both their personal and professional lives. A further objective is to promote opportunities open to young people, including on the environment and sustainability, through EU funding programmes such as Erasmus+, Creative Europe and Horizon Europe.

The **Marie Skłodowska-Curie Actions** are the EU's flagship funding programme for doctoral education and postdoctoral training. Through its 'Citizens Action' the programme aims to bring research and researchers closer to the public, with a particular focus on families, pupils and students. Every year in September, the European Researchers' Night aims to make science accessible through exhibitions, hands-on experiments, science shows, games and competitions. 'Researchers at Schools' brings top researchers to schools to engage with students and their teachers on topics such as health, nutrition, climate change and sustainable development[90].

The **New European Bauhaus**[91] translates the European Green Deal into tangible change on the ground to improve daily lives, in public spaces and buildings. The New European Bauhaus will mobilise existing EU programmes, including Erasmus+, Horizon Europe, LIFE and the European Regional Development Fund, through calls for proposals in 2021 and 2022 with a budget of €85 million.

The **University-Business Forum**[92] brings together higher education institutions; companies; business associations; public authorities and policymakers for networking, exchange of ideas and good practices. The Forum, which has taken place every two years since 2008, allows participants to examine the current state of university-business cooperation and explore the policy initiatives and programmes required to support it. In cooperation with Member States, thematic forums are held on a regular basis and address key topics at the national and regional level.

Platforms and tools

This section outlines a number of platform and tools run by the European Commission which offer direct support to education stakeholders and learners, including on the issue of environmental sustainability.

The **Education for Climate Coalition is a participatory education community launched at the end of 2020**[93]. The coalition, led by teachers and students with their schools and networks and other educational organisations and bodies, aims to support the sharing of experiences and encourage work on shared challenges. A first Education for Climate Day bringing together members of the community was held on 25 November 2021 and will be repeated annually. This day focuses on how the education sector across the EU can address the climate crisis.

The **European Climate Pact**[94] invites people, communities and organisations to participate in climate action and build a greener Europe by

[90] https://ec.europa.eu/research/mariecurieactions/about-msca
[91] https://europa.eu/new-european-bauhaus/index_en
[92] https://ec.europa.eu/education/policies/innovation-in-education/university-business-cooperation_en
[93] https://education-for-climate.ec.europa.eu/_en
[94] https://europa.eu/climate-pact/index_en

connecting and sharing knowledge; learning about climate change and developing, implementing and scaling up solutions.

The **eTwinning**[95]community for schools in Europe, offers teachers and school staff a free platform for collaboration and professional development. Teachers from 34 Erasmus+ programme countries and 10 Erasmus+ partner countries can develop projects and take part in discussion groups, webinars and other learning events, both online and on-site. The SENSE group[96] (Sustainability Education Network Service eTwinning) brings together eTwinning teachers working on projects and activities related to the environment and sustainability. The annual theme for eTwinning in 2022 will be 'Our future beautiful, sustainable, together: Schools and the New European Bauhaus'.

The School Education Gateway[97] offers online courses for teachers, school leaders and other education staff as well as webinars featuring guest experts and project leaders. In November 2021 an online course on 'Addressing the Global Climate Crisis in Your Classroom' ran with the aim of helping teachers understand the basic science behind climate change. Through the course the teachers could explore ideas, pedagogical practices and tools to address the climate crisis and environmental sustainability with their students. Teachers completing the self-paced course could apply for a course badge and a certificate. A number of training modules on environmental sustainability will be offered in 2022.

The Learning Corner[98] is a platform for primary and secondary school students and their teachers to learn more about the EU. The platform provides games, competitions, activity books and teaching material and networking opportunities for teachers. Activities and materials, sorted by age and topic, include boardgames on biodiversity and climate, a climate and energy quiz and booklets for younger children on the water cycle[99].

The **European Youth Portal**[100] offers European and country level information about opportunities and initiatives for young people living, learning and working in Europe. The portal addresses also stakeholders working in the field of youth who have an interest in EU actions and programmes.

Scientix[101] is a Europe-wide platform to connect STEM (science, technology, engineering and maths) teachers, education researchers, policymakers and other STEM education professionals. The platform provides teaching and training material and a tool to find project partners. Information on national strategies in STEM education and recent developments in STEM education research and practice is also provided.

EPALE[102] is the community of adult learning professionals, including adult educators and trainers, guidance and support staff, researchers and academics, and policymakers. It enables members to connect with and learn from colleagues across Europe, through its blog posts, forums, the Partner Search tool and meetings.

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[95] https://www.etwinning.net/en/pub/index.htm

[96] https://groups.etwinning.net/7620/home

[97] www.schooleducationgateway.eu. In 2022, the two platforms – eTwinning and School Education Gateway – will be integrated into a single European online platform offering a range of resources, tools and events to support professional, school and system development.

[98] https://europa.eu/learning-corner/home_en

[99] https://europa.eu/learning-corner/play-games_en?your_age=All&topic=89

[100] https://europa.eu/youth/home_en

[101] http://www.scientix.eu/home

[102] https://epale.ec.europa.eu/en

The **Network of European Blue Schools**[103], supported by the European Commission, aims to inspire teachers, school leaders and all educational staff to work with their students on projects related to the ocean and sea. By completing the project and sharing results, schools can receive a European Blue School label. The Network of European Blue Schools is an initiative of EU4Ocean, the European Ocean Coalition that connects organisations, projects and people working on ocean literacy and the sustainable management of the ocean.

The EU-funded **TEFCE Toolbox: An Institutional Self-Reflection Framework for Community Engagement in Higher Education**[104] helps universities and communities identify community engagement practices and reflect on their achievements and how they can further improve. Using the toolbox, institutions can develop their profile as 'civic universities' by integrating local, regional and societal issues into curricula, involving the local community in teaching and research projects, providing adult learning and communicating and building links with local communities.

Funding programmes

The implementation of initiatives in the Member States on learning for environmental sustainability can be supported through a number of European funds:

Erasmus+[105] is the EU's programme to support education, training, youth and sport. The current programme runs from 2021 to 2027 with a budget of €26.2 billion and an additional €2.2 billion from the EU external cooperation instrument. The programme, which provides opportunities to study, train, gain experience, and volunteer abroad, supports the priorities and activities of the European Education Area, Digital Education Action Plan and the European Skills Agenda. The 2021-2027 programme places a strong focus on **social inclusion, the green and digital transitions, and promoting young people's participation in democratic life.**

Erasmus+, with mobility at its core, will serve as a point of reference and inspiration for organisations and individuals paving the way for more sustainable mobility. The Programme will **promote and facilitate the use of low-carbon means transport modes** (in particular by rail), including with financial incentives. Environment and the fight against global warming is a **horizontal priority for the selection of projects**. As stated in the 2022 programme guide[106], priority will be given to projects aimed at developing green competences, developing green sectorial skills strategies and methodologies, future-oriented curricula, as well as initiatives that support the planned approaches of the participating organisations for environmental sustainability. Priority will also be given to projects that – through education, training, youth and sport activities - enable understanding, behavioural change and active engagement for sustainable development. The Programme also supports the use of innovative practices to make learners, staff and youth workers actors of change (e.g. saving resources, reducing energy use, waste and carbon footprint, sustainable food and mobility choices).

[103] https://webgate.ec.europa.eu/maritimeforum/en/node/5494
[104] https://www.tefce.eu/
[105] https://ec.europa.eu/programmes/erasmus-plus/node_en
[106] https://erasmus-plus.ec.europa.eu/document/erasmus-programme-guide-2022

In 2022 a dedicated call for large-scale projects will identify, develop and test **innovative approaches to education for environmental sustainability and digital education.** Projects should address at least one of the following areas: (i) whole institution approaches to sustainability; (ii) skills and competences development of learners and educators; and (iii) empowering citizens to act on sustainability, the environment and climate change, including in the context of the new Education for Climate Coalition.

To support and progress in all the different actions of the programme on environmental sustainability, a **resource centre will be set-up in collaboration with the network of National Agencies**. This resource centre will gather and circulate good practices, increase capacity for green practices among National Agencies and elaborate 'eco-tips' for participants and organisations on making their mobility and activities more sustainable.

The **European Solidarity Corps**[107] with a budget of €1.009 billion for 2021-2027 offers opportunities to more than 270,000 young people to help address societal and humanitarian challenges through volunteering or by setting up their own solidarity projects. The programme supports the political priorities of the EU, including promoting inclusion and diversity, aims to incorporate green practices in projects and encourages environmentally sustainable and responsible behaviour among participants and participating organisations.

Horizon Europe[108] is the EU's research and innovation programme. With a budget of €95.5 billion, it contributes to tackling the pressing challenges, including climate change, achieving the UN's Sustainable Development Goals, and putting the EU's economy on a sustainable path. The programme facilitates collaboration and strengthens the impact of research and innovation in developing, supporting and implementing EU policies while tackling global challenges. It supports the creation and better dispersing of excellent knowledge and technologies.

The recovery plan **NextGenerationEU**[109], including the Recovery and Resilience Facility and contributions to other programmes, has a budget of €806.9 billion to focus on the need for a greener, more digital and more resilient Europe. It has been designed to boost the recovery needed after the COVID 19 crisis.

The **Recovery and Resilience Facility**[110] will make €723.8 billion in loans and grants available to support reforms and investments undertaken by Member States. The aim is to mitigate the economic and social impact of the coronavirus pandemic and make European economies and societies more sustainable, resilient and better prepared for the challenges and opportunities of the green and digital transitions. Member States will prepare recovery and resilience plans that set out a coherent package of reforms and public investment projects. To benefit from the support of the Facility, these reforms and investments should be implemented by 2026.

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[107] https://europa.eu/youth/solidarity_en

[108] https://ec.europa.eu/info/horizon-europe_en

[109] https://europa.eu/next-generation-eu/index_en

[110] https://ec.europa.eu/info/business-economy-euro/recovery-coronavirus/recovery-and-resilience-facility_en

The **European Social Fund Plus** (ESF+)[111] will provide €98.5 billion euros for the 2021-2027 period for investment in jobs, mobility, public services and education; combatting social exclusion and poverty and promoting equality. ESF+ will also focus on tackling the socio-economic consequences of the COVID-19 pandemic, promoting high employment levels, building social protection and developing a skilled and resilient workforce ready for the transition to a green and digital economy.

The **European Regional and Development Fund**[112] invests in infrastructure and equipment in the Member States, including for early childhood education and care, primary and general secondary education, and vocational and adult education, but also e-learning equipment. The 2021-2027 investments enabled by ERDF will be smarter, greener, more connected and more social.

The **InvestEU**[113] programme builds on the successful model of the Investment Plan for Europe. It aims to give an additional boost to sustainable investment, innovation and job creation in Europe. It contains the European Fund for Strategic Investments and 13 other EU financial instruments. Triggering more than €372 billion in additional investment over the period 2021-27, InvestEU is an important part of the Sustainable Europe Investment Plan, including for the development of projects in the area of learning for environmental sustainability.

The EU's **Technical Support Instrument** (TSI)[114], with a budget of €864 million for the period 2021-2027,provides tailor-made technical expertise to EU Member States to design and implement reforms. The support is demand driven and does not require co-financing from Member States. The TSI can enable Member States to advance the structural transformation of their education and training systems.

International cooperation on learning for environmental sustainability

The Recommendation, whilst focused on the European Green Deal, complements and builds on work at international level. It aims to mobilise Member States and stakeholders to further contribute to the UNESCO agenda, notably the ESD 2030 Roadmap. It also supports the **EU's commitment to the UN 2030 Agenda,** the world's blueprint for global sustainable development.

Strengthening international cooperation on learning for environmental sustainability is an integral part of the EU's role as global partner in education and training. This will be reflected in international cooperation programmes at global, regional and bilateral level, including in the international dimension of Erasmus+. In particular, the EU, as part of a Team Europe approach, will promote global cooperation, while simultaneously addressing its strategic goals in priority regions, notably the western Balkans, Africa, and the Neighbourhood regions of the Eastern Partnership and the South Mediterranean.

EU cooperation with third countries to bring forward globally the skills agenda of the green transition, including through vocational education and training, is of primary

[111] https://ec.europa.eu/esf/home.jsp?langId=en

[112] https://ec.europa.eu/regional_policy/index_en.cfm

[113] https://europa.eu/investeu/about-investeu_en

[114] https://ec.europa.eu/info/funding-tenders/funding-opportunities/funding-programmes/overview-funding-programmes/technical-support-instrument-tsi_en

importance. Priorities will be on generating and sharing information on new skills demand in key sectors and the shift to circular; new qualifications, including micro-credentials to support up and reskilling; new forms of provision (including online and on the job learning); and the role of providers working with key stakeholders from industry as well as local government authorities.

Annexes

ANNEX 1: LITERATURE AND SOURCES

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ANNEX 2: LITERATURE AND SOURCES – European sustainability competence framework – chapter 4

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