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on Economics of Education

Harnessing the potential of non-formal education for sustainability

EENEE Analytical Report

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Executive summary

Learning for sustainability

The adoption of the European Council Recommendation on learning for the green transition and sustainable development (2022) notes the critical role of education, and demonstrates the commitment of Member States to the attainment of sustainable futures. This Recommendation established a solid political foundation for co-operation in the European Education Area and formally acknowledged the need for lifelong and transformative learning to address the planetary crisis and the well-being of citizens.

Formal education plays a critical role in learning for sustainability (LfS), with policy-makers paying particular attention to curriculum requirements, teacher education and school attainment. However, learning opportunities also exist outside of formal education. These are found in: communities of practice; cultural, linguistic and scientific institutions; government and private organisations, sports clubs, youth and faith groups, as well as at heritage sites, and in national parks and natural spaces. Such non-formal education offerings present diverse opportunities to experience and connect with people and planet issues; to build sustainability literacy skills and capabilities for active citizenship; to create more hands-on engagement with the natural environment; and to explore sustainable lifestyles. These opportunities extend learning beyond classrooms to involve learners and persons of all ages and backgrounds in sustainability thinking and practice. Despite the significant role played by such offerings, few data and little evidence exist that clearly define the unique contributions or impact of the non-formal education sector on the attainment of the green transition. In the absence of longitudinal data or meta-analysis, a need exists to map existing provision and to extrapolate this potential contribution from current practice.

This report

The present report, commissioned by the European Expert Network on Economics of Education (EENEE), reviews the state of play in non-formal education in the context of learning for sustainability, with a view to informing policy decision-making and guidance in this area. It seeks to identify leading practice as well as enablers that can catalyse the transformative potential of non-formal education for sustainability. The findings and recommendations of the report have been drawn from an extensive literature review informed by scholarship, research evidence, policy reports, case studies and good practice.

The literature search was conducted in the period from August to December 2023, using the search engines such as Web of Science, Scopus and Google Scholar. The search strategy favoured research published in the last five years in the area of environmental sustainability, as well as large-scale comparative studies with a strong European focus. With regard to the study's limitations, no primary data were collected to inform this research – although key informants guided the selection of relevant literature and added detail to the examples presented in this document.

The current state of play

The first section of this report provides an overview of the existing provision and contexts underpinning non-formal education for sustainability. This descriptive analysis is grounded in European experiences and helps to construct a picture of the current opportunities and offerings:

- The study has found great **diversity in terms of the providers** of non-formal education experiences in sustainability. Providers vary in terms of their capacity, interests and expertise. Specialist areas include waste and energy, climate science, biodiversity, heritage conservation, travel and transport, health and well-being, faith, ethics and culture, youth leadership, entrepreneurship and social enterprise, as well as food and sustainable lifestyles, among others. Levels of engagement differ between offerings, with learners as observers, recipients, participants and/or co-creators in the process. Providers are motivated by a desire to share their expertise; to raise levels of awareness; to build a sense of pride and belonging, as well as connections with the physical environment; to offer community service experiences; and to actively engage people in core issues that affect them and the planet.

- **Beneficiaries also vary widely,** and include adults seeking to improve their skills or knowledge for personal or professional development; individuals, groups and families aiming to engage practically with issues that concern them; organisations and institutions developing the mindsets and skills of their members or employees; young people looking for civic engagement opportunities; the elderly seeking to continue their learning journeys; and schools, colleges and universities looking to enrich learning for sustainability experiences for their students.

- It is important to recognise that non-formal education is also **reaching out to disadvantaged or marginalised groups** who have limited access to education. These include individuals with disabilities and the socio-economically disadvantaged; people living in remote or rural areas; minority ethnic or cultural groups; refugees, asylum seekers and displaced populations.

- Non-formal education experiences are often rooted in the learner's local environment, often helping to ground global issues and the scientific learning associated with climate change, biodiversity and other, similar concerns. The literature suggests that these experiences can lead to **authentic learning,** as technical understanding is anchored in the realities of lived experiences and leads to a greater appreciation of the scale of environmental issues and the systems that relate to them.

- Non-formal learning offered in a community setting can also **strengthen bonds,** as it familiarises learners with the unique and distinctive features of the communities and places to which they can relate. This can drive commitment for sustainability and motivate people of all ages to make choices in favour of the environment and the health and well-being of the communities with which they are associated.

- Non-formal education offerings lend themselves well to sustainability learning as they enable the learner to explore **interdisciplinary inquiries and boundary-crossing** concerns that are often hard to pursue in formal education settings. This more systemic view of the context and issues surrounding sustainability favours more grounded forms of learning that recognise the ways in which environmental issues transcend traditional subject boundaries.

- Non-formal education experiences are often interactive and support **participatory pedagogies** such as *place-based learning*, *inquiry-based learning*, *citizen science* and concepts including *action competence*, *social learning* and *eco-justice.* They present opportunities for learners to build the sustainability competences identified in the European GreenComp framework.

- Worthy of note is the role non-formal education plays in **enhancing levels of innovation and bolstering competitiveness** in EU economies. Given the rapidly changing environmental landscape, knowledge acquired through formal education can rapidly become outdated or inadequate, and current formal education practices are insufficient to build the creative or innovation mindsets needed to address the climate and environmental crises. In contrast, non-formal education providers are well placed to address these issues.

- In parallel to the increased opportunities for local learning for sustainability, we also see a rise in the number of **online learning providers** offering digital non-formal learning on environmental sustainability. This development can be seen within the context of the European focus on the twin digital and green transitions. Non-formal education providers are adopting digital technologies as means to improve access and educational outcomes, as well as making use of visualisation software that brings to life possible scenarios and concerns in relation to environmental concerns. Some of these learning experiences also support the development of digital skills for sustainability, required for active participation in a world that is becoming increasingly digitally connected.

Advancing non-formal education for sustainability

A close analysis of documented research and experiences reveals that although significant variations exist in the focus, quality and value of non-formal education offerings, certain key trends and policy-related observations can be shared. These can inform efforts to advance non-formal education for sustainability.

Key trends:

- **A prevailing focus on knowledge and literacy in relation to sustainability**. Most non-formal educational offerings in sustainability primarily focus on building the learner's interest and literacy in sustainability. Sharing knowledge, helping learners to make sense of complex environmental scenarios and raising awareness of the core social and economic issues that underpin these concerns, were identified as core objectives. Although exceptions can be seen, participatory learning is mostly used as a way to capture the learner's interest and motivate them, rather than to systematically build green competences or educational outcomes.

- **Schools, colleges and universities recognise the value** that non-formal education providers bring to learning experiences during the early years and through to adult education. Whole-institution approaches to sustainability that blur the boundaries between schools and the wider community are gaining ground across Europe, prompting educators to look outwards to non-formal education experiences that enrich classroom learning. At the same time, many challenges exist for teachers and schools in identifying and choosing experiences that align with the requirements of the curriculum.

- Many non-formal education providers bring specialist knowledge and interest in sustainability,but are often **not professionals in education**. This presents difficulties when offerings need to be tailored to the different ages and/or abilities of learners. Scholars have pointed out that the lack of a coherent pedagogical framework for learning for sustainability in non-formal settings represents a major challenge to advancing this vision of education.

- Non-formal education providers are well placed to develop learning experiences within their specialist areas, but **due to a lack of resources or support** they often find it challenging to adopt wider sustainability principles in their operational and management environments. This can mean that

providers may not actually be practising sustainability themselves, which in turn presents challenges in terms of their credibility.

Policy recommendations:

- **Cross-sectorial partnerships for learning:** an important means of establishing effective offerings are alliances, consortia and joint projects that engage organisations of various sizes and from various sectors and represent a diversity of interests. The sharing not only of resources but also expertise is of value to all involved. For example, schools can support non-formal providers in the design of learning activities to align with curriculum requirements. Higher education institutions (HEIs), meanwhile, are well positioned to share research that improves non-formal provision. In turn, non-formal education providers can share their expertise in experiential learning and community engagement with schools, HEIs and their students.

- **Building learning landscapes**: a systems view of learning for sustainability advocates for connected learning across the formal and non-formal education landscape. It recognises that, in the context of sustainability, the boundaries between educational sectors should not be rigid, and that connections should be both strengthened and synergistic. This approach goes beyond the partnership setting and requires the establishment of a coherent and strategic vision for lifelong learning for sustainability. Policy-makers, national authorities and agencies play a critical role in enabling these connected learning landscapes to emerge.

- **Professional development for non-formal education providers***: strategic investment in professional development could help to catalyse the quality and effectiveness of non-formal education offerings. Professional development can take a number of forms, but should focus on educational approaches and frameworks to support best practice in sustainability. This will go some way in shifting the predominant focus from sustainability literacy, towards enhancing the transformative potential of non-formal education. Professional development should be supported by research evidence and the development of best-practice resources that question dominant linear models regarding how knowledge leads to agency, and help to familiarise providers with those green competency frameworks that can assist in the design and evaluation of sustainability learning.

- ***Establishing standards and assuring quality***: there is a lack of standardisation, accreditation and recognition in non-formal education when it comes to learning for sustainability. National agencies and local authorities should lead processes that help to define and agree on standards, develop guidance frameworks for enhancing the transformative potential of learning for sustainability, and offer accreditation schemes and/or awards for excellence in non-formal education.

- ***Stronger integration into mainstream education policies:*** building learning landscapes for sustainability requires a clearer articulation of the value and contribution of non-formal education to learning for sustainability, particularly in policy frameworks and formal guidance. Specific policy strategies and measures are needed to advance non-formal education for sustainability as part of the connected lifelong learning landscape. These should be accompanied by support in the form of funding, which is often crucial to the long-term viability and success of such initiatives.

Chapter 1. Introduction

1.1 Defining contexts and learning

The adoption of the European Council Recommendation on learning for the green transition and sustainable development (EC, 2022a) notes the critical role of education,and demonstrates the commitment of Member States to the attainment of sustainable futures. The Recommendation established a solid political foundation for co-operation in the European Education Area and formally acknowledged the need for lifelong and transformative learning to address the planetary crisis and the well-being of citizens.

The Council Recommendation was accompanied by a *Staff Working Document (*EC, 2022b*).* This was informed by research evidence across a range of sectors, and provides detail on the concept of learning for sustainability, as well as documenting examples of good practice from across Europe. The Recommendation calls for opportunities for lifelong learning for sustainability that go beyond the acquisition of knowledge by building agency and capability for change at personal, professional and societal levels. This transformative edge to learning for sustainability is advanced in the European GreenComp framework, which unpacks how learners can be engaged and empowered to make a difference for sustainability (Bianchi et al., 2022).

Non-formal education can be defined as planned, structured and intentional learning that extends education beyond classrooms and formal settings to involve people of all ages and backgrounds. It can be targeted at a specific learning group, or may be broad in its reach. Offerings can be brief, providing overviews of key issues and snapshots of experiences, or may take the form of workshops, seminars or short courses (UNESCO, 2024).

Non-formal education is a critical component in lifelong learning for sustainability. In some cases, it adds value to what has been learned in schools, colleges and universities; in other instances, it can reach out to people who have not had opportunities to engage in formal, further or higher education (Tilbury, 2024). Despite its significant role, few data and little evidence exist that clearly define the unique contributions or potential impact of the non-formal education sector on the attainment of the green transition. In the absence of longitudinal data or meta-analysis, a need exists to map the existing provision and to extrapolate from current practice the potential contribution of non-formal education to a sustainable future.

Figure 1 below presents the distinctions between non-formal and formal learning. It also distinguishes these from informal learning that is not intentionally organised or planned, but occurs through experiences, interactions and activities in daily life.
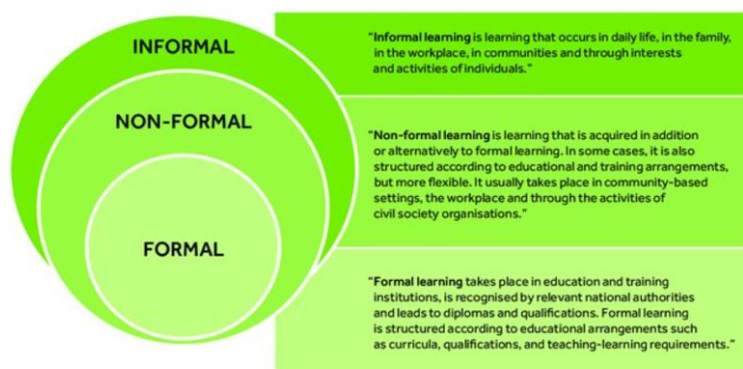
Figure 1. Source: Osman et al (2017, p. 8), adapted from UNESCO Institute for Lifelong Learning (2012).

1.2 Key questions

This report, commissioned by the European Expert Network on the Economics of Education (EENEE), reviews the state of play in non-formal education in the context of learning for sustainability, with a view to informing policy decision-making and guidance in this area. In doing so, the study seeks to answer the following questions:

Q. What are the value and key contributions of non-formal education to sustainability? How does the literature define the role of the sector in developing sustainability mindsets and competences?

Q. Who are the providers and main beneficiaries of non-formal education for sustainability? What motivates non-formal education providers, and what educational outcomes do they seek? What types of initiatives do they lead or facilitate? What are the drivers and obstacles they face in advancing LfS?

Q. What sets non-formal education apart, and how does it complement formal educational offerings? What are its limitations and challenges? How can these be overcome?

Q. What are the policy priorities relating to non-formal education for sustainability, and how can these help to advance learning for sustainability and build more connected offerings across the educational landscape?

1.3 Methodology

The findings and recommendations of the present study have been drawn from an extensive literature review informed by scholarship, research evidence, policy reports and case studies, as well as good practice. The literature search was conducted between August 2023 and May 2024, using the search engines Web of Science, Scopus and Google Scholar. The search strategy favoured research from the last five years in the area of environmental sustainability, as well as large-scale comparative studies with a strong European focus.

The initial online search of the literature employed keywords including 'education' OR 'non-formal education' AND 'learning for sustainability' OR 'education for sustainability' OR 'sustainability education' OR 'environmental education' OR 'green education'. In addition, specific words were used to inform each section of the report (eco-literacy, sustainability literacy, sustainable competence', 'VET', etc.).

The present report analyses and synthesises more than 180 articles and books published in English since 2019, which relate to non-formal education for the purposes of learning for the green transition. This process included:

- The identification of policy reports, reviews and studies developed by European institutions and agencies, as well as by other international organisations (OECD, UN, UNECE, UNESCO, CEDEFOP, EEA), to understand the strategic positioning and ambitions of this agenda;

- A structured review of theoretical articles and academic papers, with the aim of investigating the state of play in non-formal education and in the context of sustainability. Key areas of investigation included competence and education, the role of education in the green transition and the interconnections between them. In addition, broader and potentially impactful subjects were examined, such as sustainable lifestyles and consumerism, global and participatory citizenship, the circular economy and social justice;

- Recent and large scoping studies were identified. Systematic reviews and meta-analyses from across the sector were also sought, but could not be identified. Techniques to explore the sources of variations in the results of primary studies were used, as well as big data.

- In addition, the study included a (non-exhaustive) mapping exercise to identify inspirational approaches and examples of non-formal education for sustainability in various EU countries.

Although no primary data were used, expert informants from various European countries and with expertise in non-formal education were invited to describe relevant and exemplary case studies. This input guided the selection of the key literature and examples presented in the document.

Chapter 2. State of play: mapping non-formal education offerings

2.1 An overview of current provision and the value of non-formal education

Non-formal learning opportunities exist outside of formal education and are found in communities of practice; cultural, linguistic and scientific institutions; government and private organisations; sports clubs, youth and faith groups, as well as at heritage sites and in natural spaces. These offerings cover a wide range of activities, including the development of life skills; vocational and digital training; community-based literacy programmes; arts and cultural explorations, as well as practical experiences in the physical environment (Rogers, 2019). An increasing number of initiatives are offered via distance education, blended learning and mobile learning, taking advantage of the digital resources available to support education (Rogers, 1996; Spronk, 1999; Barbosa et al., 2016; Tilbury, 2023).

This review points to how non-formal education is characteristically defined by the opportunities it offers to address social needs and real-life concerns as well as experience hands-on learning. It equips individuals with practical skills for personal and professional development, including language and digital proficiency and job-related competencies (Casey and Asamoah, 2016). Non-formal education also focuses on teaching essential life skills such as decision-making, problem-solving, and emotional intelligence, which are crucial for young adults transitioning into independent living (EAIE, 2021). Peer and local learning can also be key elements of non-formal education offerings (Villalba-García, 2021; Wals et al., 2017).

When looking at non-formal education that focuses on sustainability, the research documents show offerings presenting diverse opportunities to experience and connect with people and planet issues; to build sustainability literacy skills and capabilities for active citizenship; to create opportunities for practical engagement with the natural environment; and to explore sustainable lifestyles (Tilbury, 2024).

Providers of non-formal education experiences vary in terms of their capacity, interests and expertise. Specialist areas include waste and energy, climate science, biodiversity, heritage conservation, travel and transport, health and well-being, faith, ethics and culture, youth leadership, food and sustainable lifestyles, among others. They are motivated by a desire to share their expertise; to raise levels of awareness; to build a sense of pride and belonging, as well as connections with the physical environment; to offer community service experiences; and to actively engage people in core issues that affect them and the planet. Most of the non-formal education providers considered in this report do not come from the formal education sector, although UNESCO (Institute for Statistics, 2012) reminds us that the type of provider should not be used as a main criterion for differentiating between formal and non-formal education.

Informal learning networks such as book clubs, discussion groups, hobbyist clubs and community-based learning circles have not been considered by this study. However, the scope of the study does encompass structured offerings from adult learning centres and private enterprises, as well as public and non-governmental organisations, faith groups and religious organisations, museums and public libraries, and cultural associations.

Beneficiaries vary widely and include adults seeking to improve their skills or knowledge for personal or professional development; individuals, groups and families aiming to engage practically with issues that concern them; organisations and institutions developing the mindsets and skills of their members or employees; young

people looking for civic engagement opportunities; the elderly seeking to continue learning; and schools, colleges and universities looking to enrich learning for sustainability experiences for their students. It is important to note that if such learning is delivered impactfully, its ultimate beneficiaries will be the environment and all who depend upon it (EAEA, 2023).

The levels of engagement among beneficiaries also varied, with learners as observers, recipients, participants and/or co-creators in the process. Non-formal education can provide flexible, accessible and empowering learning opportunities that extend beyond the confines of traditional schooling (Romi & Schmida, 2009). It plays a critical role in empowering individuals to engage in personal, professional and community change for sustainability (Iyengar & Kwauk, 2021).

2.2 Snapshots of provision

This section of the report profiles diverse non-formal education experiences in an attempt to capture the range and scope of activities supporting sustainability. It reflects on their value in building interest and engagement in, as well as capability for, the green transitions. Some of the case studies presented below also provide insights into the expertise brought to learning as well as the enablers and obstacles that influence provision in this sector.

2.2.1 Libraries, museums and science centres

Cultural and science centres are reservoirs of knowledge and knowledge creation (ICOM, 2022) and are well placed to convene learning experiences for sustainability. This group of providers includes state, local and mobile libraries; museums of natural history, science, art and culture; and institutions that promote research and innovation across of a range of areas. Traditionally, these institutions have had the function of creating and disseminating knowledge, housing artefacts and documentation, and raising awareness and literacy levels. In contemporary contexts, however, such institutions have extended their roles to become more multi-purpose – offering people opportunities to connect, learn, experiment and share ideas (Nicholson, 2019). In addition, these institutional spaces may also offer the use of specialist tools, facilities and work spaces, as well as physical structures and experiences that can serve as inspiration for a sustainable future (Jochumsen et al., 2021). Exemplifying this are the public city libraries of Dokk1 (opened in Aarhus, Denmark, in 2015), De Krook (opened 2017 in Ghent, Belgium) or Deichman Bjørvika (opened 2020 in Oslo, Norway) (cf. Henley, 2024).

Another example, the Oodi library in Helsinki, is located in the cultural centre of the city, opposite its parliament building. Oodi is an accessible, spacious, well-lit and inviting space offering entry free of charge. To increase circulation space, reading and rest areas, only a portion of the library's books are on display, with other resources being available upon request (Oodi Library, 2024). Citizens use the library for various purposes; it has become a meeting place, a recreational space for children, and a venue for non-formal learning. The library provides work and study rooms as well as sound-proofed spaces for music, dance, singing and film rehearsals. The Oodi library ultimately serves as an accessible and inclusive hub for community learning (Jochumsen et al., 2021). It promotes environmental and sustainability education through workshops, events and educational programmes that focus on lifestyle changes, recycling and environmental conservation (Oodi Library, 2024). Moreover, Oodi is located in a sustainably designed and energy-efficient building that models best practices in sustainability for contemporary libraries. The second floor of the building is dedicated to education and interpersonal interaction. While information about its non-formal education offerings is limited, it is known that courses such as

sustainable fashion, sustainable architecture, design for sustainability are well attended. Those who work at Oodi believe that the accessibility and open design of the space invite learners of all ages to participate in these education activities (Oodi Library, 2024; Jochumsen et al., 2021).

2.2.2 Youth organisations

The provision of non-formal education aimed at young people (especially teenagers and young professionals) is the fastest growing area of this sector. This is perhaps unsurprising, given that many young Europeans are interested in climate and environmental issues (European Commission, 2020d; Deloitte, 2021; European Environment Agency, 2019; McKinsey & Company, 2020; YouthActionNet, 2020), and young people's environmental activism in response to climate change has been growing globally (Ipsos Mori, 2020; United Nations, 2021; UNICEF, 2019).

These offerings, mot of which seek to engage young people between the ages of 12 and 30 years, include internships, volunteering camps and international exchanges, which are frequently accompanied by formal training, workshops and courses. Sustainable fashion, food and lifestyles are often the focus of these activities. Studies have shown that young people are predisposed to choosing ethical brands that embrace social and environmental responsibilities, and to taking on professional responsibilities that align with sustainability (McKinsey & Company, 2020). The circular and regenerative economy, as well as sustainable enterprises, are also of interest to Generation Z (Deloitte's Global Consumer Trends Report, 2021), which explains the steady rise in non-formal education courses offered in these areas.

Young people are not solely seeking knowledge and understanding, but also skills and experiences that can help them to navigate towards a more sustainable future. Of note is the increasing number of non-formal learning opportunities for young people offered by NGOs, on how to influence socio-economic systems for sustainability. For example, *Forum for the Future* is a non-profit organisation that offers programmes for young people in relation to food, energy or business. It uses systems frameworks, foresight and participatory approaches to bring just and regenerative futures into focus (Draper, 2023). Such offerings are underpinned by learning on how to influence and change the social, economic and political system (Forum for the Future, 2024).

Ireland's ECO-UNESCO's *Youth for Sustainable Development* programme promotes the principles of sustainability via peer-learning and youth leadership development activities. Through weekly learning opportunities, ECO-UNESCO helps to build young people's knowledge about the UN Sustainable Development Goals (SDGs), as well as imparting skills to bring about sustainable changes in their lives and in communities. Young people are also provided with concrete opportunities to engage in change at a local level (ECO-UNESCO, 2024). Although little is known about the specific pedagogical principles or educational frameworks adopted by this programme to support learner engagement, its initiatives are underpinned by active and experiential learning, and guided by a well thought-out and high-quality manual (ECO-UNESCO, 2023).

Also common are non-formal education programmes on planetary health, social justice and environmental responsibility, such as those offered by the Girl Guides and Scouting movement. The Portuguese Scouts Association, for example, has committed itself to the UN 2030 initiative and has offered more than 100 non-formal workshops involving a total of more than 20,000 young participants across the events. These offerings have sought to mobilise "Scouts for a fairer and more sustainable planet, where no one is left behind". The programme also offers the *Compromise 2030 Badge,* which requires Scouts to complete five actions to address the *Peace, Planet, Partnerships, Prosperity and People* goals, as mapped by the SDGs. Scouts

undertaking this initiative are supported by Compromise 2030 – an online platform that aggregates resources, good sustainable practices and more than 700 suggestions for activities and actions in support of sustainability (Portuguese Scouts Association, 2024). The *Local Group Sustainable Kit* and *Practical Guide for Sustainable Scout Centres and Camps* also encourages Scouts to improve the sustainability impact of Scout centres and of the movement itself (Gigante, 2023).

In Spain, regional government authorities have a tradition of partnering with NGOs, academia and conservationists to support the education and active engagement of young people in natural resource management (Ministerio de Medio Ambiente de España, 1999). These offerings are often tied to a natural space such as a botanical garden, nature reserve, national park or protected area. They seek to build knowledge and understanding of core ecological, conservation and sustainability concepts, as well as the practical skills and experiences of young people (YouthWiki, 2024). The Spanish government has established CENEAM, a national centre for outdoor education on the outskirts of Madrid with a primary focus on environmental and sustainability literacy (Ministry for the Ecological Transition [MiTEco], 2021). The centre, which operates in partnership with Spain's national parks, brings providers and educators together annually through its permanent programme of capacity building for sustainability that seeks to update their knowledge and skills in learning for sustainability (MiTEco, 2024).

Some non-formal education providers focus specifically on supporting young people to engage with agendas as a means to bring social and economic innovation into their communities. Young Social Innovators (YSI) is a non-profit organisation in Ireland that empowers young people to come up with innovative solutions to social challenges. The organisation promotes social innovation learning among young people aged between 13 and 18 in schools and HEIs across Ireland. Every year, around 15,000 young people are supported to make positive changes in their communities and beyond. The SDGs and environmental agendas are seen as gateways for tackling socio-economic challenges. Training programmes and resources help young people to develop cooperative social innovation projects on issues of interest to them, which are put into action and bring about positive social change (Young Social Innovators, 2024). The programme amplifies young people's voices and creates spaces for creative exploration. YSI offers formal training and gives visibility to the ideas that emerge. Although the thematic areas of the training provided by YSI are known, its educational and pedagogical objectives are not shared. Notably, it's the organisation's Social Innovation Fund has funded more than EUR 150,000 in grants to support youth-led ideas for social change across Ireland (Young Social Innovators, 2024).

European youth policy has generated various instruments, agencies, programmes and studies in support of non-formal education opportunities targeted at young people and youth organisations. These have mostly focused on employability or community engagement, and have operated alongside initiatives aimed at developing vocational and technical education skills (European Commission, 2020a). Numerous studies point to the increasing interest of youth in entrepreneurship and start-up initiatives, particularly if these address social, economic and/or environmental issues (YouthActionNet, 2020; OECD, 2021). Significant potential exits to advance learning for sustainability with a focus on this area. Youth-led social enterprises can help young people to fulfil their ambitions to pursue careers that have positive impacts, while building their capability and agency in relation to social and environmental issues (OECD 2022).

2.2.3 Volunteer programmes

Various volunteer programmes contribute actively to environmental conservation while developing participants' practical skills, fostering teamwork, and enhancing environmental stewardship values. Volunteer programmes focusing on sustainability are very often underpinned by structured induction workshops and training programmes in sustainability. For example, the *Local Volunteering Groups* programme of WWF Spain supports participants through education workshops on ecology, forestry, the marine environment, fund-raising and advocacy (Fien et al., 2002). The organisation has taken 25 years to build its extensive network of local volunteers, spanning the Spanish mainland. After receiving their training, participants are provided with opportunities for direct involvement and ultimately to contribute to positive environmental outcomes (WWF Spain, 2024). WWF Spain sees this adult programme as an effective way to deliver its conservation strategy, recognising that changes will not be driven solely by experts but instead by simplifying the challenge and uniting people around a focus for greater impact (WWF, 2023). This programme involves them not only in practical work but also in social and digital campaigns that focus on issues such as reducing plastic pollution, conserving biodiversity and on sustainable consumption practices. It often involves educational outreach and advocacy (Fien et al, 2002).

Meanwhile, WWF Italy has partnered with other organisations to establish a similar volunteering project, "Ri-Party-Amo". This initiative was made possible by a crowdfunding campaign and following a series of induction courses that engaged hundreds of volunteers in cleaning beaches and rivers, and restoring many degraded areas (Journal for the Environment, 2022). The literature suggests that engagement in activities that yield tangible results provides participants with a sense of accomplishment and motivation to continue their efforts towards sustainability (Tilbury, 2024). Seeing the direct impact of their actions can inspire individuals to adopt more sustainable lifestyles and become advocates for environmental conservation (UNESCO DUK, 2021).

The training offered to volunteers by such schemes varies in terms of its quality and focus, according to one Cypriot study (Stylianou et al., 2023). The authors reviewed non-formal education services offered by non-profit organisations in environmental education and related fields. The research acknowledged the challenges that arise from bringing together volunteers from different educational backgrounds, which necessitate their engagement in workshops and training prior to undertaking volunteering activities. Stylianou et al. (2023) identified a number of challenges and benefits of volunteering for the environment, but more significantly, pointed to how many non-profits remain underfunded, understaffed and ill-equipped, despite their value and effectiveness in delivering learning for the environment. The findings of the aforementioned study also point to the expertise of trainers who, overall, had significant in-depth experience of outdoor education and in identifying opportunities for volunteering. The authors of the report highlighted the importance of linking these offerings to formal education and strengthening collaboration between these sectors. Increased competition for funding threatened some of these good practices, and concerns were expressed regarding the future of non-formal education activities, given the shrinking resource base available to non-profit organisations. A study conducted in Slovakia by Sládkayová (2019) identified similar concerns, pointing to the potential demise of providers as a result of insufficient legislative and financial support as well as an absence of methodological recommendations to support the work of non-profits in volunteering and adult learning for sustainability.

2.2.4 The elderly

The quest for a healthy and active aging population is often supported by lifelong learning and volunteering alongside more conventional activities such as helping families with childcare or domestic affairs (Principi, Jense, & Lamura, 2014; Socci, Clarke, & Principi, 2020). Being active and engaged in meaningful social activities is correlated with life satisfaction for elderly individuals (Stenner, McFarquhar, & Bowling, 2011).A study by Štuopytė (2022) has shown that those elderly people volunteering and participating in NGO educational activities in Lithuania are motivated by needs such as self-expression, communication, social mobility, integration and social adaptation to constant changes in society. In Portugal, the results of a study by Antunes and Ferreira (2023) indicate that community-based, non-formal education interventions targeted at the elderly have impactful benefits – particularly in relation to emotional stability and overall well-being.

Learning for sustainability can also take learning a step further, enhancing the transformative power of elderly education, which has the dual effect of improving the health of the learner and benefitting both the community and the environment (Griswold, 2017), as well as leading to greater justice (Casey & Asamoah, 2016). In European countries, the usual providers of non-formal education for elderly learning are the state, civic associations, non-profit organisations, trade unions, faith organisations and social groups, as well as Universities and training institutes (Drobná, 2008; Sládkayová, 2021; EAIE, 2021).

Closely aligned with the Sustainable Development Goals, the United Nations Decade of Healthy Aging (2021-2030) aims to improve the lives of older people, their families and communities. In this context, numerous activities are now flourishing all over the world. These include senior universities, senior tourism, social networking platforms aimed at the elderly, and support for intergenerational activities. One recent report also points to the opportunities offered by the UN Healthy Aging Decade to sensitise older people with regard to climate change and to engage them in collaborative, multi-stakeholder actions for climate resilience (WHO, 2021).

Non-formal education can support the elderly in other ways too, as they experience lifestyles changes and deal with the challenges of the technological age (Gou, 2023). Offerings that enable active green citizenship experiences together with digital learning or the adoption of new technologies for older learners are currently a small component of current provision, but the literature suggests that the presence of such provision is likely to increase over time (EAEA, 2023). Such programmes serve to prevent the disinformation and fake news that is frequently addressed towards elders as well as other vulnerable groups in the population (Gou, 2023).

It is also appropriate here to make reference to "aging in place" (at home and or within social networks). Research refers to "place" as an important grounding concept for the elderly. Place can relate to home, the neighbourhood, friendship groups and the local environment. All of these are important contexts, given older people's increased sense of attachment to social connections, familiarity and identity, which in turn enhance their sense of security and well-being (Pani-Harreman et al., 2021). Non-formal education for sustainability tends to be rooted in the locality, and can provide a supportive environment that strengthens the ties between the elderly and their own surroundings.

2.2.5. Social economy organisations and social entrepreneurs

The social economy brings together profit and non-profit organisations, mostly small and medium-sized, including associations, cooperatives, mutual organisations, foundations and social enterprises. Social enterprises are driven by values of

solidarity, prioritising people over capital, and advocating for democratic and participatory governance. Collectively, these social economy organisations have the capacity to accelerate the transition from a linear to a circular economy, making it more inclusive, innovative, resilient and engaging (OECD, 2022).

The social economy is represented in numerous sectors of economic activity, including health and social services (poverty, work integration, social inclusion); culture and media (cinemas, theatres, festivals, slow press cooperatives); tourism (youth hostels, ecotourism); the energy industry and renewable energy groups; the food industry (agro-ecology, short food supply chains, cooperative supermarkets and vineyards); the technology industry and ICT service providers; waste and upcycling, as well as recycling centres and shops; mobility, including the promotion of cycling and bike repair initiatives; trade and retail (including fair trade shops, manufacturing, insulation equipment, packaging and printing); banks and social finance, including co-operative savings banks; real estate, housing co-ops, community land trusts and temporarily occupied units; and building design and construction, including sustainable construction. Social economy organisations play a central role in the context of the green transition and are members of consortia working in the fields of formal education and training, as well as providing opportunities for learning on how to take action towards sustainability (Bilan et al., 2017).

Zero Waste Europe is a network with the goal of scaling up waste reduction and recycling and promoting positive change across Europe. Although its work is mostly campaign-led, it also offers training, demonstrations of and experimentation in ecological and sustainable activities at its eco-centres (Zero Waste Europe, 2024). A review of publicly available information reveals that a member of this network, Reseau-Ecocentres, operates in 10 French cities, building knowledge and practical engagement opportunities to advance the circular economy. However, no information could be accessed regarding its educational objectives, pedagogical frameworks or the learner outcomes underpinning these offerings.

The literature points to how many social economy organisations are community-based, driven by the desire for environmental change rather than personal gain and profit (Bilan et al., 2017). It also indicate that they can play a crucial role in the green transition, acting directly as agents of non-formal education (Cedefop, 2023a). *La cité* is a Belgian non-profit educational organisation created in 2006 by a group of young entrepreneurs from the environmental and cultural sectors. Its work revolves around an eco-centre at the Citadelle de Liège which functions as a place for raising awareness, training and the educational demonstration of ecological alternatives in the areas of energy, biodiversity and food. Its focus is on hands-on learning, as well as the dissemination of knowledge and key concepts associated with sustainable living (La cité, 2024). The organisation seeks to achieve transformative learning, but its is unclear how these intentions are to be achieved educationally, other than exposing learners directly to practical challenges and building sustainability literacy.

Promoting OGA (OECD, 2022) points to the challenges associated with scaling up learning and education with a focus on social enterprises. Namely, that financial support is hard to access, legal frameworks are often hard to interpret, and new initiatives tend to have low visibility. Perhaps, by sharing educational principles and frameworks, quantifying their social contribution and better articulating their unique contribution to the green transition the prospects of this sector will improve, enabling it to offer transformative experiences for consumers, learners and other social entrepreneurs.

2.2.6. Enriching experiences in formal education

Non-formal learning can respond to the needs of children and young people, by providing education that is preparatory, complementary or an alternative to formal

schooling. Non-formal education initiatives aimed at children are often delivered by language and music schools, municipal libraries and media centres, as well as youth, cultural and sports associations. These out-of-school activities give substantial meaning to learning for sustainability, helping children and young people to engage with their localities and the world around them in ways that have the potential to build sustainability competences (Tilbury, 2024). This is evidenced in the literature, which indicates that sustainability literacy is maximised when a combination of formal, non-formal and informal learning experiences is offered to students (Caldana et al., 2023; Martínez Casanovas et al., 2022).

With complementary yet distinct roles, formal and non-formal education can contribute to building the innovation required for the green transition. As highlighted by Wals, Mochizuki and Leicht (2017), the boundaries between formal and non-formal education should not be seen as rigid, but should allow fluid synergies to be maintained between educational organisations. From a sustainability learning perspective, making connections and crossing boundaries is a critical element from which new possibilities arise (Tilbury & Wortman, 2005; Tilbury, 2013). This can be achieved by integrating formal learning with non-formal formats such as interdisciplinary courses, optional subjects present in the curriculum, the practical training of specialists, study visits, educational partnerships involving the community, as well as the use of experiences, teaching methodologies and self-regulated learning, among others (Melnic & Botez, 2014).

The literature on sustainability learning strongly supports *whole-institution approaches* (WIA), which seek to break down the walls between formal education (including schools, colleges and universities) and non-formal education to bring expertise from external organisations into school, as well as to extend the learning experience beyond the school perimeter (Wals et al., 2017). Numerous studies consider the merits of WIA and the related concept of a whole-school approach to sustainability (UNESCO, 2017; UNECE, 2012; Council of Europe, 2018; EC, 2022b). These advocate for sustainability to be integrated into: i) the vision, ethos and leadership of the education institution; 2) the curriculum, with opportunities being sought for interdisciplinary learning; 3) pedagogy and learning, extending experiences through place-based, experiential and participatory learning approaches; 4) institutional practices, enabling educators and learners to 'live' sustainability within their places of study; 5) capacity building, to support professional development in sustainability issues and pedagogies for teachers and staff; and 6) community connections that engage schools, universities and colleges with external organisations, leveraging expertise and resources in sustainability.

Following on from this last point, the literature documents how non-formal education encourages the creativity and innovation that are indispensable for navigating the challenges presented by the green transition (Casey & Asamoah, 2016; Cedefop, 2022). By using the local community as a 'living lab' or outdoor classroom, students also can become more rooted in their locality and gain a sense of place and connectedness (Tilbury, 2024). Experience also suggests that non-formal education provision not only directly strengthens the learner's experience, but supports pedagogical innovation in formal education (Romi & Schmida, 2009). These influences are important at a time when curricula and educational policies for primary and secondary education, for example, make limited references to environmental themes, climate change and the loss of biodiversity (UNESCO, 2021). Building synergies between formal and non-formal education institutions is a win-win strategy, leading to the sharing and multiplication of resources, to new learning dynamics, and to the faster adoption of new ideas (Grajcevci & Shala, 2016). This is confirmed by the Ciência Viva ("Living Science") case study, discussed below.

Ciência Viva ("Living Science") is a Portuguese national initiative dedicated to promoting education and scientific culture. Among other issues, it seeks to inform citizenship responses to climate change. Tilbury (2024) argues that this example showcases how sustainability learning experiences in schools can be enhanced through non-formal education partnerships that draw on expertise and provide interactive educational opportunities. The case study reveals how non-formal education also benefits from these connections, and how national agencies can provide important support, enabling cross-sectoral partnerships to emerge.

Case study 1: Ciência Viva

In 1996, the Portuguese Ministry of Science and Technology established **Ciência Viva** centres, which promote experimental and experiential sciences through interactive learning opportunities (Ciência Viva, 2024). These centres, funded by national agencies, seek to bring the sciences to life for schools and communities, through thematic awareness-raising campaigns, exhibits, engagement activities and bespoke educational resources that cater for a range of age groups[i]. A key policy commitment of the scheme is for the centres to be established in new, bespoke buildings or located in former convents, churches, factories or prisons that are refurbished to attract visitors. National investment in Ciência Viva came from the realisation that education and innovation are needed to address well-being, economic development and key socio-scientific challenges such as sustainability (National Agency for Scientific and Technological Culture, 2020).

Key features

- **Learning hubs:** 21 centres across Portugal host primary and secondary schools and invite the general public to explore how science is relevant to their everyday lives, with many focusing on biodiversity, nature-based solutions and climate change. To date, these centres have attracted more than 13 million people[ii]. Among the associates of the centres are major national research laboratories, which ensure that the most relevant and up-to-date science is available to learners.

- **School engagement:** the learning hubs facilitate Ciência Viva clubs that operate in schools as well as online "conversation circles" at which scientists address questions relating to, among other subjects, astronomy, botany, physics, zoology, the environment and sustainable living (Ciência Viva, 2024). Currently, 895 Ciência Viva school clubs operate across the country, involving nearly 720,000 students and covering all districts including the Autonomous Regions of Madeira and the Azores and the Portuguese Schools of Mozambique (National Agency for Scientific and Technological Culture, 2020). These clubs help students not only to learn in their localities, but to connect with other schools and science professionals internationally.

- **Connecting the local to the global partnerships:** the Ciência Viva network is specific to Portugal, but similar initiatives exist across Europe (see Ecsite, 2024). Ciencia Viva partners regularly with CERN, the European Organization for Nuclear Research in Switzerland, the European Space Agency (ESA), the European Maritime Safety Agency (EMSA), the King Baudouin Foundation, the La Caixa Foundation in Spain, and Biogen from the United States. Hubs broker these international relationships, which bring innovative ideas and cutting-edge science to schools and local communities.

- **Unique characteristics of the regions:** more recently, the programme has been extended to *Quintas Ciência Viva,* which has more a rural focus, with centres established in spaces where agricultural production and services are important for livelihoods (Ciência Viva, 2024). These centres seek to create synergies between traditional and innovative ways of supporting food production, and to encourage the sustainable use of local resources as well as the purchasing of local produce.

Learning from experience

- **Value-added:** the experience of Ciência Viva demonstrates how non-formal education is well positioned to support schools in the context of LfS. The programme enables the sharing of discoveries and new initiatives that are relevant to sustainability as they emerge, and draws expertise into primary or secondary schools.

- **Engagement:** through the use of enquiry-based learning and participatory pedagogies, Ciência Viva centres are able to engage students actively in the key issues that shape aspirations for a more sustainable future. These learning experiences serve to develop the understanding and capabilities of pupils, who can potentially gain action competence through the process.

- **Linking learning contexts:** Ciência Viva also enters into the classroom setting, and uses digital technologies to help situate local learning within a wider global context. It actively seeks to connect educators and learners with national and international actors who can support the green transition at a more local level.

- **Learning from one another:** research has documented the value of Ciência Viva centres, but also points to the need for stronger collaboration between the science communicators that prepare the activities, and practising teachers. More opportunities are needed for them to work together to design activities that are more closely linked to school curricula (Costa et al., 2023).

- **Role of national agencies:** national agencies and coordinating authorities can play a critical role in connecting schools to their local area and in ways that connect learning to national and international systems and actors. Lessons could be learned through a formal evaluation of the policy context and levers that have helped to extend this programme across Portugal and beyond.

- **Motivations and drivers:** work that supports the green transition and the building of green competences in local contexts does not always have to be motivated or labelled as "sustainability". Economic motivations and social drivers can also lead to environmental learning opportunities, given that sustainable development brings together these three overlapping concerns that co-exist within our communities.'

Source: extract from Tilbury (2024)

A study (EC, 2021) on successful educational approaches adopted by Erasmus+ projects to support learning for sustainability identified 15 projects that used innovative, interdisciplinary, hands-on methods, and showed how small, bottom-up actions made a difference. However, the results of the study also indicated the need to move from individual awareness towards action-oriented learning in formal education. The resulting report called for:

- hands-on approaches and activities that yield tangible results in relation to environmental protection (e.g. collecting waste, planting trees, organising environmental campaigns);

- peer-to-peer learning as an efficient way to inspire change;

- bottom-up approaches to motivate, empower and engage individuals in environmentally sustainable initiatives; and

- interdisciplinary and multidisciplinary approaches, as well as long-term, community and culturally contextualised perspectives.

The above are common characteristics of non-formal education programmes. Strengthening synergies and cooperation between non-formal and formal education can address these pedagogical issues and assist in the development of learner competences for sustainability, as defined by GreenComp (Tilbury, 2024).

2.2.7 Municipalities and the new sustainability learning hubs

Across Europe, there are now many examples of previously derelict and unsafe urban and industrial areas and buildings that have been transformed into vibrant cultural zones. These new cultural hubs built within municipalities are attracting artisans, artists and young entrepreneurs as well as alternative catering and retail businesses, all of whom are helping to regenerate cities and breathe new life into spaces whose traditional functions have become outmoded.

The New European Bauhaus (NEB) supports urban renewal and breathing new life into cities, using European Union funds to build these cultural zones and hubs in defunct spaces and bringing together the community. The initiative has succeeded in bringing a cultural and creative dimension to the European Climate Agenda, activating actors from different economic sectors to jointly design, experiment with and build a sustainable and inclusive future (EC NEB, 2024). The strong involvement in these processes of schools, teachers and the non-formal education sector strengthens opportunities for learning landscapes to emerge.

Learning landscapes present a systems view of learning for sustainability, advocating for connected learning across the formal, informal and non-formal education sectors in a specific locality or region (Tilbury, 2024). This view recognises that, in the context of sustainability, the boundaries between the educational sectors should not be rigid, and that connections should be strengthened and synergistic.

Germany's municipality funding programme for learning for sustainability connects efforts across non-formal educational offerings, improving the quality of provision and catalysing local learning landscapes for sustainability (Tilbury, 2024). Funding provided by Germany's Federal Ministry of Education and Research (BMBF) supports network structures as well as evaluation processes that can help to establish links and improve implementation. Among the 50 municipalities committed to building learning communities for sustainability, Hamburg in particular stands out (see Case study 2).

Case study 2: Hamburg, a Learning City for sustainability

Hamburg is a "*Learning City*"; belonging to this UNESCO network gives it both prestige and profile, and thus assists in its work to establish partnerships and connect experiences across the local learning landscape.

It is also Germany's second largest city, and one of its greenest, with a long history of advancing education for sustainable development (ESD). Supporting Hamburg's commitment to sustainability is the German National ESD Action Plan (BNE, 2017);

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a policy document that values networks of learning and seeks to promote dialogue within municipalities.

In 2022, the Hamburg Ministry for the Environment, Climate, Energy and Agriculture developed and agreed a set of strategies, activities and arrangements between non-formal, informal and formal education providers in support of sustainability. The resulting partnerships and cooperation are captured in the Hamburg ESD for 2030 Masterplan (BUKEA, 2022). This plan brings together the sustainability learning opportunities offered by museums, field centres, ecological markets, green festivals and the media as well as kindergartens, schools, vocational schools and institutes of higher education. The Masterplan, which was developed jointly with more than 100 organisations, has a dedicated budget of around EUR 1 million per year to support the implementation of the scheme (BUKEA, 2022). This l document offers a connected vision of learning and education for sustainability through building closer links between kindergartens, schools, vocational colleges and universities, as well as local authorities, NGOs and other entities that offer training and learning opportunities.

Key features:

Concrete tools for strengthening cooperation between formal and non-formal education partners help these initiatives to succeed at municipal level. To guide schools in their quest for extra-curricular learning opportunities and to support the providers of education services on sustainability, Hamburg has:

- **Digitally captured** the city's most significant learning opportunities on sustainability, helping educators and other interested parties to gain an overview of ESD projects and initiatives across the city.

- **Developed the Norddeutsch und Nachhaltig (NUN) certification scheme** as a means to enhance the quality of non-formal and informal learning opportunities, and to support freelance providers in aligning with ESD principles, good practice and the expectations of schools. The NUN scheme is the result of a north German partnership that includes the federal states of Hamburg, Mecklenburg-Vorpommern and Schleswig-Holstein.

Learning from experience:

- **Encouraging monitoring and evaluation initiatives** that gather data guided by an indicator-based monitoring plan which includes local stakeholders in the process. In Hamburg, this has been supported by the Free University of Berlin, which has developed self-assessment tools to determine the effectiveness of policy structures, participation and engagement, and capacity building, as well as to assess the outcomes of the learning. Such tools help the initiative to uncover enabling conditions and to identify the factors that underpin quality experiences.

- In addition, the UNESCO Institute for Lifelong Learning and Germany's Federal Ministry of Education and Research (BMBF) are conducting **a pilot project and reviewing** how to strengthen data-based educational planning and management for lifelong learning so that lessons learned can be shared with other municipalities in Germany and beyond.

Source: extract from Tilbury (2024)

One of the most high-profile learning landscapes for sustainability is that of the Japanese city of Okayama, in which 240 institutions, including community learning centres, schools, universities and NGOs have come together in a large-scale initiative that has attracted a great number of citizens to collectively engage in issues and practices in relation to sustainable living. This widespread engagement of stakeholders and co-operative efforts between providers has been made possible by a vision for education for sustainable development that has been crafted collaboratively by those involved and led effectively by the Okayama authorities (see Case study 3).

Case study 3: Okayama's connected commitment to sustainability learning

Okayama initially declared its ambitions in relation to sustainability education in January 2005, following Japan's commitment to the UN Decade in Education for Sustainable Development. The city's vision was supported by an ESD Promotion Committee comprising a representative group of formal, non-formal and informal learning providers. Underpinning the city's work is a vision to achieve a connected and effective learning landscape over a period of 10 years. During this time, Okayama sought to:

- Reach all primary schools in the district with ESD-focused activities at least once in a year.
- To secure the participation of more than 150 organisations across the region in the Okayama project.
- Attract more than 10 % of the population in the designated area to participate proactively in activities relating to the building of a sustainable society (City of Okayama, 2015).

It has been suggested that the targets identified above have been met effectively (Usami, 2017); however, a detail description of how this was achieved is not available. In 2016, Okayama received the UNESCO-Japan Prize on Education for Sustainable Development, a biennial prize that honours outstanding projects (UNESCO, 2023).

Key features:

Clearly crafted objectives and timelines, together with the support of leading authorities, has led to the formation of strong partnerships across the learning landscape. Zen and Shibakawa (2022) believe that Okayama provides a good example of how a prefecture-wide vision statement can lead to multiple actors "collaborating for knowledge co-creation and circulation, and the establishment of a new social values system can lead new social value system" (p.1).

Learning from experience:

Efforts to monitor this initiative suggest that it has managed to achieve a shift from awareness-raising to more transformative social learning practices. The learning landscapes continues to extend its reach. Currently, it has attracted more than 350 organisations including *kominkans* (community learning centres), as well as formal education institutions, civic organisations, NGOs and government agencies. Its ambition continues to be to promote cooperation and collaboration to build a sustainable Okayama through learning through collaboration and from experience (UNESCO, 2023).

2.2.8 Summary of provision

As this chapter has shown, non-formal education providers offer opportunities for learners to experience and connect with people and planet issues. The offerings of such providers are diverse in terms of their thematic entry points, target audiences and the spaces used to convene learners. The activities carried out build sustainability literacy skills and capabilities for active citizenship, as well as creating more hands-on engagement with the natural environment and exploring sustainable lifestyles. In essence, such experiences extend learning beyond classrooms to involve learners and persons of all ages and backgrounds in sustainability. Despite the significant role such providers play, however, few data and little evidence exists to clearly identify the educational contributions or impact of non-formal education sector in the

attainment of the green transition. Information regarding the educational frameworks or pedagogical principles that underpin non-formal education work is not available, and educational evaluation studies that might assess their transformative contribution are practically non-existent in the literature. In the absence of longitudinal data or meta-analysis, this section has mapped some of the existing provision and extrapolated this potential contribution from current practice and perspectives.

Chapter 3. Key insights from the current provision of non-formal education

This chapter provides a summary of key observations arising from the review of studies and documented examples carried out for this report. Please note that not all of these observations have been explicitly articulated in the previous chapter, in which only a sample of studies are featured. Here, we provide a more complete overview of the trends and insights that arise from the present review. These observations inform the policy recommendations presented in Chapter 4, which offer a more global assessment of the pathways for strengthening non-formal education for sustainability.

3.1   Increasingly, non-formal education experiences are rooted in the learner's local context, often helping to ground global issues and the scientific learning associated with climate change, biodiversity and other similar concerns. The literature suggests that these experiences can lead to ***authentic learning***, as technical understanding is anchored in the realities of lived experiences and leads to a greater appreciation of the scale and systems in relation to environmental issues (Tilbury, 2024). Non-formal education initiatives epitomise "situated learning" (Lave & Wenger, 1991), offering flexibility (Romi & Schmida, 2009) and responsiveness to learners' interests (Simac, Marcus, & Haerper, 2021), while remaining relevant to a wide array of subjects, methods, audiences and educational contexts (Schugurensky, 2000).

3.2   Non-formal learning offered in a community setting can also ***strengthen bonds***, as learners become familiar with the unique and distinctive features of the communities and places to which they can relate (Paraskeva-Hadjichambi et al., 2020). This familiarity can drive a commitment to sustainability and motivate people to make choices and take actions in favour of the environment and the health and well-being of the communities they are associated with (Thomashow, 2002). More elderly learners in particular benefit from these offerings, as they find security in familiar contexts and experiences (Pani-Harreman et al., 2021).

3.3   It is important to recognise that non-formal education can reach out to ***disadvantaged or marginalised groups*** who have limited access to education. These include individuals with disabilities; people living in remote or rural areas; minority ethnic or cultural groups; and individuals experiencing poverty or homelessness, people transitioning into new circumstances or lifestyles such as refugees, asylum seekers, or displaced populations. Individuals who face marginalisation on the basis of their gender or sexuality, including women and girls (Zwysen, 2024), should also be considered part of such social groups. Also included should be elderly individuals, who may face marginalisation due to ageism, limited access to healthcare and social services, and societal attitudes that devalue their contributions (Prattley et al., 2020). Also relevant are people with low levels of education and others who reside in rural or economically disadvantaged areas and who may face precarious housing situations that further contribute to their vulnerability (EAPN, 2019; Eurostat, 2023c). The inclusion of "people on the margins", as well as anyone who is in some way excluded from full participation in society, is vital to the attainment of a more sustainable future (Spillare, Paltrinieri, & Marciante, 2018). Learning for sustainability should be accessible to all, and non-formal education is able to reach these groups in society, which are often seen as unreachable.

Moreover, non-formal education empowers marginalised communities to prepare for climate change by equipping them with skills needed in the context of changing workplaces, communities and lifestyles (EC, 2022b). It can also help to address inequalities through initiatives that seek to actively include marginalised and vulnerable groups into their mainstream activities, thereby bringing a sense of cohesion, belonging and well-being to these social groups (OECD, 2019).

Youth initiatives led by young people or aimed at younger generations also have a substantial and crucial role to play in the green transition. Given the increasing interest of youth in sustainable lifestyles, circular economies and environmental issues (European Commission, 2020d; Deloitte, 2021; European Environment Agency, 2019; McKinsey & Company, 2020; YouthActionNet, 2020), it is unsurprising to find that non-formal education activities aimed at youth are the fastest growing in the sector. Non-formal education providers are supporting young people to engage with sustainability agendas as a means to improve nature conservation as well as to bring into their communities the social and economic innovation needed for the green transition. They address the needs of young people –especially early school leavers – who are particularly susceptible to exclusion from society or the labour market, and are at a heightened risk of poverty or unemployment (Carmona, 2021). By offering alternative learning opportunities via youth clubs, community learning centres and volunteer programmes, young people are provided with educational support and enrichment activities that are relevant to their participation in changes for sustainability (Eurostat, 2023b).

3.4 The pivotal role that non-formal education plays in nurturing ***entrepreneurial mindsets*** is well evidenced by research (Debarliev et al., 2022; Galvão et al., 2020; Bilan et al., 2017). Non-formal education initiatives often focus on mentorship opportunities and real-world problem-solving – essential components of the development of entrepreneurial skills. By exposing individuals to entrepreneurship concepts, opportunities and role models, non-formal education programmes can inspire people to pursue entrepreneurial ventures and contribute to economic innovation (Moberg, 2014). The literature also notes that social economy organisations are driven by a desire for environmental change rather than personal gain and profit, and can therefore play a crucial role in the ecological transition, acting directly as agents of non-formal education in communities of practice (Bilan et al., 2017).

3.5 Refurbished ***cultural and social institutions*** as well as redesigned ***community spaces*** are establishing themselves as key hubs for non-formal education for sustainability. Museums, libraries and similar institutions are using new buildings or refurbished spaces to bring together learners to foster the collaboration and practices needed to navigate the challenges presented by the green transition. Alongside this, the burgeoning movement towards community learning centres, as noted by Rogers (2019), offers a robust foundation for learners to engage with the Sustainable Development Goals (SDGs). The Nordic countries, which have a long history of non-formal education rooted in the concept of popular enlightenment (Lindström, 2005; Sulkunen & Malin, 2014), operate well-established 'folk' or community centres, study circle centres and institutes for adult education with a strong environmental focus (Lindström, 2005). These hubs increasingly invite adults and young people to explore their relationship with the planet and the future of their communities.

3.6   Non-formal education offerings lend themselves especially well to sustainability learning, as they enable learners to explore **interdisciplinary enquiries and boundary crossing**, which are often hard to pursue in formal educational settings (Wals et al., 2017; Tilbury & Wortman, 2005). This more systemic view of the context and issues surrounding sustainability favours more grounded forms of learning that recognise the ways in which environmental issues transcend traditional subject boundaries. Making connections rather than distinctions and crossing boundaries is a critical element of learning for sustainability, from which new possibilities arise (Tilbury & Wortman, 2005; Tilbury, 2013).

3.7   Non-formal education experiences are often interactive, supporting **participatory pedagogies** such as *place-based learning*, *enquiry-based learning*, *citizen science* and concepts including *action competence*, *social learning* and *eco-justice* (Tilbury, 2024). Non-formal education activities are structured so as to empower learners to find solutions to challenges themselves, drawing upon their prior experiences and through collaboration with peers (Roggoff, 1994). These activities instil responsible commitment and engage practical methodologies, presenting opportunities for learners to build the sustainability competences identified in the European GreenComp framework (Bianchi et al., 2022). These can potentially help learners to embody sustainability values, embrace complexity, envision sustainable futures, and act for sustainability.

3.8   In parallel to the rise of local learning for sustainability, an increasing number of **online learning providers** are creating opportunities for digital non-formal learning for sustainability. The adoption of digital technologies by non-formal education providers enables them to improve access and educational outcomes and to make use of visualisation software that brings alive possible scenarios and concerns in this area (Tilbury, 2023). Such digital opportunities address diverse learning needs and contribute significantly to individual growth, community development, informed consumer choices and lifelong learning (Lim et al., 2023). By leveraging technology, non-formal education programmes can reach learners who are not able to access traditional classrooms, especially those in marginalised or remote areas, thereby encouraging their participation (Spillare, Paltrinieri, & Marciante, 2018). Some of these learning experiences also support the development of digital skills for sustainability, required for active engagement in a world that is increasingly digitally connected.

3.9   Worthy of note is the role played by non-formal education in **enhancing innovation levels and bolstering competitiveness** in EU economies. Given the complexity and rapidly changing nature of environmental issues, knowledge acquired through formal education may rapidly become obsolete or inadequate. Research indicates that supplementing formal education with non-formal education enhances levels of innovation and competitiveness in EU economies (Denkowska et al., 2020). Formal education practices may not sufficiently emphasise the promotion of creativity and innovation needed to address the climate and environmental crises. Non-formal education providers are well placed to address these issues due to their capacity to address specific challenges and opportunities within local contexts, including those related to sustainability and promoting contextual relevance and ownership.

3.10   **A prevailing focus on knowledge and literacy with regard to sustainability**. Most non-formal education offerings on sustainability primarily focus on building the sustainability interests and literacy of the

learner. Sharing knowledge, helping learners to make sense of complex environmental scenarios and raising awareness of the core social and economic issues that underpin these concerns were identified as core objectives. Participatory learning was used as a way to capture interest and motivate the learner rather than to systematically build green competences or advance educational objectives.

The lack of pedagogical frameworks for non-formal education in LfS is a core concern, and a major challenge to advancing transformative offerings (Paraskeva-Hadjichambi et al., 2020). The literature reveals that addressing climate challenges and achieving global temperature reduction goals necessitates transformative social learning (González-Gaudiano & Meira-Cartea, 2022). Yet most of the examples cited in this report do not outline educational approaches or pedagogical frames that align with transformative practice. The information available suggests that non-formal education providers assume a linear correlation between the acquisition of sustainability knowledge and agency. For example, there appears to be an absence of considerations relating to learner competencies. It should be noted that the adoption of pedagogical approaches that transcend knowledge transfer and sustainability literacy is essential in this context (Macintyre et al., 2018).

3.11 **Schools, colleges and universities recognise the value** non-formal education providers bring to learning experiences during the early years and through to adult education. Whole-institution approaches to sustainability that blur boundaries between schools and wider community are gaining ground, prompting educators to look outwards to non-formal education experiences that can enrich classroom learning (Wals et al., 2017). At the same time, teachers and schools often face challenges in identifying and choosing experiences that align with the requirements of the curriculum (EAEA, 2023). Connections between non-formal education providers and schools appear random and perhaps dependent on the interests of individual teachers or schools, and could be enhanced through the support of educational authorities.

3.12 Many **non-formal education providers** bring specialist knowledge and interest in sustainability, but are often **not professionals in education**. This makes it challenging for non-formal education offerings to be tailored to the various ages and/or abilities of learners (Tilbury, 2024). There is a need to better understand learning processes in order to adapt provision to learning needs (Nerlich, Koteyko, & Brown, 2010; González-Gaudiano & Meira-Cartea, 2022; Monroe et al., 2019). So far, the focus has mostly been on what key concepts and messages non-formal education providers wish to convey (see LinkedIn, 2024). To shift this focus towards learner outcomes, educators and facilitators in non-formal education would benefit from specific training in learning for sustainability. Educator frameworks in education for sustainable development such as that offered by the UNECE (2012) could prove useful in developing their competences in this area.

3.13 A **lack of financial resources and security**, especially in low-income communities and regions, limits the action of many non-formal education providers and limits the effectiveness, scalability and long-term prospects of these programmes (Stylianou et al., 2023). Weak infrastructure and/or weak institutional or legal support also threatens the impact that can be achieved by this sector (Sládkayová, 2019). The literature suggests that addressing these limitations requires concerted efforts from stakeholders, including increased investment in non-formal education infrastructure, improved

institutional support, and greater recognition of the value of non-formal education for sustainability in legal and policy frameworks (Bourn, 2015).

3.14   Non-formal education providers may find it challenging to adopt wider ***sustainability principles within their operational and management environments***, due to a lack of resources or expertise. The present research finds that this can be the case for community, charitable or non-profit organisations that offer non-formal education, and may explain why the study has found only limited examples of providers that practice sustainability themselves within their organisations. Such a situation can present credibility challenges going forward.

Chapter 4. Policy recommendations

To strengthen non-formal education for sustainability, policy measures should seek to build a complementary and connected landscape for learning for sustainability – one in which non-formal education can play a key transformative role in empowering people of all ages and backgrounds to contribute purposefully to the green transition. This can be achieved through the following measures:

- **Partnerships for learning:** alliances, consortia and joint projects that engage organisations of various sizes and in various sectors, and which represent a diversity of interests, are important to the establishment of a connected and effective offering in sustainability education. Funding could come from multiple sources, including sponsorship, European programmes, national government initiatives and the reserves of non-formal education providers. The sharing of perspectives, resources and expertise is of value to all those involved. For example, schools can support non-formal providers in the design of their learning activities in order to align with educational best practice, or to ensure their alignment with curriculum requirements.

  HEIs are especially well positioned to support research that improves policy and practice in the non-formal sector, as well as in training teachers to better integrate and engage with it (Brower, 2011; Heigh, 2006). Such collaborative efforts could help to surmount external barriers such as limited access to pertinent technical skills, and also provide the operational support crucial in addressing the challenges intrinsic to scaling up non-formal education activities (Creech et al., 2014). In turn, non-formal education providers can provide expertise, experiential learning and community engagement opportunities to school pupils and students in higher education. Indeed, multi-stakeholder partnerships are a core expectation in the delivery of the 2030 Agenda (Shulla, Filho, Lardjane, Sommer, & Borgemeister, 2020; UN, 2015). Given the complexity involved in changing societal mindsets for sustainability, good coordination is essential between researchers and scientists, educational leaders and teacher educators, curriculum planners and formal and non-formal educators (McKeown et al., 2002).

- **Building learning landscapes:** a systems view of learning for sustainability advocates for connected learning across the formal and non-formal education landscape (Wals et al., 2017). Such a view recognises that in the context of sustainability, boundaries between educational sectors should not be rigid and that connections should be strengthened and synergistic (Tilbury, 2024). The present review reveals how effective LfS initiatives have often been the result of integrating together both formal and non-formal activities into a single offering (Štuopytė, 2022). The drive to adopt whole-institution approaches to sustainability has seen schools, colleges and universities increasingly reaching out to non-formal education providers. Such connections are necessary to overcome the boundaries between experiential, social, local and digitally enhanced learning, and requires a holistic vision for the learning system. Policy-makers as well as national authorities and agencies have a critical role to play in establishing this vision and enabling these connected learning landscapes to emerge (Tilbury, 2024).

- **Professional development for non-formal education providers:** The professional development of trainers, tutors, presenters and facilitators could catalyse improvements in the quality and effectiveness of non-formal educational offerings. Professional development could take a number of forms, but should focus on educational approaches and frameworks to support best practice. The role of non-formal education is not to send key messages,

give prescriptions, expose dogmatic conjectures or model behaviour, but to scaffold the process of active engagement. Such a role is important in shifting the focus from sustainability literacy towards enabling the transformative potential of non-formal education to be realised. Professional development can familiarise non-formal providers with the relevant competency models and frameworks for designing and evaluating sustainability learning. The strategic mapping of needs, as well as deliberate actions to develop the capacity of those who facilitate learning in non-formal education contexts, deserves the attention of policy-makers.

- **Establishing standards and assuring quality:** there is a lack of standardisation, accreditation and recognition when it comes to learning for sustainability in non-formal education (Souto-Otero, 2021). National agencies and local authorities should take the lead in initiating processes that help to define and agree on standards, as well as in developing guidance frameworks for enhancing the transformative potential of learning for sustainability and offering accreditation schemes and/or awards for excellence in non-formal education.

Flexibility and the individual focus of provision are positive characteristics of non-formal education, but can also result in a lack of standardisation of curricula, assessment and quality assurance, thus reducing the credibility and impact of efforts (Harris & Wihak, 2018; UNESCO, 2021). In this respect, the Hamburg Learning City accreditation scheme for certifying non-formal education provision in sustainability serves as an example of how standardisation can assist in enriching and extending learning landscapes (Tilbury, 2024). Certification could also be extended to non-formal education trainers, educators and facilitators to ensure they possess the technical and pedagogical skills needed to support learning for the green transition. The recognition and validation of non-formal educators has been shown to have a positive effect on the quality of provision (Harris & Wihak, 2018; Villalba-García, 2021).

European guidelines for validating non-formal education already exist (Cedefop, 2023c). These place importance on profiling the activities as well as the outcomes of learning. The guidelines aim to support the development and implementation of validation arrangements across Europe, placing the individual at the centre and offering insights into validation tools and techniques. The guidelines also address new and emerging issues such as cost and financing, standards and reference points, outreach strategies, digital certification, and microcredentials. In addition, they emphasise transparency and transferability throughout the validation process, enabling lifelong and comprehensive learning and yielding outcomes that are trusted across various institutions, sectors and countries. Another tool, the European Qualifications Framework (EQF) (Council of the European Union, 2017), is of particular relevance to vocational education and training (VET) (see Appendix 2 for a definition). The EQF covers qualifications at all levels and in all sub-systems of education and training across 38 European countries, enhancing the transparency and comparability of qualifications between different countries and systems by defining eight reference levels based on learning outcomes: namely, knowledge, skills and autonomy-responsibility. The EQF has also prompted the development of comprehensive national qualifications frameworks based on learning outcomes, with all those countries committed to the EQF considering such frameworks essential for comparability across sectors and countries.

- **Monitoring non-formal education programmes** is crucial for various reasons: maintaining quality, tracking progress, evaluating impact, collecting feedback, ensuring accountability, and adjusting interventions to meet changing needs. Internal self-assessment monitoring processes support the effective implementation and continual enhancement of non-formal education initiatives. Chaudhary et al. (2020) emphasise the importance of building evaluation capacity in non-formal education settings, and demonstrate how such efforts enable participants to critically evaluate and enhance their own programmes and practices.

- **Integrating non-formal education into mainstream education policies:** building learning landscapes for sustainability requires a clearer articulation of the value and contribution to learning for sustainability provided by non-formal education, as well as it better integration into both overall and specific strategies for learning for sustainability. Authorities can play a critical role in enabling learning landscapes – policy vision is essential to reimagining and transforming learning offerings, partnerships and relationships in response to issues such as climate change and the green transition. Participatory approaches should be emphasised in helping to define this vision, in addition to dedicated institutional efforts, financial resources and long-term monitoring in support of these aspirations. If non-formal education providers operate in a vacuum, without policy directions or frameworks, it is less likely that a connected or coherent vision of learning for sustainability will emerge. The literature calls for stronger legislative frameworks concerning non-formal education in the context of sustainability that will help to deepen and widen provision in the sector.

European policy vision and platforms: of equal importance is a recommendation that that there should be a clearer policy vision to connect European policy frames and measures to support the provision of non-formal education in the context of sustainability. The European Green Deal, the Erasmus+ Programme, the Lifelong Learning Programme, the European Sustainable Development Strategy and the EU Youth Strategy are prominent among European policies providing significant support to non-formal education programmes aimed at advancing environmental sustainability, climate action and sustainable development objectives across Europe (European Commission, 2018; 2019a; 2019b; 2020a; 2020b; n.d.a; n.d.b; Council of the European Union, 2018). In alignment with the goals of the European Green Deal and the European Sustainability Development Strategy, non-formal education programmes receive strategic support and funding from various EU initiatives and gain endorsement from European policy-makers and stakeholders. The Council Recommendation on learning for the green transition and sustainable development (Council of the European Union, 2022) serves as a framework for promoting sustainability education and awareness through both formal and nonformal education, emphasising its role in fostering sustainable behaviour. Erasmus+ funding (European Commission, n.d.a) also enables the development of innovative non-formal education programmes that promote sustainability values. The Lifelong Learning Programme (Cedefop, 2024) supports non-formal education projects that promote sustainable development and eco-friendly lifestyles, fostering capacity-building and knowledge exchange. The Youth in Action programme (2024) acknowledges the importance of youth-led initiatives in fostering environmental awareness, and supports non-formal education projects that address environmental issues. Collectively, these programmes foster collaboration, networking and knowledge-sharing among organisations, educators and youth groups dedicated to promoting environmental stewardship. Ensuring a coherent, well-articulated policy vision will enhance the effectiveness and impact of these measures.

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Appendix 1: Acknowledgments

Appendix 2: Defining Terms

Extract from UNESCO Institute for Statistics (2012)

Formal education

> *Formal education is education that is institutionalised, intentional and planned through public organizations and recognised private bodies, and – in their totality – constitute the formal education system of a country. Formal education programmes are thus recognised as such by the relevant national education or equivalent authorities, e.g. any other institution in cooperation with the national or sub-national education authorities. Formal education consists mostly of initial education (see Paragraph 37). Vocational education, special needs education and some parts of adult education are often recognised as being part of the formal education system. Qualifications from formal education are by definition recognised and, therefore, are within the scope of International Standard of Classification in Education (ISCED). Institutionalised education occurs when an organization provides structured educational arrangements, such as student-teacher relationships and/or interactions, that are specially designed for education and learning.*

> *Formal education typically takes place in educational institutions that are designed to provide full-time education for students in a system designed as a continuous educational pathway. This is referred to as initial education, defined as the formal education of individuals before their first entrance to the labour market, i.e. when they will normally be in full-time education.*

> *Formal education also includes education for all age groups with programme content and qualifications that are equivalent to those of initial education. Programmes that take place partly in the workplace may also be considered formal education if they lead to a qualification that is recognised by national education authorities (or equivalent). These programmes are often provided in cooperation between educational institutions and employers (e.g. apprenticeships).*

Non-Formal education

> *Like formal education (but unlike informal, incidental or random learning), non-formal education is education that is institutionalised, intentional and planned by an education provider. The defining characteristic of non-formal education is that it is an addition, alternative and/or complement to formal education within the process of lifelong learning of individuals. It is often provided in order to guarantee the right of access to education for all. It caters to people of all ages but does not necessarily apply a continuous pathway structure; it may be short in duration and/or low-intensity; and it is typically provided in the form of short courses, workshops or seminars. Non-formal education mostly leads to qualifications that are not recognised as formal or equivalent to formal qualifications by the relevant national or sub-national education authorities or to no qualifications at all. Nevertheless, formal, recognised qualifications may be obtained through exclusive participation in specific non-formal education programmes; this often happens when the non-formal programme completes the competencies obtained in another context.*

> *Depending on the national context, non-formal education can cover programmes contributing to adult and youth literacy and education for out-*

of-school children, as well as programmes on life skills, work skills, and social or cultural development. It can include training in a workplace to improve or adapt existing qualifications and skills, training for unemployed or inactive persons, as well as alternative educational pathways to formal education and training in some cases. It can also include learning activities pursued for self-development and, thus, is not necessarily job related.

Informal learning

Informal learning does not fall within the scope of ISCED for measuring participation in education, although recognised qualifications obtained through informal learning are considered when determining educational attainment levels. Informal learning is defined as forms of learning that are intentional or deliberate, but are not institutionalised. It is consequently less organized and less structured than either formal or non-formal education. Informal learning may include learning activities that occur in the family, workplace, local community and daily life, on a selfdirected, family-directed or socially-directed basis. Like formal and non-formal education, informal learning can be distinguished from incidental or random learning.

UNESCO Institute for Statistics (2012)

Vocational education and training (VET)

Learning which aims to acquire knowledge, know-how, information, values, skills and competences – either job-specific or transversal – required in specific occupations or more broadly on the labour market.

VET covers initial vocational education and training, continuing vocational education and training at secondary, post-secondary and higher levels; it plays an increasing role in retraining and upskilling adults; VET can take place in a broad range of – formal and non-formal – settings and – public or private – sectors.

Cedefop (2024b)

Appendix 3.1: Learning for sustainability: skills and competences

Table 1. A comparison of future skills (Marr, 2022) and Competences in ESD (Lozano et al., 2017)

Future skills (Marr, 2022)	Competences in ESD and descriptors (Lozano et al., 2017)	
• Creativity • Curiosity and continuous learning	Anticipatory thinking	• Envisioning, analysis and evaluation of possible futures, including scenarios with multi-generational timescales • Application of the precautionary principle • Prediction of reactions • Dealing with risks and changes
	Systems thinking	• Analysis of complex systems across different scales and domains of enquiry • Comprehension, verification and articulation of a system's key components, structure and dynamics • Attention to systemic features such as feedback, inertia, stocks and flows, and cascading effects • Understanding of complex systems phenomena, including unintended consequences, path dependency, systemic inertia and intentionality • Understanding of connectivity and cause-effect relationships • Application of modelling
• Critical thinking • Judgement and complex decision-making • Time management • Adaptability and flexibility • Embracing and celebrating change	Critical thinking and analysis	• Ability to challenge norms, practices and opinions • Reflection on one's own values, perceptions and actions • Understanding of external perspectives
	Assessment and evaluation	• Development of assessment and evaluation standards and guidelines • Independent evaluations with respect to conflicts of interest and goals, uncertain knowledge and contradictions
	Strategic action	• Ability to design and implement interventions, transitions and transformations for sustainability • Active and responsible engagement in sustainability activities • Development and application of ideas and strategies • Planning and executing projects • Ability to reflect on, and deal with, possible risks • Organisation, leading and controlling processes, projects, interventions and transitions • Identification of scopes of creativity and participation • Taking responsibility for motivating others
	Tolerance for ambiguity and uncertainty	• Coping with conflicts, competing goals and interests, contradictions and setbacks
• Ethical awareness	Justice, responsibility and ethics	• Application of concepts of ethics, justice, social and ecological integrity, and equity • Description, negotiation and reconciliation of principles, values, aims and goals for sustainability • Responsibility for one's actions • Ethics and sustainability in personal and professional behaviour
• Leadership skills • Collaboration and working in teams	Interdisciplinary work	• Appreciation, evaluation, contextualisation and use of knowledge and methods from different disciplines • Ability to work on complex problems in interdisciplinary contexts
• Emotional intelligence and empathy	Interpersonal relations and collaboration	• Participatory and collaborative approaches to solving problems or conducting research • Skills and understanding in communication, deliberation, negotiation, empathising, leadership and collaboration • Ability to deal with conflicts • Learning from other perspectives

Future skills (Marr, 2022)	Competences in ESD and descriptors (Lozano et al., 2017)	
• Interpersonal communication • Cultural intelligence and diversity consciousness • Working in gigs		• Participation in community processes
	Empathy and change of perspective	• Ability to identify one's own and external perspectives • Understanding of and sympathy for the needs, perspectives and actions of others • Ability to deal with internal and external value orientation • Compassion, empathy and solidarity with others across differences • Accepting and embracing a diversity of opinions, experiences or perspectives • Transcultural understanding
• Brand of "You" and networking • Looking after yourself	Personal involvement	• Participation in creating sustainability initiatives • Willingness and ability to take action • Willingness to learn and innovate • Self-motivation • Initiation of one's own learning
• Digital literacy • Data literacy • Technical skills • Digital threat awareness	Communication and use of media	• Ability to communicate effectively in intercultural contexts • Ability to use appropriate information and communication technologies • Critical consideration and evaluation of media

Table 2. Key sustainability actions by individuals, households and communities

Lifestyle domain	Key sustainability actions by individuals, households and communities		
	Refuse	**Effuse**	**Diffuse**
	Refuse targets negative-impact activities – actions by individuals/ households to avoid or reduce unsustainable practices (e.g. avoiding food waste).	Effuse targets positive impact activities by individuals/households that are sustainable (e.g. repair, recycling).	Diffuse collaborative engagement actions with wider communities that provide solutions and reduce environmental impact (e.g. a local community farming allotment).
Generic examples	• boycott • avoid • develop	• eco-innovate • do-it-yourself (DIY) • re-use • conserve	• share • collaborate • localise • eco-innovate
Food	• food waste: schedule meals, use leftovers • distinguish between 'sell by', 'best before' and 'use by' dates. • climate diet – flexitarian and Mediterranean diets. • avoid excessive consumption of animal products	• choose local, fresh, in-season and/or organic produce over exotic and out-of-season options	• initiate healthy and balanced low-impact meals at work canteen • participate in local farmers' market; invest in food cooperatives and community agriculture exchanges • urban vegetable gardens • having a neighbourhood compost bin run by community groups
	Values and conditions for change • *Common good* – the agri-food system is responsible for more than a quarter of greenhouse gas emissions • *Personal interest* – health, savings, quality of life. • *Necessary structures* – evolving from the linear economy to the circular economy		
Mobility	• private car use • single-occupancy driving	• public transport for part of or all of the journey to work • • walking or cycling for very short journeys	• car-pooling scheme or car club • teleconferencing instead of long-distance face-to-face meetings
	Values and conditions for change • *Common good* – air pollution from energy use, road transport, industry and agriculture causes premature deaths in the European Union • *Personal interest* – gains in physical and mental health and savings on fuel, car maintenance and the environment. • *Necessary structures* – car-pooling system and the use of online car-pooling platforms and groups. Existing cycle paths, shared bicycles		
Housing and consumer goods	• large houses (with low occupancy) • excessive water consumption in domestic use • promotions/discounts (read the labels and question the environmental footprint and the real need for each product)	• repair, recycle, replace, repurpose • use containers made from reusable and biodegradable materials • purchasing detergents in bulk • using sustainable technologies (from LED light bulbs to solar-powered appliances)	• start or join a neighbourhood tool library • buying/exchanging used clothes/furniture/utilities • local commercial exchanges (of goods, services and skills); renting less frequently used goods instead of buying • community washing centres; community care for the elderly managed by and for the elderly; parent-led community nurseries

Lifestyle domain	Key sustainability actions by individuals, households and communities		
	Refuse	**Effuse**	**Diffuse**
	Refuse targets negative-impact activities – actions by individuals/ households to avoid or reduce unsustainable practices (e.g. avoiding food waste).	Effuse targets positive impact activities by individuals/households that are sustainable (e.g. repair, recycling).	Diffuse collaborative engagement actions with wider communities that provide solutions and reduce environmental impact (e.g. a local community farming allotment).
	- one-time-use products - multiple and/or large electronic and electrical devices - digital waste (deleting unnecessary emails)	learn to repair what has broken; re-use/renew containers, packaging, plastics and wrapping paper	- cooperative purchasing groups: buy in bulk directly from suppliers. Shop at local markets and stores for regional and seasonal products - find information from trusted sources and experts on environmental action.
	Values and conditions for change • *Common good* – informed and conscious consumption saves the environment. Being informed avoids the perverse mechanisms of fake news and manipulation. • *Personal interest* – informed and parsimonious consumption ensures domestic savings; recycling and recovering damaged goods stimulates creativity, develops personal skills, is innovative, and generates joy and active leisure. Solidarity with donations and exchanges generates joy. Information improves quality of life. • *Necessary structures* – supporting science communication, ethical journalism and local environmental groups to demystify, inform and provide environmental and personal utility. Support for social solidarity actions, local commerce and fair trade, as well as incentives for photovoltaic electrical energy production and storage systems for self-consumption.		
Leisure	- tourism to sensitive biodiversity hotspots - polluting leisure spaces	choose low impact yet enjoyable activities for leisure (gardening, visiting parks, local museums and theatre, cycling and other outdoor activities, volunteering, family parties/picnics)	- participating in or initiating a community allotment project - shared playing spaces for families and friends leisure meetings - participating in voluntary rubbish collection campaigns and actions - planting trees for a healthy environment
	Values and conditions for change • *Common good* – appreciation for and protection of nature and the public space is healthy and improves quality of life. • *Personal interest* – rubbish and pollution in leisure spaces and public spaces is harmful to health, destroys the environment and generates discontent. Vegetable gardens and urban gardens on vacant land owned by the council, in backyards and in personal gardens is a hobby that helps to control stress and provides organic food • *Necessary structures* – leisure spaces, landscaped gardens and parks, play equipment for children, woods and wooded areas. Vegetable gardens and urban gardens on vacant and council-owned land, in communal and personal gardens, are good environmentally and psychologically positive hobbies.		

Note: this structure is based on the REDuse framework – Refuse, Effuse and Diffuse (Akenji & Chen, 2016).

Appendix 3.2: Learning for sustainability: skills and competences

GreenComp (Bianchi et al., 2022), the European sustainable competences framework, has been designed to be a non-prescriptive reference for learning schemes fostering sustainability as a competence. This framework establishes four interrelated competence areas, with each area comprising three interlinked competences, as follows:

1) Embodying sustainability values
   o valuing sustainability
   o supporting fairness
   o promoting nature

2) Embracing complexity in sustainability
   o systems thinking
   o critical thinking
   o problem framing

3) Envisioning sustainable futures
   o futures literacy
   o adaptability
   o exploratory thinking

4) Acting for sustainability
   o political agency
   o collective action
   o individual initiative