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in Highly Competitive Countries:  
Country Reports and International Comparison**

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**Technological and Vocational Education Research Center (TVERC),  
National Taiwan Normal University, Taiwan**

Published in 2025 by  
Technological and Vocational Education Research Center (TVERC), National Taiwan  
Normal University, Taiwan  
162 Hoping East Road, Section 1, Daan District, Taipei 106308, Taiwan

Printed by Wu-Nan Book Inc.  
4F, 339, Hoping E. Road, Section 2, Daan District, Taipei 106103, Taiwan

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(TVERC), National Taiwan Normal University, Taiwan

ISBN 978-626-7545-68-3 (平裝)

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Editors-in-Chief: Yi-Fang Lee and Lung-Sheng Lee  
Editing Assistant: Shan-Yuan Chuang  
Cover Design: The Epoch Times Co., Ltd.

# **Status, Trends and Issues of Education for Sustainable Development (ESD) in Highly Competitive Countries: Country Reports and International Comparison**

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# Preface

Education for Sustainable Development (ESD) is a response to the urgent challenges facing humans and our planet, and its successful advancement requires international exchange, dialogue, and cooperation. Accordingly, the purposes of this book are twofold: (1) to strengthen mutual understanding and foster meaningful connections between Taiwan and other countries in the implementation of ESD in primary and secondary education, thereby enhancing the effectiveness of national ESD initiatives; and (2) to provide opportunities for highly competitive countries to share their experience in advancing ESD, thereby contributing to the international literature and promoting shared prosperity.

In this book, “ESD” is defined as education that empowers learners with the knowledge, skills, values, and agency to address interconnected global challenges (such as climate change, biodiversity loss, the unsustainable use of resources, and inequality), and to meet sustainability-related needs across economic, social and environmental dimensions through a balanced and integrated approach. The term “highly competitive countries,” as used in this book, refers to the top 21 countries (approximately one-third) ranked in the 2023 IMD World Competitiveness Ranking. Contributors from the following ten highly competitive countries have authored their country reports in this book, listed here in alphabetical order: Australia, the Czech Republic, Finland, Hong Kong SAR, Iceland, Norway, Singapore, Sweden, Taiwan, and the United States.

We developed detailed manuscript guidelines, including a set of comparative components, to guide the preparation of each country report, and subsequently invited representatives from these ten selected countries to contribute their experience of implementing ESD. After all country reports were submitted, reviewed, and revised by respective authors, we, together with two doctoral students, conducted a cross-country comparative analysis for the concluding chapter. As a result, this book contains eleven chapters: ten country-specific reports and one cross-country comparative chapter.

We are grateful not only to the K-12 Education Administration, Ministry of Education, Taiwan, for providing funding for this book, but also to all the experts who contributed to its production. It is our sincere hope that this book will contribute to the global advancement of ESD, benefit students, and foster international exchange and collaboration.

Editors-in-chief

A handwritten signature in black ink that reads "Yi-Fang Lee". The signature is written in a cursive style with a long horizontal stroke at the end.

Yi-Fang Lee

A handwritten signature in black ink that reads "Lung-Sheng Lee". The signature is written in a cursive style with a long horizontal stroke at the end.

Lung-Sheng Lee



# **Status, Trends and Issues of Education for Sustainable Development (ESD) in Australia**

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## Abstract

Education that addresses key environmental and sustainability matters has been on the formal education agenda in Australia for over 50 years. However, while much good has happened, the past decade or so has not been prosperous for what is often loosely labelled “environmental education” or “sustainability education.” Currently, there is neither a strong platform nor momentum at Government levels to achieve Agenda 2030 in Australia, while SDG 4.7 on “Education for Sustainable Development” (ESD) is invisible in Government policies and activities. Key factors in shaping the current situation include that the Australian Government de-funded the 2009 national action plan of education for sustainability in 2010, and that sustainability became a cross-curriculum priority in the Australian Curriculum from 2012, but has remained unmeasured and unreported in terms of “student attainment” and policy “progress.” Consequently, much activity has been left to the energy, vision and networks of the committed individual principal or teacher rather than contributing directly to mainstream structures of educational thinking, provision and accountability. Equally, teacher education and professional development is left up to individual institutions as there are no relevant national professional standards. Environmental/sustainability education thus frequently falls between the cracks in government action. There are some promising trends, such as the growing recognition and integration of First Nations’ perspectives into thinking and practice. However, major issues create ongoing challenges. These include having the field formally recognized, administratively supported, and funded in any substantial way. Nevertheless, whether it is the diversity and accessibility of land-based and other environments in Australia, growing concerns about biodiversity, the relatively high levels of support and robustness of its diverse education systems, the near full enrolment of primary aged students, and the continuing high levels of professionalism among teachers, there are strong indicators that the situation could be turned around.

**Keywords:** environmental education, sustainability education, cross-curricular approaches, whole-school approaches, national education declaration

## Introduction

### Schooling

Australia, among other things, is a federation of six states and two territories. In the 2020s, it is characterized by a high-income mixed economy that is strongly intertwined with the countries of East and Southeast Asia, with a population of approx. 27 million (Australian Bureau of Statistics, 2024). In 2024, of people aged 15-74 years: 63% had a non-school qualification; 79% with a non-school qualification, and 58% without, were employed; while 84% who finished a non-school qualification in 2023 were employed in 2024 (Reserve Bank of Australia, 2024). Adults in work or training do so primarily in an economy dominated by the service sector (employing 87% of the workforce, and generating more than 80% of Australia's GDP). Of people aged 15-24 years: 62% were currently studying, and 9% were not engaged in any work or study (Reserve Bank of Australia, 2024). We also note that in Australia, skilled workers (domestic and migrant) have qualifications that include a mix of academic and vocational certifications, with many industries offering opportunities for lifelong learning and further credentialization possible, including in an—at times—fragile “green skills” market and for a “post-carbon workforce” (McCoy et al., 2024).

School attendance is compulsory in Australia, from the age of 5 to approximately 16, with some variation across states and territories. In broad terms, the Australian education system comprises Government (64%), Catholic (20%)

and Independent (16%) schools (Australian Bureau of Statistics, 2024). School income is made up of a combination of government funding, fees and charges, and private contributions. In 2022, government funding made up 96.3% of gross income for government schools, 76.4% of gross income for Catholic schools, and 48.7% of gross income for independent schools (ACARA, 2024a). In the 2021/22 financial year, total recurrent funding for schooling was approx. AU\$54 billion (approx. 9.3% of total government expenditure). In the OECD's Programme of International Student Assessment, the country regularly ranks among the top five of 30 major developed countries, despite ongoing general trends of decline in "performance" (OECD, 2023).

Against this contextualizing backdrop, it is important to note that the Australian Government does not routinely collate data on annual expenditure on environmental or sustainability education from each state or territory, in either academic or vocational settings, while its Survey of Education and Work (ABS, 2024) does not require data to be collected about those who have experienced these either. This means there is no data on the provision of various forms of environmental/sustainability education in the schools' sector, for example, in subject, cross-curricular or whole-school approaches, or as documented in terms of qualifications (e.g., through assessing the relevance of vocational pathways or pre-university study guides or examinations). Equally, recent proxy measures developed for the OECD that have been recommended for Australia, for example on climate-related education (White et al., 2023), or the sustainable development goals (SDGs) on global citizenship education and Education for Sustainable Development, continue to be plagued by technical and conceptual shortcomings (e.g., Atack, 2021; Bourn & Hatley, 2023; Edwards et al., 2024; Yoshida, 2024). This includes in relation to both policy relevance and policy-relevant integration with government monitoring systems and policy reform. Such integration might help counter right-wing narratives in mainstream and alternative media about Australia's past, present, future and progress, including its responsibilities to have a fit-for-purpose education

system in a “settler-colonial state” in the “age of the Anthropocene,” alongside an ongoing (and at times, ill-fated?) quest to regulate education through “evidence-based policy making” (e.g., Bennich et al., 2020; Biesta, 2016; Brennan, 2017; Wescott, 2022).

Understanding how this dire situation of lack of profile, accountability and reform has emerged requires an historical perspective. In the 1901 Australian Constitution, for example, education –and what is now called environment- or sustainability-related matters–was enshrined as a state/territory responsibility. However, the complex realities of shifting priorities and provision are more complicated than these simple ascriptions of governance and regulation suggest. As Heffernan (2021) concisely notes about the history of education in Australia, “Education changed when Europeans invaded Indigenous lands” (unpaginated), prefaced by the acknowledgement that:

Education in Australia’s history stretches back tens of thousands of years, but only a small number of changes have altered its shape in that time. The first period of education lasted for thousands of years and was an Indigenous education as knowledge of religious beliefs, society, and laws was shared from one generation to the next. Knowledge of Australia’s significant environmental diversity was also taught because possessing the skills to find appropriate shelter for the conditions, while developing methods of hunting, gathering, and fishing, was knowledge that needed to be taught to ensure survival (Heffernan, 2021).

The development and maintenance of systems of free, inclusive, public and compulsory education in Australia that form the backdrop for Education for Sustainable Development (ESD) therein, must thus be understood as being rooted in diverse waves of European invasion and settlement in the 19th cen-

ture that principally created systems that largely mimicked those in the UK. Thus, since federation in 1901, a highly differentiated and arguably divisive system of settler colonially-framed approaches to education has emerged—and has remained largely in place (Kenway, 2013)—despite repeated calls for reform (e.g., Campbell & Proctor, 2014). Illustrative features of this system include:

- continued support by “the nation’s wealthiest” for exclusive, fee-charging religious and grammar schools, that “still sees approximately one-third of all school students attending private schools” (Heffernan, 2021);
- the “normalisation of white places in the Australian curriculum” (Smith, 2024) despite the increasing awareness of First Nations injustices and the multicultural nature of modern Australia, that is, propping up a paradigm for learning about Australia and oneself that continues to reproduce colonial epistemologies and marginalize learning about/in/of place rooted in Country; and
- an “intergenerational policy failure” that highlights baked-in shortcomings to the policy architecture for a state/territory system of school-based education (Eacott, 2022).

While the effects of the former are discussed later on in this chapter, the latter, for example, has been shown to correlate closely with:

- current teacher shortages that mitigate against the recruitment and retention of “high quality staff” who feel valued and supported in the profession (Mills et al., 2024);
- layers of segregation and stratification that reproduce socio-educational disadvantage and stymie efforts fostering equity and inclusion (Perry et al., 2024); and
- the de-professionalization and de-democratization of teachers’ workloads even as they, and schools, are “charged with the responsibility” to address “society’s ills” by various policy makers, pundits and “pissants” (Lewan-

dowsky, 2011) trying to shape education within and beyond the remit of government (Smith & Stevenson, 2017).

Government and Catholic schools follow the relevant state or Australian Curriculum, while independent schools generally follow the relevant state/territory or Australian Curriculum but some do follow the International Baccalaureate curriculum or their own philosophy. Since the 1960s the Australian Government has sought to influence state and territory level education through grants programs (such as a States Grant Act for school science laboratories and libraries) (Harrington, 2011). However, as the Gonski Review (Gonski, 2011) highlighted, there are a range of deficiencies that have plagued school funding arrangements, and possibilities for reform, summarized as follows (Commonwealth of Australia, 2014, para 2.34):

When considered holistically, the current funding arrangements for schooling are unnecessarily complex, lack coherence and transparency, and involve a duplication of funding effort in some areas. There is an imbalance between the funding responsibilities of the Australian Government and state and territory governments across the schooling sectors.

There is a distinct lack of coordination in the way governments fund schooling, particularly in relation to directing funding to schools based on student need across jurisdictions and sectors...

It is not always clear which level of government is providing funding, nor what role the Australian Government and state and territory governments should play in funding particular educational priorities.

The Australian Education Act 2013 set out reforms to funding which continue to shape the contemporary schooling situation. Coupled with contested changes to initial teacher education since the mid 2010s (e.g., Loughran & Menter, 2019), a period of widespread change to the sector was also marked by the formalization of a national curriculum. Noting that after much discussion, including over more than 20 years “emphasising education’s contribution to economic productivity” (Brennan, 2011, p. 261), Australia’s education ministers endorsed a national curriculum—the “Australian Curriculum”—and the Foundation-Year 10 curriculum, in September 2015 (ACARA, 2024a, n.p.):

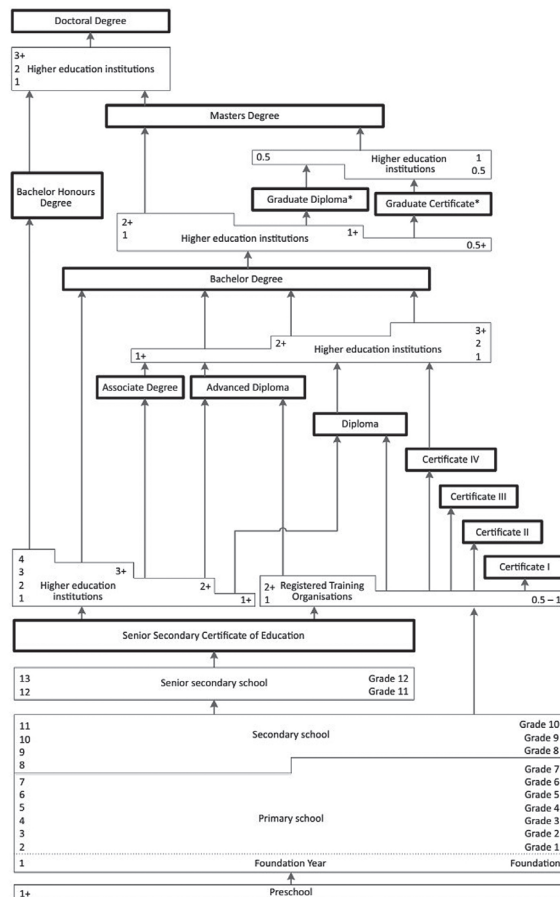
The curriculum provides teachers, parents, students and the community with a clear understanding of what students should learn regardless of where they live or what school they attend. The national curriculum was introduced to improve the quality, equity and transparency of Australia’s education system.

This curriculum has been developed and administered through the Australian Curriculum, Assessment and Reporting Authority (ACARA), which also conducts annual literacy and numeracy testing of students in Years 3, 5, 7 and 9 of schooling. All states and territories have endorsed the Australian Curriculum, which provides general guidelines for Foundation – Year 10 and for 15 senior secondary (Years 11 and 12) subjects across English, Mathematics, Science, History and Geography (ACARA, 2024b). However, only Tasmania, South Australia, the Northern Territory and the Australian Capital Territory (ACT), use the Australian Curriculum. New South Wales, Queensland, Victoria and Western Australia have curriculum statements written by their curriculum authorities. These statements do, at times, differ from the Australian Curriculum, but generally not to any great extent. In all the various curriculum statements, while sustainability is included as a cross-curriculum priority (ACARA, 2024c), this is neither mandated nor assessed; a situation discussed further below.

There is also a national Early Years Learning Framework for Australia (Australian Government Department of Education [AGDE], 2022) which includes sustainability as one of its principles.

In recent years there has also been standardization of the number of years in primary and secondary schooling across the states and territories. Figure 1 presents a generalized view of the Australian education system.

**Figure 1** The Australian Education System



\*Graduate Certificates and Graduate Diplomas are also awarded by Registered Training Organisations (RTOs) as vocational education and training qualifications

Source: Australian Government Department of Education and Training, 2024, p. 6.

The content of teacher education programs for early childhood, primary and secondary schooling is the responsibility of the institution offering the program (usually via certified provision at a university), although these programs do need to meet national standards (AITSL, 2023) to be accredited, and this process is managed at a state/territory level.

## **ESD Policies and Practices**

Echoing many features of Westernized versions of awakening to modern forms of environmental concern over the past 75 years (e.g., Gulliver et al. 2019; Tranter, 2010; Wrigley et al., 2024)—particularly regarding the complex motivations for engaging in action and activism to address what is now termed the “polycrisis” through educational means (Yoshida, 2024)—Australia displays a checkered history in effectively linking educational priorities to environmental challenges (e.g., Gough, 2021; Stevenson, 2022).

In brief, as concerns about the state of the environment developed in the 1960s, the Australian and state governments legislated regarding air and water quality: for example, Victoria’s Environment Protection Authority was established in 1971 under the Environment Protection Act 1970. However, federal and state governments were slower to respond educationally.

In these early waves of policy and practice development, environmental education was seen as a political rather than an educational priority. That it was a national political priority was reflected in the 1973 Australian Labor Party (ALP) platform statement:

This (environmental education) policy aims to facilitate public participation and awareness of the need to preserve the environment by One funding and expanding environment [sic] education and information programs; Two, further developing the environmental education function in the curriculum development centre (Langmore, 1987, p. 7),

The ALP proceeded to enact this policy when it was the elected Government between 1972-1975. The Curriculum Development Centre started its environmental education activities in 1974 (Greenall & Womersley, 1977). Some states (Western Australia and Tasmania [only in draft form], and Queensland) released environmental education policies in the mid 1970s. These may have been prompted by the Curriculum Development Centre's activities in this area (Greenall & Womersley, 1977), or by the 1975 Australian National Commission for UNESCO seminar on education and the human environment (Linke, 1977), reflecting broader international initiatives associated with the early work of UNESCO and UNEP, particularly before a recognizable discourse linking education and sustainability emerged (Reid & Dillon, 2017). However, as Greenall (1987, p. 11) noted about its status in the mid 1980s, "Environmental education was interpreted as education *in* the environment and education about the environment... [and] very few of these activities had attitudinal or action components, 'education *for* the environment'." In addition, none of the policies gave environmental education "a particularly high priority, and few provided much support in the form of resources" (p. 11). The same could be observed for its broad replacement, "education *for* sustainability" (Gough et al, 2024) despite ambitions to steer a different course than that which had happened with environmental education during the UN's Decade of Education for Sustainable Development (e.g., Tilbury, 2004).

Before this, in the late 1980s, the Australian Department of Employment, Education and Training was active in environmental education. They sponsored a Bicentennial Australian Studies Schools Project Bulletin on "Education for the Australian Environment" (Fien, 1988) and released a national environmental education strategy, "Learning for Our Environment" in 1989, which involved \$400,000 in grants for environmental education activities (Anon, 1990). However, nothing further was heard of this strategy (Greenall Gough, 1991), and all future Australian Government environmental education strategies, including various configurations of education and sustainability, have come

from environment departments (Department of the Environment and Heritage (DEH), 2005; Department of the Environment, Water, Heritage and the Arts (DEWHA), 2009; Environment Australia, 2000). The federal education ministry has not addressed environmental education or sustainability since the late 1980s.

Thus, it is perhaps of no surprise that Australia has no national “education for sustainable development”<sup>1</sup> policy. As noted previously, between 2000 and 2010 the Australian Government, through its environment ministry, did have two action plans for environmental/sustainability education – *Environmental education for a sustainable future: National action plan* (Environment Australia, 2000) and *Living sustainably: The Australian government’s national action plan for education for sustainability* (Department of the Environment, Water, Heritage and the Arts (DEWHA), 2009). The Department of Environment and Heritage (2005) also released a national statement on environmental education for schools. However, the environment ministry ceased its involvement in environmental-related education activities in 2010 when the Australian Government withdrew its support for, and involvement in, the implementation of the action plans (Larri & Colliver, 2020).

At a state/territory level, most States and Territories had environmental education policies in the late 1980s/early 1990s, and in the mid 1990s many were looking to revise their policies in the light of the advent of a national curriculum and changes in the governing party at State level (Gough, 1997). The Department of Education in Victoria, for example, issued a new policy statement in 1998, and a New South Wales policy has been in effect since 2001, but these were exceptions. Other states and territories let their policies lapse

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1 Please note that in this chapter the terms environmental and sustainability education, education for sustainability (Efs) and education for sustainable development (ESD) are used interchangeably. The most used terms in Australia are Efs and sustainability education, compared with the international usage of ESD.

or scaled them back to put emphasis on the sustainability of school operations, for example, in an environmental management or “greening of the campus” mode (e.g., Prabawa-Sear & Dow, 2018). As office holders of the Australian Association for Environmental Education (Watterson et al., 1995, p. 1) noted in the mid 1990s:

One of the main barriers facing attempts to promote consistent government responses on environmental education is the fluctuating and sometimes cyclical nature of public policy priorities. Our lobbyists have often succeeded in having initiatives announced only to see these gains eroded by lack of will to implement them, funding changes, or changes of government. A frequent result is the provision of government programs that are fragmented, variable and often short term.

As signaled above, in recent years three states have produced environmental sustainability policies. The ongoing New South Wales policy (which was revised in 2020) has its emphasis on School Environment Management Plans and a whole school approach, the Queensland policy (2024) is focused on cost savings, whereas the Victorian (2023) and Western Australian (2024) statements take a more holistic approach, including a school’s community. It is important to note, however, that none of these policies are formerly titled “Education for Sustainable Development” in line with, for example, international expectations for consistency and inter-comparability of approach and provision, by UNESCO (2020), for example, on SDG 4.7, or more recently, its Greening Education Partnership.

## The Status of ESD

Although Australia is a signatory to the United Nations 2030 Agenda for Sustainable Development, from the Government's official reporting on progress towards the SDGs (Department of Foreign Affairs and Trade (DFAT), 2018a, 2018b; Department of Education, 2022), it is apparent that the SDGs are not being taken seriously with respect to environmental or sustainability education programs. This has significant implications for how environmental/sustainability education is being supported in the states and territories, and in relation to any research or development, or innovation funding for schools and curriculum.

That the Government is not seriously engaging with the SDGs is starkly illustrated in this notice on the Department of Climate Change, Energy, the Environment and Water (DCCEE) website (<https://www.dcceew.gov.au/environment/international/2030-agenda>):

### **Notification – Australia's Reporting Platform on the Sustainable Development Goals**

The Australian Government's Reporting Platform for the Sustainable Development Goals (SDGs) will be closed from Sunday 10 March [2024]. This is due to unsupported software.

The Australian Government remains committed to the 2030 Agenda and its SDGs.

Alternative options for managing Australia's national SDGs data and reporting are currently being explored.

To reiterate, a situation where a government could allow the reporting website

to lapse speaks of its token engagement with the SDGs, and the continued failure to plug significant data gaps since 2018. This is even as the major political parties in power change, including most recently, back to the ALP (cf. Allen et al., 2024; Bolton, 2021). There is a new website, Sustainable Development Goals Australia (<https://sdgs.org.au/>), developed by the Global Compact Network Australia (GCNA), with the support of the Australian Government: “to provide Australia with a live and ongoing platform to centralise and showcase action being taken across government, business, civil society and academia to advance the SDGs in the Australian context.” While there are lots of projects listed on the website, several of which relate to environmental education, none seem to derive their financial support from the Australian Government, or directly link to ACARA.

As Klees (2024) argues from an international survey of progress towards Agenda 2030, a key proximal cause of failure in relation to SDG 4 is a failure to finance SDG 4; or as Buchanan (2024) observes, “Australia is meeting the education targets, but on the cheap” by failing to invest in essential infrastructure, “especially our educators.” Even so, while both Kless and Buchanan omit reference to the specifics of SDG 4.7, they have helped document underinvestment in early childhood education, disadvantage in primary and high school students with Aboriginal and Torres Strait Islander heritage, rural students and learners with disabilities, each of whom continue to have poorer educational outcomes than their more advantaged classmates in relation to SDG 4, and by extension, SDG 4.7. These and related findings (e.g., Sonter & Kemp, 2021), reinforce the concerns expressed earlier about having a holistic sense of the configuration and especially, financing of the educational sector in Australia, to comprehend the effects of various barriers and enablers to effective provision of environmental and sustainability education. Disappointingly, this particular blindspot is also replicated in the AGDE’s (2024) midterm review of SDG 4 progress. As with UNESCO’s (2021) *Futures of Education* report, the Australian Government now appears more pre-occupied with “the digital

transformation of education” and “harnessing AI tools to support teaching and learning” with only cursory consideration of the broader vision and need for the SDGs (AGDE, 2024, p. 4), as found in the final of two aspects for its “moving forwards” section:

Lifelong learning can support all learners to become informed and active global citizens, with the skills to respond to the social, economic, environmental and technological challenges of the future. Australia is embracing innovative and flexible learning options for education delivery – such as online and hybrid learning models, and micro-credentials – as mechanisms to address current and emerging skill needs through quick and flexible options for upskilling and reskilling.

The Australian parliamentary (Foreign Affairs, Defence and Trade References Committee [FADTRC], 2019) Senate Committee report on the UN SDGs, and especially, para 4.1 on “Partnering with other levels of government,” significantly continued to take responsibility and demonstrated lack of concerted political will to better represent the problem at hand, including how to address it in relation to SDG 4 and SDG 4.7; to wit:

Evidence received during the inquiry largely focused on the national government level. However, Australia's first voluntary national review (VNR) noted that ‘many targets in the SDGs are in the purview of subnational levels of government’.<sup>2</sup> Therefore, the committee heard that, to ‘be effective, a governance structure that provides for coordination and communication across the Australian Govern-

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2 Australian Government, Report on the implementation of the Sustainable Development Goals, 2018, p. 12.

ment and between the three levels of government will be needed'.<sup>3</sup>

In short, ESD continues to fall between the cracks in Government actions. This is despite the Department of Education (2022, p. 1) claiming in a statement on “transforming education,” “Australia meets the majority of targets under SDG4 and we are committed to continuous improvement to exceed all targets.” However, it is difficult to see how this can be true when there is no mention of Target 4.7 (which includes ESD), and “environment” only appears once: “Lifelong learning can support all learners to become informed and active global citizens, with the skills to respond to the social, economic, environmental and technological challenges of the future” (p. 4).

Compounding this problematic situation, whereas in the past (up to 2010) the national environment department has taken a leading role in supporting environmental education, the current Department of Climate Change, Energy, the Environment and Water (DCCEEW) website entry regarding the 2030 agenda (<https://www.dcceew.gov.au/environment/international/2030-agenda>) does not mention education either as its direct responsibility or as a contributor to other goals and departments:

We actively participate in the whole-of-government approach to the 2030 Agenda. We have direct responsibility for 6 of the goals. These are:

Goal 6 – Clean water and sanitation

Goal 7 – Affordable and clean energy

Goal 12 – Responsible production and consumption

---

3 City of Sydney, Submission 54, p. 5.

Goal 13 – Climate action

Goal 14 – Life below water

Goal 15 – Life on land.

We also contribute to goals led by other Australian Government departments including:

Goal 2 – Zero hunger

Goal 9 – Industry, innovation and infrastructure

Goal 11– Sustainable cities and communities

Goal 17 – Partnerships for the goals.

So, while since the dawn of Agenda 2030, the two-way linkages and spillover effects between SDG 4 and the other links has been widely known (Vladimirova & Le Blanc, 2015), it looks like there is still no one nationally owning environmental/sustainability education beyond the Australian Curriculum, and its commitment is very marginal beyond being positioned as an “elaboration” or “curriculum connection”; in other words, rarely as “reportable content” (see Gough et al., 2024) for further discussion of this aspect).

### **Actions Taken and Performance Achieved for ESD**

The UNESCO (2020) roadmap has been largely ignored in Australia, in both mainstream and specialist provision (Gough et al., 2024). Actions towards achieving ESD are very much at the individual school or teacher education institution level.

The main responses to ESD routinely appear via repeated citation of the existence of a sustainability cross-curriculum priority in the Australian Curricu-

lum or by way of voluntary initiatives such as the Sustainable Schools and/or ResourceSmart Schools programs which operate in most states and territories (Larri & Colliver, 2020).

The Sustainability cross-curriculum priority description says the right things:

Young people require the knowledge and skills to engage with contemporary issues such as climate change, biodiversity loss, equitable access to resources, and preservation of cultural and language diversity. They are looking for social, economic and political models that provide solutions to these issues (ACARA, 2024c).

However, there is scant follow through in the curriculum itself, for example, in terms of the scope and sequencing of the curriculum, and measurable / reportable learning objectives (Nicholls, 2017).

**Table 2** A Cross Table of Five Priority Action Areas (UNESCO, 2020) and Four Interconnected Global Challenges

Five Priority Action Areas	Four Interconnected Global Challenges to be Addressed			
	A. Climate change	B. Loss of biodiversity	C. Unsustainable use of resources	D. Inequality
1. Advancing policy	47 mentions of climate change in the Australian Curriculum, mainly at ISCED 2	47 mentions of biodiversity in the Australian Curriculum, mainly at ISCED 2	5 mentions included in the Australian Curriculum, mainly at ISCED 2	53 mentions of inequality in the Australian Curriculum, mainly at ISCED 2
2. Transforming learning environments	State education authorities are starting to respond to living with climate change	A module in the sustainable schools program		Education authorities have inequality policies

Five Priority Action Areas	Four Interconnected Global Challenges to be Addressed			
	A. Climate change	B. Loss of biodiversity	C. Unsustainable use of resources	D. Inequality
3. Building capacities of educators	On an individual institutional basis	On an individual institutional basis	On an individual institutional basis	Appropriate courses for teachers and part of teacher education programs
4. Empowering and mobilizing youth	Groups such as the Australian Youth Climate Coalition have formed	Mainly through environmental organizations	Mainly through environmental organizations	LGBTQI+ groups have formed
5. Accelerating local level actions	Mainly through environmental organizations	Mainly through environmental organizations	Mainly through environmental organizations	Mainly through LGBTQI+ groups

## Key Themes in ESD

### 1. Indicator

Since 1989, some aspects of environmental (and to a lesser degree, sustainability) education have been included in the national goals for schooling. The need for Australian school students to learn about the environment was included in the first national education declaration, the 1989 *Hobart Declaration on Schooling* where one of the 10 goals was, “an understanding of, and concern for, balanced development and the global environment and complex environmental and social challenges” (Australian Education Council, 1989, p. 1). This Declaration was superseded in 1999 by the *Adelaide Declaration on National Goals for Schooling in the Twenty-First Century*. This Declaration moved recognition of complex environmental and social challenges to a “preamble,” and

added a new goal, that students should have “an understanding of, and concern for, stewardship of the natural environment, and the knowledge and skills to contribute to ecologically sustainable development” (Ministerial Council on Education, Employment, Training and Youth Affairs (MCEETYA), 1999, Goal 1.7). This was an expansion of a goal in the *Hobart Declaration*, but it was still missing an action component.

The next Declaration was the 2008 *Melbourne Declaration on Educational Goals for Young Australians*. This expanded on the environmental content of the Adelaide Declaration and recognized the unprecedented challenges posed by climate change. Here, the preamble noted new demands on Australian education, including “Complex environmental, social and economic pressures such as climate change that extend beyond national borders pose unprecedented challenges, requiring countries to work together in new ways” (MCEETYA, 2008, p. 5). The goal accompanying this statement was for students to become “active and informed members of citizens [who] ... work for the common good, in particular sustaining and improving natural and social environments” (p. 9), and the associated action was a resolution that “a focus on environmental sustainability will be integrated across the curriculum” (p. 14). Although sustainability has been included as a cross-curriculum priority in the Australian Curriculum since its inception—and despite attempts to remove it (Donnelly & Wilshire, 2014; ACARA, 2020)—its placement within the curriculum is haphazard, in that it generally develops a shallow understanding of sustainability, if it is taught to students at all (Nicholls, 2017). However, as discussed in the Curriculum section, there is an element of luck that it still appears in national frameworks.

The most recent declaration is the *Alice Springs (Mparntwe) Education Declaration*, which replaced the Melbourne Declaration in December 2019. This simply sees education as preparing “young people to thrive in a time of rapid social and technological change, and complex environmental, social and economic challenges” (Education Council, 2019, p. 2), and repeats the above goal

from the Melbourne Declaration (see also Ham & Menzie-Ballantyne, 2024, on the risks of top-down rather than bottom-up approaches to Sustainability in policy and practice development in Australia). The Declaration is deafeningly silent on climate change (Gough, 2024), and reduces consideration of sustainability in the curriculum to encourage students to “engage with complex ethical issues and concepts such as sustainability” (Education Council, 2019, p. 15).

The Australian Curriculum includes a cross-curriculum priority of Sustainability in addition to the eight learning areas. The priority is based on four sets of organizing ideas (ACARA, 2024c). These are:

**Systems:** The interdependence of Earth’s systems (geosphere, biosphere, hydrosphere and atmosphere) that support all life on Earth, and social and economic systems.

**World views:** The role of world views (sets of attitudes, values and beliefs) that shape individual and community ideas about how the world works and our role in the world.

**Design:** The role of innovation and creativity in sustainably designed solutions, including products, environments and services, that aim to reduce present and future impacts or to restore the health or diversity of environmental, social and economic systems.

**Futures:** Ways of thinking and acting that seek to empower young people to design action that will lead to an equitable, sustainable and inclusive future.


While these organizing ideas may look good, they are not reflected in the content statements or supporting elaborations of the various learning areas in the Australian Curriculum. Nor are they assessed in any way so there is no accountability.

## ***2. Competence***

There are no competences identified.

## ***3. Curriculum***

As previously noted, Sustainability is a cross-curriculum priority in the Australian Curriculum (ACARA, 2024c) which is neither mandatory nor assessed.

Content that is seen as related to the cross-curriculum priority is indicated by the symbol . In previous iterations of the curriculum the symbol was a leaf which reinforced the association of sustainability with the environment. Arguably the new symbol is more encompassing of all ESD entails, for example, the global citizenship component of SDG 4.7.

The Sustainability cross-curriculum priority is theoretically connected to all eight learning areas of the Australian Curriculum (ACARA, 2024c), but there is no sustainability content in Mathematics.

There is also a senior secondary curriculum for Earth and Environmental Science (ACARA, 2024d) and for Geography (ACARA, 2024e) which are two of many subjects available to students at the ISCED3 level. Both subjects have explicit connection to the themes of the Sustainability cross-curriculum area.

It is important to note that the inclusion of sustainability as a cross-curriculum priority in the Australian Curriculum is precarious. In 2014, the then Minister for Education commissioned a review of the Australian Curriculum which included looking at reducing the perceived overcrowding of the curriculum and which recommended: “ACARA reconceptualise the cross-curriculum priorities and instead embed teaching and learning about ... sustainability explicitly, and only where educationally relevant, in the mandatory content of the curriculum” (Donnelly & Wiltshire, 2014, p. 247). Fortunately, this recommendation was not implemented. However, a second review of the Australian Curriculum

was undertaken by the ACARA in 2020-21 at the request of the national Education Council. Included in its terms of reference was to “rationalise and improve content elaborations, ensuring they are fit for purpose and they suggest to teachers the most authentic ways to treat general capabilities and cross curriculum priorities when teaching the learning area content” (ACARA, 2020, p. 2). Specifically,

The review will look to:

- a. revisit and improve if necessary, the organizing frameworks for the cross curriculum priorities with reference to current research
- b. declutter the content of the Australian Curriculum by improving the relationship of the cross curriculum priorities to learning area content, removing any repetition of content between the cross curriculum priorities and the learning areas, and replacing the current ‘icon tagging’ for cross curriculum priorities on the Australian Curriculum website with a more user-orientated approach (ACARA, 2020, p. 5).

The Review panel released a consultation paper in April 2021 which stated,

revisions to the sustainability cross-curriculum priority reflect evolving understanding of the concepts that underpin sustainability and the features of effective sustainability education. In particular, the revisions position the priority with reference to the Alice Springs (Mparntwe) Education Declaration (2019) and the United Nations Sustainable Development Goals (ACARA, 2021, p. 2).

In particular, the Review panel claimed that these revisions:

Broaden actions for sustainability to include the mitigation of human impacts and restoration of environments, in addition to preservation.

Provide clearer support to explore how individuals and communities can take action and effect positive change.

Ensure that organizing ideas fit naturally within learning areas and can be applied to content descriptions and elaborations (ACARA, 2021, p. 2).

While the reduction in emphasis on sustainability and the environment (including issues such as climate change) is consistent with the approach taken in the *Alice Springs (Mparntwe) Education Declaration* (Education Council, 2019), the link to the SDGs is puzzling, except as an example of greenwashing, given that (as already discussed) the Australian Government is displaying token engagement with the SDGs, as well as other United Nations initiatives such as UNESCO's (2020) roadmap for ESD.

#### ***4. Formal Education***

There is no consistent implementation of ESD in Australian schools. While there is the Sustainability cross-curriculum priority in the Australian Curriculum documents and the state and territory variations, K-12 classroom teachers have control of what and how (and if) they teach sustainability content.

Schools that participate in Sustainable Schools, ResourceSmart Schools and EcoSchools programs are more likely to be teaching sustainability, as are schools that visit field study centers and similar facilities if they exist in their state or territory.

## ***5. Teacher Training***

Pre-service teacher education programs in each institution are individually accredited by the Australian Institute for Teaching and School Leadership (AITSL) (2023) according to their standards and procedures. ESD is not included as one of the standards so there is no requirement for the programs to include it. There have been several studies of what is needed to embed ESD in teacher education (Ferreira et al., 2009, 2019; Gough, 2016; Stevenson et al., 2014) but there has been little movement in this regard, and the constraints of the AITSL standards leave little room for its inclusion.

Pre-service programs for science and geography teachers will include sustainability content, but for other learning areas inclusion of relevant content is up to the individual institution or academic in charge of a program. For example, Monash University incorporates core and elective units about environmental/sustainability education into its early years, primary and secondary education programs (e.g., <https://handbook.monash.edu/2024/units/edf5043>, <https://handbook.monash.edu/2024/units/EDF1078>), while other providers use professional development certificates, for example, in partnership with state government (<https://education.nsw.gov.au/teaching-and-learning/curriculum/sustainability/professional-learning/>).

In-service teacher education activities and supporting resources are offered by groups such as Environment Education Victoria (<https://www.eev.vic.edu.au/>), Environmental Education New South Wales (<https://aaensw.org.au/>), and by field study centers in several states and territories. The Australian Association for Environmental Education chapters in some states and regions also offer activities (<https://www.aae.org.au/get-involved/your-chapter-or-branch/>).

## ***6. Non-Formal Education***

ESD-related activities and campaigns, generally related to the environment,

are the focus of a wide range of community groups such as Greening Australia (<https://www.greeningaustralia.org.au/>) who organize tree plantings, ecosystem restoration, and so on. To illustrate a state-level organization, Environment Victoria has a long list of members (<https://environmentvictoria.org.au/get-involved/membership/group-members-directory/>) and has equivalents in other states and territories.

Museums, zoos, aquariums, and so on in each state and territory also organize ESD-related activities through directed and free-choice learning: see, for example, Zoos Victoria (<https://www.zoo.org.au/>), and Melbourne Museum (<https://museumsvictoria.com.au/melbournemuseum>), as do their equivalents in other states and territories. In many instances the zoos and museums also have an education service staffed by qualified or/and registered teachers which offers structured programs directly to students and for teachers as well as more informal activities.

## ***7. Social Partnership***

Many environmental organizations engage with social partners to sponsor their programs and activities such as conferences. For example, Environment Victoria's partners (<https://environmentvictoria.org.au/who-we-are/our-community/>) include foundations (Hamer Family Fund, Lord Mayor's Charitable Foundation, Mullum Trust), trade unions (Electrical Trades Union, Victorian Trades Hall Council), religious groups (Anglicare, Quang Minh Temple), local government (Brimbank City Council, Darebin City Council), resident groups (Flemington Association, Morwell Neighbourhood House), ethnic groups (Victorian Arabic Social Services, Spectrum Migrant Resource Centre), community support groups (Centre for Multicultural Youth), universities, as well as like-minded groups (Greenpeace, The Wilderness Society).

The 2023 Australian Association for Environmental Education conference attracted a range of sponsors (<https://aaeeconference.org.au/sponsor23-2/>),

though there were no big business or industry partners.

The ResourceSmart Schools Awards in Victoria have sponsors—a bank, the Department of Education and the state recycling scheme—but they are obviously keen for more sponsors (<https://www.sustainability.vic.gov.au/our-work/resourcesmart-schools/resourcesmart-schools-awards-and-competitions/resourcesmart-schools-awards/resourcesmart-schools-awards-sponsors>).

Greenwashing by businesses has become an issue in Australia (see AESA, 2014). In a 2022 internet sweep of businesses by the Australian Competition and Consumer Commission (ACCC), “57% of businesses raised concerns because of using vague or unclear environmental claims, not providing sufficient evidence for their claims, setting environmental goals without clear plans for how these will be achieved, and/or using third-party certifications and symbols in a confusing way” (ACCC, 2023, p. 1).

## **Features of ESD**

A key feature of ESD in Australia is that, even 50 years after the introduction of environmental education, it is still not formally institutionalized in Australian schools. Despite this, many schools engage with some form of sustainability education, often because committed teachers recognize that schools are a key vehicle for reproducing late capitalist forms of exploitation of ecology, economy and humanity, and this needs challenging during formal education (Gough, 2021). Also, while not connected to the UNESCO (2020) roadmap nor mandatory in the curriculum, field study (environmental education) centers in several states continue to deliver relevant programs and develop place-based pedagogies attuned to Australian conditions and concerns (Renshaw & Tooth, 2018). Further features of ESD in Australia include the following.

***ESD in Australia is framed by a mainstream background culture primarily indexed to individualism, functionalism in education, and a***

### ***neoliberal political economy***

While scholarship and advocacy in environmental/sustainability education continues to critique each component of this framing and the ideologies and worldviews associated with those, a broad-based emergence and embedding of a critical consensus that aligns ESD with broader commitments for “living well in a world worth living in for all” (Reimer et al., 2023) is yet to materialize.

### ***ESD has failed to become formally institutionalized in Australian schools***

Although sustainability is a cross-curriculum priority in the Australian curriculum, it is neither mandated nor assessed, and therefore frequently not taught as other matters take priority. The only separate subject directly aligned with core aspects of ESD is optional and at the senior science level—Earth and Environmental Science—which focuses on content knowledge about the environment and not attitudes and actions for the environment (Gough et al, 2024).

### ***Schools active despite government inaction***

Although the Australian government ceased its financial and policy support for ESD in 2010, schools have continued to participate in programs such as Sustainable Schools, ResourceSmart Schools and EcoSchools (Larri & Collier, 2020).

### ***Field study (environmental education) centers and pedagogies of place***

Field study centers were originally established in several states to provide fieldwork opportunities for the school biology and geography curricula. Over the years centers have developed their own individual character and now provide students with a diverse range of experiences related to place-based envi-

ronmental education, including understanding First Nations ways of knowing the land and sea.

These centers operate outside many of the constraints of schools, although they still follow the relevant curriculum of their location. Many are able to extend and enhance the content from their particular perspective and interests to make their programs engaging for students, and contribute to both environmental and sustainability education. They are also able to explore new ways of working with schools and with students, such as through “Australian forms” of pedagogies of place (Renshaw & Tooth, 2018).

## **Trends and Issues in ESD**

### **Trends**

The following are trends, including aspirational aspects, for ESD, in Australia.

#### ***Climate change awareness and action***

Despite the lack of national action on climate change and only token coverage in the Australian Curriculum (Whitehouse & Gough, 2022), several states have instigated enquiries into how climate change will affect both schools and schooling, and have proposed actions to address these impacts. For example, the New South Wales Department of Planning, Industry and Environment funded a report into improving the resilience of schools to summer heat (Pfautsch et al., 2020), the Victorian Government has an Education and Training Adaptation Action Plan (DEECA, 2022), and the Western Australian Parliament (2022) held an inquiry into the response of Western Australian schools to climate change. In addition, the South Australian Department of Education is supporting Carbon Neutral Adelaide (n.d.). The Tasmanian Department of

Premier and Cabinet states that “A range of climate change and sustainability programs are currently being implemented in Tasmanian schools” ([https://www.dpac.tas.gov.au/divisions/archived-climatechange/what\\_you\\_can\\_do/schools](https://www.dpac.tas.gov.au/divisions/archived-climatechange/what_you_can_do/schools)), and in Queensland, climate action is combined with the sustainable schools initiative (<https://education.qld.gov.au/initiatives-and-strategies/strategies-and-programs/sustainable-schools>). This is also the case in the Australian Capital Territory (<https://www.climatechoices.act.gov.au/policy-programs/sustainable-schools-program>).

The ground swell for this emphasis is also evident in schools and students increasingly engaging in responding to climate change, recognizing too broader shifts internationally in “generational responses” to this issue that often foreground the importance of student voice in curriculum making (for example, from the USA, Swim et al., 2022, discuss a shift towards a focus on climate justice rather than climate science alone). Closer to home, a 2022 special issue of the *Australian Journal of Environmental Education* (Verlie & Flynn, 2022, p. 1) found:

Five key themes emerge from this special issue: (1) students are striking because of the affective weight of climate injustice; (2) students learn through their participation in striking, in contrast to the often insufficient climate change education taught in schools; (3) young people are becoming climate change educators through their roles as strikers; (4) strikers are patronised through paternalistic structures (including schooling) that ostensibly exist to protect them; and therefore (5) we need to reimagine education.

### ***Policy and practice development for ESD is not a priority***

Twenty years ago, Gough (2004, p. 31) described a situation where “teachers

often struggle to teach science/environmental education because they are not confident and competent in the content, lack curriculum resources and equipment, have inadequate time to prepare, and have difficulty finding a place for science/environmental education in what they perceive as an already overcrowded curriculum.” Little has changed in the situation in initial teacher education and continuing professional development, even while the terminology has.

### ***Decline and de-legitimation of effective outdoor education provision as a vehicle for education for sustainability***

A trend that was developing prior to the COVID pandemic but which has been exacerbated since, is the reduction in providing students with outdoor experiences, on school grounds and further afield. With school closures during COVID and the switch to learning online, outdoor experiences became virtual and in some instances have remained so (e.g., virtual excursions), even though there is scant evidence for the benefits of such experiences (Quay et al., 2020). The regulations for taking students out of school have also tightened (see, for example, <https://www2.education.vic.gov.au/pal/excursions/policy>), while the need to pay teachers extra when on school camps (Carey & Precel, 2023) has created other forms of deterrent.

### ***Working with First Nations peoples***

A notable trend over the last decade and a half in Australia has been the increased public recognition of the original human inhabitants of the country. For example, Welcome to Country ceremonies are performed at the beginning of public events by a traditional custodian of the land on which it is occurring to acknowledge the cultural significance of the local area to the descendants of the original Aboriginal clan or language group. Equally, many schools will provide a direct Acknowledgement of Country at the start of the school day, and indirectly through signage and policy documentation that highlight key

aspects of Aboriginal worldviews, including for example, the injunction to Care for Country.

The significance of historical places and lives for different Indigenous groups has increasingly received more attention in both schools and, for example, in programs for schools offered by environmental education centers. Indigenous knowledge and traditional land management strategies are an integral part of many center programs that focus on place-responsive teaching and learning (Renshaw & Tooth, 2018). These programs often include students meeting local Indigenous people to hear their stories, including how surrounding resources were used in a range of practices, including culturally, medicinally, ethically, and for trade. These meetings reveal different ways of knowing and being in Aboriginal culture and can be mobilized as part of place-responsive pedagogies in which educators are articulating such stories and uses, and then developing a place-responsive pedagogy to engage students (Renshaw & Tooth, 2018).

### ***Learning for action***

While perhaps more of an aspirational trend, some schools in Australia have embraced a socially critical approach to environmental education (e.g., 30 years ago, see Greenall Gough & Robottom, 1993), with a social inquiry or project-based approach to investigating environmental issues continuing in many schools to provide students with opportunities to learn for action and citizenship. The UNESCO (2020) ESD Roadmap appropriately positions children and young people as capable and active agents of change. This is a responsibility many young Australians are willing to carry as they understand the uncertainties as to their future quality of life, the stabilities of their cultures and societies, and the habitability of the planet, as evidenced by global protest movements (including the school climate strikes and Extinction Rebellion). On the one hand, young Australians are making it clear that the lack of urgent global and national action in the face of climate disruption has pushed them

to collective activism to address such inertia (Verlie & Flynn, 2022, and the related special issue of the *Australian Journal of Environmental Education*). On the other, their activism is a clear signal of the failure of educational institutions, politicians, policy makers, corporations and governments to directly address young peoples' heightened concerns.

At the formal education level, and not always tied to climate change but still engaging other aspects of sustainability, for the last 20 years, Student Action Teams (SATs) have been a feature of many schools in the state of Victoria. Students in these teams identify and investigate “an issue of concern within their school and/or (hopefully) wider community and then plan and take action to improve” the situation (Mayes & Holdsworth, 2020). This educationally rich approach can be an important means for young people to construct visions of and possibilities for alternative, positive futures.

## **Issues**

Various issues arising from this analysis affect ESD implementation in Australia:

### ***Lack of commitment to ESD by governments***

ESD is still not overtly recognized by national, state or territory governments. Climate change as a political focus would seem to be a key vector for ESD entering onto the main stage, rather than remaining as a side act, to curriculum thinking and making, so to speak, particularly if “joined up government” is to occur (see the section on **Status of ESD**).

### ***Lack of traction of ESD in initial teacher education and ongoing professional development***

The Australian Professional Standards for Teachers (AITSL, 2023) drive understandings of what it means to be a qualified teacher in Australia, at “gradu-

ate,” “proficient,” “highly accomplished” and “lead” levels. Arguably, until these standards directly address genuine forms of, and commitments to, education for sustainability, there is no imperative for Australia’s teaching workforce, and related agencies, to build educator capacities in ESD. Graduate level programs in ESD are rare, and starkly differ from previous opportunities to participate in, for example, Masters level study of environmental education, and other routes to mainstreaming ESD in preservice teacher education (Ferreira et al., 2007).

### ***Effects of power struggles between UNESCO and OECD leading to moments of “capture” in academic leadership and direction regarding ESD***

Addey (2024) illustrates how power struggles over the making and monitoring of global learning metrics for SDG4 severely compromise the autonomy and priorities of various stakeholders in education. Issues flow from the effects of machinations by policy entrepreneurs, careerism in academia, and various “squabbles” over the production and curation of technical expertise, data and information. As Unterhalter (2024) has warned for the overarching goal and various targets for SDG4, the uses to which metrics can or should be put also requires attention to ethics, if not an “ethics of care.” This includes addressing the perverse logics and effects on those in the education system of being subject to “global monitoring,” and the risk of exercises in “soft power” that distort legitimate concerns such as how schooling addresses gender inequality (Kwauk & Wyss, 2022) in genuine ways, rather than continuing to see the “metrics” tail wagging the proverbial dog. As noted in the introduction, Australian academics are not immune to these risks, and educational scholarship, initial teacher education, and consultancy/partnership work must take heed of calls for transparency and accountability in an increasingly “uncertain world” (Hardy, 2024).

### ***Confusion about the meaning of ESD***

The discourse in Australia in the 1990s changed from environmental education to ESD for some people, but there was also the introduction of education for sustainability (as distinct from education for the environment) (Gough, 2024). While there was an embracing of the term ESD or sustainability education, what often happened in practice was a continuation of environmental education without great consideration of the social or economic dimensions, even as the label ESD was adopted (Gough, 2017). This has continued into the latest version of the Australian Curriculum (ACARA, 2024c).

### ***Meaningful, locally determined measures for monitoring and evaluation of ESD have not been developed to demonstrate ESD impact and influence***

Related to the previous point, while sustainability is a cross curriculum priority in the Australian Curriculum, there are no reporting requirements on this, nor is there any assessment of student learning and skills in this area, including in relation to what matters to Australia.

### ***Crude instrumentalism and homogenization of ESD arising from repeated focus on cognitive, socio-emotional and behavioral learning domains to the exclusion of other framings for ESD***

Building on the previous point, Crossley (2019) and Knutsson (2019) among others draw on comparative and international education to warn of the uncritical transfer of policy, and powerful policy logics/frames that privilege “reference societies” through various awards and benchmarking exercises of “what works,” or is supposed to work for addressing global challenges. Risks include directly or inadvertently fostering “convergence” and the eradication of difference about how to talk about and report on education, including those and specific Indigenous perspectives and concerns, and undermining efforts to stand

out against homogenized accounts (e.g., in Africa, using Ubuntu as a counter frame/cosmology for education on environmental and sustainability matters; Kyei-Nuamah & Peng, 2024). In relation to ESD in Australia, there are efforts to “keep the conversation going,” by supporting ongoing professional and academic engagement with the task at hand, such as through engaging the work and rejuvenation of a diverse community of stakeholders (Stevenson, 2022):

Treating and assessing approaches to ESE...only in terms of what works in the current structural and cultural arrangements of the school or other educational context should be avoided. Communicative space for open-ended critical inquiry must be created in which understanding and interpreting conditions that constrain actions for changing unsustainable practices are addressed. Reconciling both educational and sustainability practices and conditions that contribute to more sustainable communities is the necessary urgent challenge facing both researchers and educators.

### ***Increased focus on social and cultural sustainability not integrated with environmental sustainability***

Concerns about gender-based violence have had a big impact on the latest version of the Australian Curriculum, and there is an increased focus on First Nations (Aboriginal and Torres Strait Islander) connections through the related cross-curriculum priority. However, none of this is related to environmental sustainability or even the sustainability cross-curriculum priority (ACARA, 2024b). This is a major issue that needs addressing.

### ***Sustaining sustainability in schools***

While many schools sign up to and even complete a “sustainable schools” program (Larri & Colliver, 2020), there are major problems with sustaining the

initiative once the status has been achieved (Edwards, 2016). There remains too much reliance on champions (who risk burnout or leaving) in the schools rather than wide ownership of the priority, and school leadership ownership is essential but often missing. This is related to the next issue.

### *Achieving a whole school approach*

There has been advocacy for a whole school approach to sustainability education for over 2 decades (DEH, 2005), but this is rarely achieved. Other adjectival educations, such as those focused on gender-based bullying (<https://www.schools.vic.gov.au/safe-schools>) have been much more successful in becoming a sustained priority in schools.

## Conclusion

Although perhaps seemingly slow to respond to the environmental crises of the late 1960s/early 1970s from an educational perspective, upon returning from participating in the 1975 UNESCO Belgrade workshop (that developed the Belgrade Charter for Environmental Education) Fensham (1976) commented that, at that time, Australia was way ahead of much of the rest of the world with respect to engaging with environmental education, but that the “head start advantage” could rapidly dissipate. A “resource rich,” tourism and service sector driven economy is a shorthand for many people’s perception of Australia beyond its shores, and to support that, amongst other things noted in this chapter, requires deliberate efforts in education and training to foster stewardship and learning about its lands, seas and peoples—and more.

Five decades on, the Australian Government has continued to squander this situation by marginalizing ESD and related aspects of environmental education at all levels. Some states and the Australian Capital Territory are engaging

with ESD through concerns about climate change adaptation, either through management strategies or Sustainable Schools initiatives, but this is not greatly reflected in the Australian Curriculum nor in the state/territory equivalents, including how to prepare an Australian workforce and citizenry for living in and beyond the middle part of the 21<sup>st</sup> century.

Nevertheless, there remains much activity at the school level in many States and Territories by committed teachers and educators, and supportive communities, and evidence of student voice and activism as reflected through protests about climate change.

As this chapter has shown then, there are many issues still to be addressed, and while there are positive trends, many challenges have to be faced to turn the situation for ESD in Australia around, to the benefit of all who live, and remain committed to this “lucky country.”

## **Acknowledgement**

This chapter was written on the unceded lands of the Woi wurrung and Boon wurrung peoples of Naarm (Melbourne) and the unceded lands of the Turrbal and Jagera peoples of Meanjin (Brisbane); and we respectfully acknowledge their Elders, past and present, and what they have taught us about this land and sea. The chapter also draws on some of our previous writings including Gough (2024) and Gough et al. (2024).

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# **Status, Trends and Issues of Education for Sustainable Development (ESD) in the Czech Republic**

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## Abstract

This chapter provides a comprehensive overview of the current state of Education for Sustainable Development (ESD) in the Czech Republic. It covers the historical development and the structure of the education system and relevant policies, emphasizing the integration of ESD into formal and non-formal education. The leading documents covering early childhood to upper secondary education are the Framework Educational Programmes (FEPs). The recently revised FEP document outlines curricular principles aimed at integrating competences (i.e., for citizenship and sustainability) and cross-cutting issues (i.e., a society for all and a sustainable environment). These principles were designed to address key challenges of the past, including a lack of emphasis on active and participatory learning methods, which often resulted in passive learning environments dominated by frontal teaching, thus hindering the development of critical skills such as independent decision-making, critical thinking and effective communication. In the new curricula, innovative pedagogical methods should systematically implement ESD as a transdisciplinary theme across the curriculum. Structural and institutional challenges will be consequently addressed, including the fragmented nature of teacher education, which remains discipline-based and often lacks the interdisciplinarity required to effectively teach sustainability. In this context, the role of non-governmental organizations (NGOs) and their collaboration with schools and universities through innovative programs and partnerships are crucial. However, there are issues of accessibility and equity in environmental education, as many non-formal Environmental Education and ESD programs are voluntary and therefore tend to be attended by children from middle and upper socio-economic backgrounds, excluding those from disadvantaged backgrounds. To address these challenges, recent curriculum revisions and strategies aim to improve the integration of sustainability and climate change into compulsory education through formal curricula.

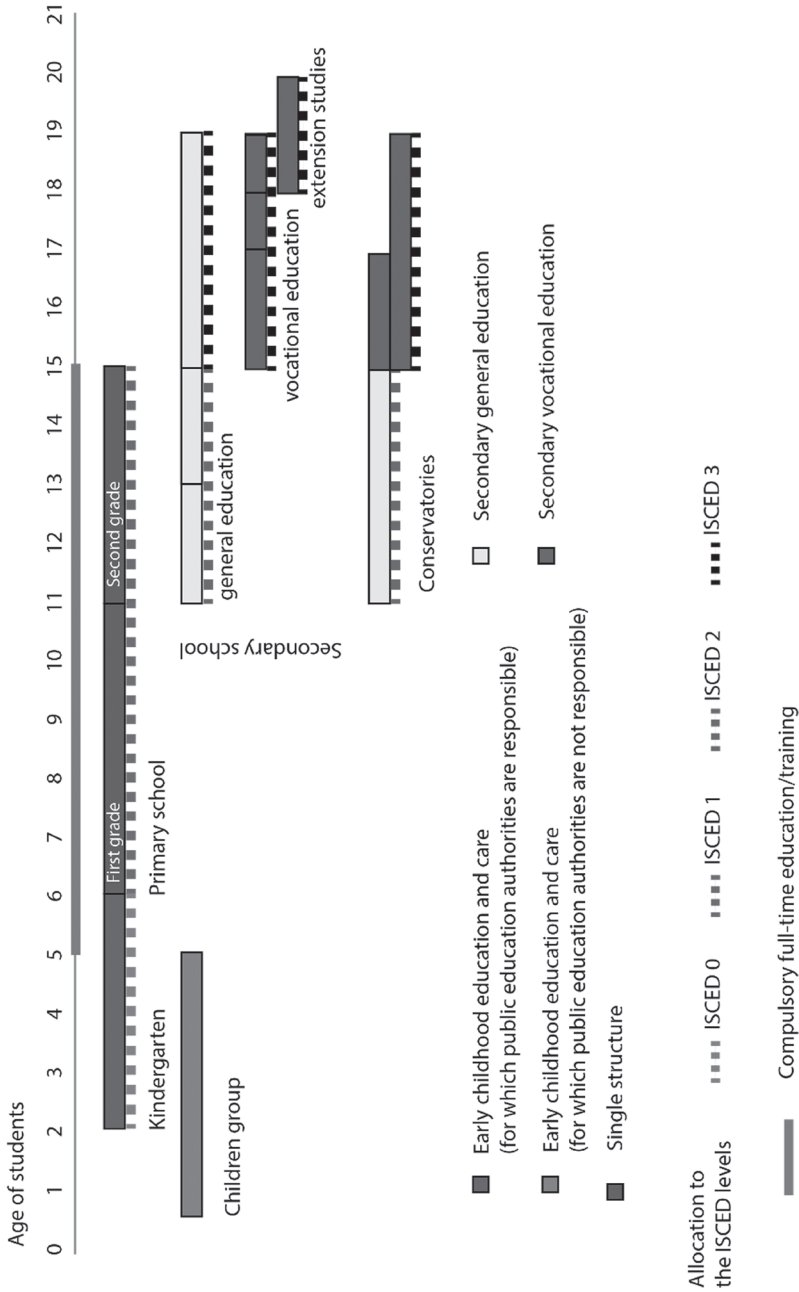
**Keywords:** education for sustainable development (ESD), environmental education, historical development in the Czech Republic, formal and non-formal education, educational policy

## **Introduction**

### **Structure of the Educational System**

Early childhood care is mainly provided by children's groups, and falls under the responsibility of the Ministry of Labour and Social Affairs. Education from pre-school to higher education is the responsibility of the Ministry of Education, Youth and Sports (MEYS) which administers the following types of schools: nursery schools, primary schools, upper secondary schools, conservatories, tertiary vocational schools, basic arts schools and language schools authorized to hold state language examinations; see Figure 1 for the structure. Higher education is regulated separately (EURYDICE, 2024a).

**Figure 1** Structure of the National Education System in the Czech Republic



Note: ISCED = International Standard Classification of Education

Source: Revised from EURYDICE, 2024a.

Table 1 shows the latest available data on the number of educational institutions from pre-school to upper secondary level (ISCED levels 0-3). For special needs education, there are separate educational institutions (112 nursery schools, 320 primary schools, 138 secondary schools) (EURYDICE, 2024b). In addition to these public schools, there are also schools and educational institutions of non-public donors, that is, private and church education. Although this is a relatively small segment of the education system, its existence represents a significant expansion of the educational offer. These schools are obliged to follow the Czech legislation and respect the Framework Educational Programme (FEP), but their practice is slightly different in many respects (Kitzberger, 2015).

**Table 1** Number of Educational Institutions from Pre-Primary to Upper-Secondary Education Level (ISCED levels 0–3) of Different Types in the Czech Republic in 2022/2023

Type of educational institution in English (in Czech language)	ISCED levels provided	Main orientation of the programs provided	Number of educational institutions			
			Total	Public	Private-government-dependent	Private-independent
Nursery schools (mateřské školy)	0	(-)	5374	4877	497	(-)
Basic schools (základní školy)	1,2	(-)	4261	3914	347	(-)
Secondary schools (střední školy)	3	G, V	1294	953	341	(-)
Conservatories (konzervatoře)	3	V	18	13	5	(-)

Notes: G = General; V = Vocational; (-) = Not applicable

Source: Ministry of Education, Youth and Sports; Revised from EURYDICE, 2024b.

## *Pre-School Education*

Pre-school education is organized for children, usually between the ages of 3 and 6, with the aim of enriching the child's daily program during the pre-school years, and providing professional care. In September 2017, the last year of pre-primary education (i.e., from 5 years of age) became compulsory. Nursery schools are mostly run by municipalities; however, a small number have been set up by private providers and churches.

In March 2005, MEYS adopted the Framework Programme for Pre-school Education.<sup>1</sup> It lays down rules for educational activities in nursery schools and kindergartens with a program adapted to the needs of children and preparatory forms of primary schools. The programs may focus on aesthetic activities, physical activities, ecology, and so on. Nursery schools can also use some of the alternative programs, for example Montessori pedagogy, Waldorf pedagogy, and Step by Step, or join the network of Healthy Nursery Schools - A Curriculum of Nursery Schools Advocating Health. This is an opportunity to set up environmental programs, for example in the Forest Schools. According to the Handbook for interested parents, teachers and school founders (Vošahlíková, 2010), the aims of an eco-school are to enable children to spend time in nature or in a naturally designed school garden every day, to promote a healthy lifestyle through healthy food, plenty of opportunities for exercise in natural terrain, and outdoor hardening in all weathers. Forest Schools (as a specific category) are supported by the Ministry of the Environment (MoE) and are included in the MEYS Register of Schools and School Facilities; 41.8% of them are certified according to the quality standards for forest kindergartens and clubs (data from 02/2024).

In nursery schools, children are taught by nursery school teachers, most of whom have completed secondary education with a specialization in pre-school

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1 It builds on the Framework Programme for Pre-school Education published in 2001.

pedagogy (graduates of secondary pedagogical colleges). They may also be trained at higher vocational schools or at higher education institutions in a bachelor's or master's degree program. The training must always be specialized in early childhood education (MEYS, n.d.).

### ***Primary and Lower Secondary Education***

Primary and lower secondary education (basic education) begins at the age of 6 and lasts 9 years. It is mostly organized within a single structure system in 9-year basic schools. Lower secondary education can also be provided by multi-year general secondary schools and 8-year conservatoires (EURYDICE, 2024a).

Children may receive their primary education in a variety of different schools, which may also use different types of educational programs. Most commonly, children attend a regular 9-year primary school, which is divided into two levels: primary and lower secondary; primary comprising grades 1-5 and lower secondary grades 6-9.

In addition, children have the option of attending 6- or 8-year grammar schools (gymnasiums) after their 5th or 7th year of primary school. Students may also choose to attend a conservatory, for example an 8-year dance conservatory, and some students with disabilities are placed in special schools to meet their needs. All of these different types of schools provide pupils with a basic education that enables them to continue their education at secondary and university level. Especially, gymnasiums are designed to provide a sound basis of lower (and consequently upper) secondary education, as a step towards tertiary education. With regard to the commitment to address global environmental challenges at the local level and to promote sustainable practices in their communities, there is the Eco-Schools Network (see below) and schools with a special focus on the environment (e.g., the Nature School – an 8-year gymnasium, Přírodní škola).

The Czech School Inspectorate conducted a thematic survey (in the 2019/2020 school year) to assess selected aspects of the conditions and course of environmental education in primary schools. According to the results of this survey, in three quarters of the evaluated schools, support for environmental education (e.g., coordination of activities, consultation and methodological support, initiation of cooperation) was organized by environmental education coordinators, half of whom had also completed a specialization course for this position. This is a voluntary activity of the school; a less common practice is the existence of a functional team of teachers who would jointly plan and implement environmental education – the existence of such a team was found in about half of the evaluated schools. The support for environmental education by school management is provided by opening opportunities for teachers to participate in in-service teacher training that focuses specifically on environmental education issues (Novosák et al., 2020).

### ***Upper Secondary Education***

This level of education is provided by secondary schools, which may be general or specialized (with a higher or lower proportion of the general component); they prepare pupils for further study or for a profession or employment. Programs last from 2 to 4 years and cover a wide range of fields to meet the educational needs of the Czech population aged 15-19.

The upper secondary school is a type of school with three basic subtypes: secondary general school, secondary technical school, and secondary vocational school. If the school meets the requirements for registration in the Register of Schools and School Facilities, it may offer different levels, fields and forms of secondary education. Secondary education is also provided at conservatories, which provide artistic education in 6- or 8-year programs for a small number of students admitted on the basis of aptitude tests.

For pupils who have already completed secondary education with a vocational certificate or school leaving examination and wish to acquire further or better

qualifications, secondary schools organize several types of extension studies. Only the Maturita (General Certificate of Secondary Education) gives access to tertiary education.

### ***Vocational Schools***

According to the Government Regulation 211/2010 on the system of educational fields in basic, secondary and post-secondary vocational education, the Czech Republic offers 281 specialization programs in secondary education. Each (narrow) specialization has its own FEP, from which schools can create a curriculum with relatively large modifications. Schools can specialize the FEPs according to their own needs and the needs of the region. The Czech Republic is therefore characterized by a large number of specializations, each with its own FEP (e.g., engineering has 13 FEPs, while construction, surveying and cartography even have 18 FEPs). Vocational school teachers must have a pedagogical qualification in addition to a qualification in their field of study (neither of which includes training in Education for Sustainable Development) (Zeman, 2023).

The interest in apprenticeship has been decreasing since 2012, but the capacity of upper secondary schools is still insufficient and those interested in general upper secondary education have to attend vocational schools. As a result, the number of students in upper secondary vocational education is relatively high (varying from region to region). Narrow specialization with lower qualifications in general subjects is associated with high unemployment rates. A reform of this system is underway (to be completed in 2027) – it envisages 130 programs with a more general base (e.g., mathematics, languages) and a later vocational base (e.g., construction), to which students could then add other specializations (e.g., interior design, roofing).<sup>2</sup>

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2 Husová, Z. (2025). Process of revision of secondary vocational education. Presentation at the Education Committee of the Government Council for Sustainable Development, 20 January 2025.

Vocational and secondary schools often lack programs tailored to the specific economic, environmental and social challenges of their regions and their needs for sustainable development. Due to the underdeveloped sector of small and medium enterprises (SME), there is a lack of school partnerships with local industry and government. As a result, secondary education is mostly not instrumental in supporting regional environmental goals, addressing climate change challenges, mitigating environmental degradation and promoting community-based sustainability initiatives. On the other hand, according to the School Atlas, there are about 30 secondary and vocational schools in the Czech Republic with an Ecology and Environment study program (including environmental protection and creation), and even more with ecology programs related to agriculture and forestry.

### **Formal Educational Policy**

The main document is the Act No. 561/2004 Coll. on Preschool, Basic, Secondary, Tertiary Professional and Other Education (the Education Act). This Act was amended in 2015 by Decree No. 82/2015. Early childhood care is regulated by the Act on the Provision of Care for Children in a Children's Group.

On the basis of the Education Act, curricular documents have been incorporated into the education system of the Czech Republic: the National Education Programme (White Book introduced in 2002; no longer valid) and the Framework Educational Programmes (FEPs from 2004).

As a basis for the ongoing revision of the FEPs, the Strategy for the Education Policy of the Czech Republic up to 2030+<sup>3</sup> (adopted in 2020) provides general

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3 This Strategy 2030+ is a follow-up document to the Strategy for the Education Policy of the Czech Republic until 2020. Its aim is to prepare the education system of the Czech Republic for the new challenges and to address the persistent problems in the system.

principles and describes the priorities to be addressed in the field of formal education, non-formal learning and lifelong learning. It has two main strategic objectives which focus on transforming the content of education and on reducing social inequalities in education. These objectives are further developed in strategic lines that focus on changing the content, methods and evaluation of education; promoting equal access to quality education; supporting teachers; increasing professional capacity, trust and cooperation; and ensuring stable funding. One of the strategic objectives of this strategy is to identify the competences needed for active citizenship, professional and personal life as the main educational objectives, which will have implications for applied pedagogy. On the basis of this document, Guidelines for the Revision of the Framework Curriculum for Primary Education (MEYS, 2022) have been published; the FEP documents for pre-primary and primary education were completed in January 2025, and recently related methodological tools have been developed – the Model School Education Programmes, which complement the FEP at school level. Success in developing these methodological materials, including evaluation methods, is a prerequisite for the practical applicability of the new curricula.

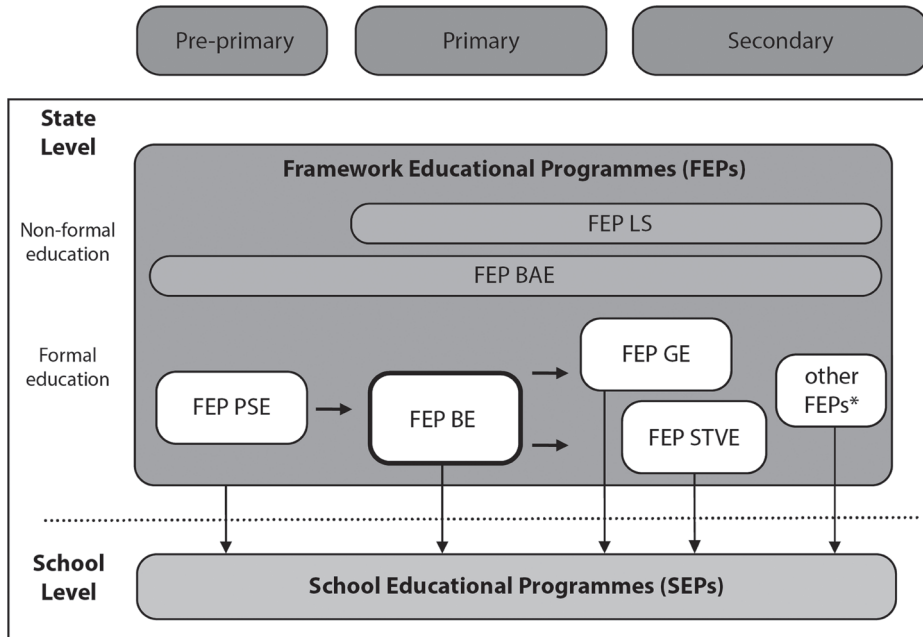
Until 2027, the implementation document of Strategy 2030+ is the Long-term Plan for Education and the Development of the Education System of the Czech Republic (2023-2027) (MEYS, 2023a). One of its main goals is to change the subject structure of secondary schools to strengthen general education.

## **Revision of the Framework Educational Programmes**

FEPs mainly define the specific objectives, form, duration and compulsory content of education, as well as the conditions for the process and completion of education. They set binding educational standards for pre-school, primary and secondary education. On the basis of the FEPs and the rules laid down in them, individual schools draw up their own School Education Programmes

(SEPs). The curricular documents for pupils and students from 3 to 19 years of age are thus developed at two levels: the state level and the school level (see Figure 2).

**Figure 2** The System of Curricular Documents in the Czech Republic



Notes: Types of Framework Educational Programmes (FEPs):

FEP PSE – for Pre-School Education;

FEP BE – for Basic (i.e., primary and lower secondary) Education

FEP GE – for Secondary General Education (grammar schools);

FEP STVE – for Secondary Technical and Vocational Education.

FEP BAE – for Basic (i.e., primary and lower secondary) Artistic Schools;

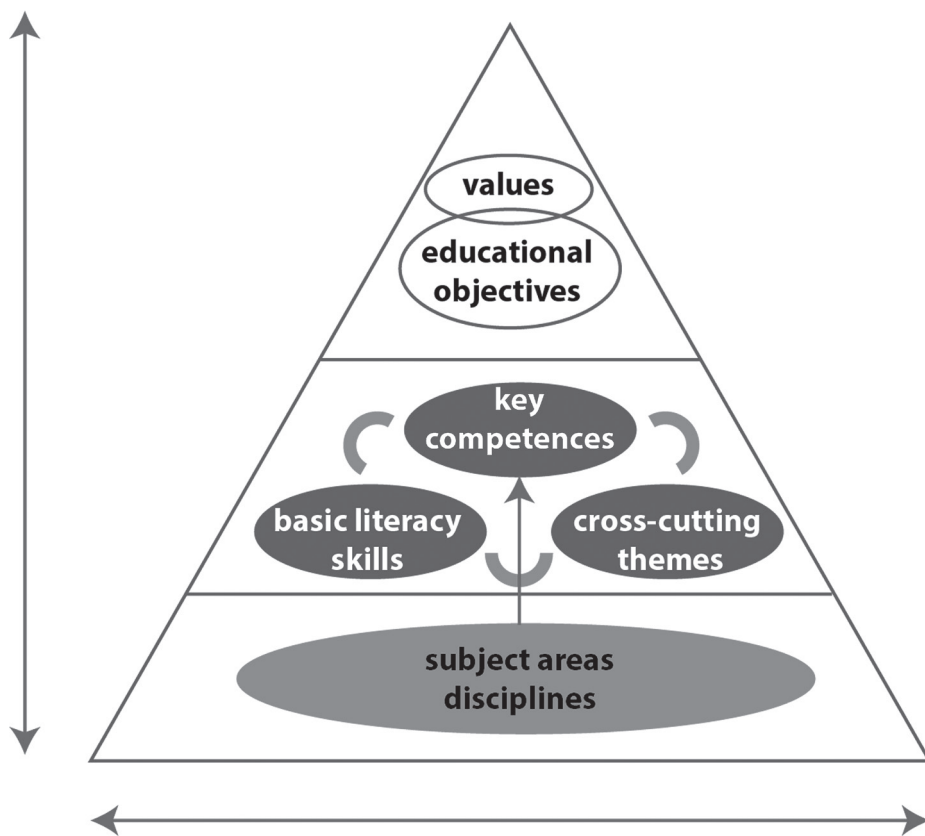
FEP LS – for Language Schools.

\* Other FEPs – additional Framework Educational Programmes defined by the Education Act – such as for educational institutions providing special needs education.

Source: Revised from General Chapter of the Revised FEP D

FEPs are based on a general education strategy that emphasizes key competences, their link with educational content, and the application of acquired knowledge and skills in practice. The key learning objectives to be achieved through FEPs are set out in Figure 3.

**Figure 3** Interrelationships Between Educational Objectives and Content Categories of the FEP for Primary Education

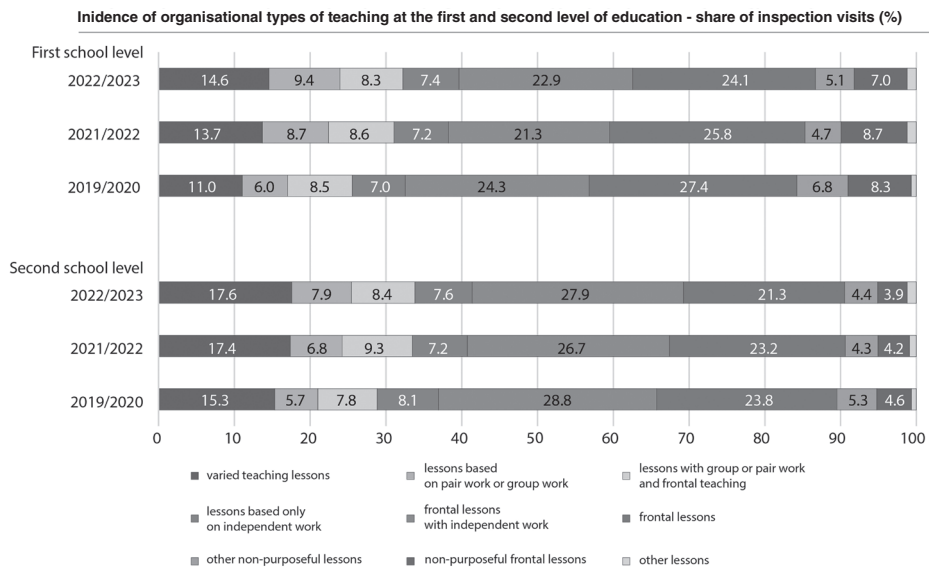


Source: Revised from General Chapter of the Revised FEP Document.

Although the competence-based FEPs for primary education were approved for the first time in 2004, the implementation of the pedagogical principles in

the curricula is still inadequate, and frontal teaching prevails with a minimum of activating elements, which is demotivating for a large proportion of pupils. They have few opportunities to develop communication skills, independent decision-making, critical thinking, processing and evaluating new information, self-assessment and peer assessment. Teaching is mostly not differentiated according to pupils' individual abilities, and elements of individualization are only sporadically included in teaching (CSI, 2019, p.136). This situation has not changed much in recent times, as active learning methods are still not common in our education system (didactic teaching prevails) (see Figure 4). In order to improve this situation, the curriculum was revised in 2024 in accordance with the Strategy for the Education Policy of the Czech Republic up to 2030+.

**Figure 4** Frequency of Organizational Forms of Teaching in Primary Education



Source: CSI, 2023, p.62.

The curriculum revision process is being carried out on a participatory basis, with representatives of non-governmental organizations (NGOs), including those from the field of environmental education, as members of various working groups. This will ensure that the curricula include ESD competences (one of the key competences is a competence for citizenship and sustainability) and that the cross-cutting themes have a strong sustainable development dimension, namely Society for all and a Sustainable environment (Novák et al., 2024).

## **The Status of ESD**

### **The Overall ESD Policies**

Environmental Education and ESD are developed within a legal framework, based in particular on the Environmental Act No. 17/1992, which formulates the need to focus on sustainability and to implement sustainability principles in the education system. The Act on Environmental Information No. 123/1998 contains a special paragraph on the duties of the public administration in the field of environmental education; the Act on Education No. 561/2004 defines eight main objectives of the education system in the Czech Republic, including democracy, human rights, social cohesion, gender equality, respect for ethnic, cultural and religious identity, and environmental protection.

The general policy document formulated with the aim of implementing the United Nations' Sustainable Development Goals (SDGs) in all areas of society is the Strategic Framework – Czech Republic 2030 (Kásniková, 2017). The National Review of this strategy in 2021 delegated the implementation of ESD to the new Strategy for the Education Policy of the Czech Republic until 2030+ and the revised Framework Education Programmes.

This Strategy 2030+ recognizes the changing role and status of formal educa-

tion, partly in response to the environmental changes we are currently facing, such as climate change, loss of biodiversity, increasing air and water pollution, the ever-increasing consumption of non-renewable resources, and a declining natural resource base. The document stresses the urgent need to innovate the content and methods of education at all levels, and to equip citizens with the competences to act in a socially and environmentally responsible manner. Incorporating the principles of sustainable development is therefore one of the objectives of civic education. New forms and methods of education that reflect the transversal nature of sustainable development are seen as a prerequisite for understanding the interconnectedness and interdependence of today's world. In terms of modernization, the school must respond to the technological and social changes associated with global megatrends and develop the sustainable culture of the school (the whole-school approach is formulated here).

The importance of environmental education is justified in the State Environmental Policy of the Czech Republic, which became the basis for the development of the recently valid State Programme of Environmental Education, Awareness and Counselling in the Czech Republic for 2016–2025 (SPEEAC)<sup>4</sup> – this national plan was prepared as a supra-ministerial document and was adopted in October 2000 as the strategic basis for the long-term development of environmental education and ESD. It defines priority areas, priority themes, goals and objectives for the promotion of environmental education at the national level in the Czech Republic (relevant themes are: Nature; Place & Settlement & Landscape; Sustainable Consumption; Climate in Context). The latest Action Plan for Environmental Education 2021-2025, developed by the EE (Environmental Education) Working Group of the Education for Sustainable Development Committee under the Government Council for Sustainable Development (GCSD), builds on previous action plans, assesses the current

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4 Submitter of the State Programme to the Government of the Czech Republic and its guarantor is the Ministry of the Environment; the Program was approved by Resolution No. 652 of 20 July 2016 (MoE, 2021).

status in all areas, and sets target statuses for them; its conclusions respond to the recommendations of expert studies and analyses on environmental education.

Other important aspects of sustainability are included in the Ministry of Foreign Affairs' document Strategy for Global Education (GE) 2018-2030 (this strategy follows the first National Strategy for Global Development Education 2011-2015 and the updated version for the period 2016-2017). The strategy includes more “anthropocentric” themes within the SDGs, which are not reflected in SPEEAC. Biennial action plans for this strategy are being developed by the Global Education Working Group under the Government Council for Development Cooperation. This group is led by the Ministry of Foreign Affairs (MFA) and includes ministries, regional public bodies, the Czech Development Agency, civil society organizations, academia and the private sector. With the aim of implementing the national GE strategy and the Dublin Declaration, this forum plans joint actions on raising awareness of global issues, grant schemes, and so on.

ESD is not enacted independently; rather, the topic is included in relevant broader education documents, such as the Strategy for the Education Policy of the Czech Republic up to 2030+ (mentioned above), and the Long-term Plan for Education and the Development of the Education System of the Czech Republic (2023-2027). Attempts to develop an autonomous strategy under the auspices of MEYS have not been successful in the past. This was the case when the Czech Republic signed up to the United Nations Economic Commission for Europe (UNECE) Strategy in 2005 – as a result, the National Strategy for Education for Sustainable Development of the Czech Republic (2008-2015) was adopted by government resolution in July 2008. The MoE had only an initiating and methodological role in the preparation of this strategy, while MEYS was responsible for the preparation of its action plans. The second action plan, adopted in 2011 under the title Education for Sustainable

Development (ESD) Measures for 2011 and 2012 to the Strategy of Education for Sustainable Development of the Czech Republic (2008-2015), was implemented by MEYS at a time of economic crisis with a delay and only formally – without a perspective for continuation in the future (Dlouhá, 2012).

Recently, the main national body for ESD has been the ESD Committee of the Government Council for Sustainable Development, which brings together about 25 different stakeholders (such as relevant ministries, NGOs, researchers, regional authorities, and UN organizations; it plans to include youth members). It is coordinated by the MoE and MEYS, and meets about five times a year. The committee supports the work of key stakeholders to implement the principles of ESD in non-formal education and national curricula. In the future, all schools will have to include ESD in their work with children in one way or another in accordance with the formal curriculum documents (Novák et al., 2024).

### ***Regional Level***

Municipalities establish the majority of primary and nursery schools or have to ensure access to such schools by agreement with another municipality, that is, they act as school founders and have many obligations towards schools and their principals. The regional authorities are also obliged to ensure the conditions for secondary and higher vocational education (Kitzberger, 2015).

Regional authorities (14 in total in the Czech Republic) have their own long-term plans for the development of education policy; they also develop and approve the Regional Concept of Environmental Education as a strategic document based on the Environmental Information Act No. 123/1998. The recommendations for regional authorities, as founders of educational institutions, emphasize ESD as a long-term regional strategic and political goal. This requires, among other things, methodological support for schools and educational institutions, efforts to decarbonize these institutions, and the develop-

ment of energy-efficient educational infrastructure (MEYS, 2023a).

Some regional authorities and municipalities establish or contract organizations to carry out specific tasks in the field of ESD and environmental education, and they also financially support (with varying intensity and focus) ESD and environmental education activities and programs in their area. In addition, local authorities (cities, etc.) have the opportunity to participate in various sustainable development programs such as Local Agenda 21, Smart Cities, Covenant of Mayors, and so on which implement lifelong learning policies.

### *School Level*

Schools develop their own School Education Programmes (SEPs) autonomously on the basis of the Framework Education Programme – they use their own ideas and teaching experience to implement the principles outlined in the FEP and to achieve the basic learning objectives, with the right to omit, reduce or extend certain parts of the FEP. In the past, the Manual for the development of the SEP provided instructions for the preparation of the document as a whole, and its various components and specific examples. In the future, three models of school curricula will be offered as examples of discipline-based and also transdisciplinary curricula, with different levels of application of innovative pedagogical approaches.

In addition to the basic tasks given by the FEP, the recommendations for schools are as follows (MEYS, 2023a, pp. 29-30):

- 1) Adopt a whole-school approach to sustainability and the principles of place-based learning.
- 2) Implement sustainability in the curriculum in a cross-curricular way across different educational areas, with participation of the whole teaching staff and in cooperation with partners outside the school (educational organizations, eco-centers, community, NGOs).

- 3) Undertake out-of-school learning programs (in the village, in nature, etc.), including cooperation with a wide range of institutions, where the educational areas are linked to real life.
- 4) Use the function of school coordinators for environmental education and awareness to promote effective education on sustainability and to support the implementation of innovative educational methods.
- 5) Train educators in all areas of sustainability (environmental and socio-economic), including climate education, media literacy and the development of critical thinking and evaluation of information and resources.

### ***Financing***

The MoE is the main guarantor of environmental education, awareness and environmental counselling in the Czech Republic. Within the Ministry, the Unit of Voluntary Instruments and Cooperation with NGOs plays a leading role in coordinating environmental education and its funding (MoE, 2024).

At the national level, the main funding for environmental education comes from the State Environmental Fund of the Czech Republic and the NGO funding program of the MoE. A significant part of environmental education funding comes from occasional EU grants, the European Social Fund or grants from the European Economic Area (EEA) and Norway. The MoE regularly issues calls for projects on capacity development in SD and environmental issues for different target groups (NGOs, municipalities). Recently, such a call was focused on capacity building in climate change education (Novák et al., 2024).

As the programs are mostly run on a non-formal basis, funding for environmental education also comes from a variety of sources, including different regional funds and from several municipalities, foundations, international NGOs, and corporate social responsibility programs of companies or individu-

als. This ensures independence from government policy and openness to new approaches and trends.

### ***International Initiatives***

The Czech Republic is a member of the UNECE Steering Committee on Education for Sustainable Development, thus contributing to the long-term implementation of the UNECE Strategy for ESD adopted in 2005.

The ESD 2030 Country Initiative was developed by the MoE, MEYS, and the Czech Commission for UNESCO, and was approved by UNESCO in 2024. The principle of this Czech initiative is that the experience with traditional environmental education and ESD programs developed in the non-formal learning sector will be transferred to formal education through a complex curriculum change.

### **Actions Taken and Performance Achieved for ESD**

ESD has developed through a relatively long evolution from the grassroots – in the context of non-formal education. Nature and environmental protection had a strong tradition in the Czech Republic even during the socialist period, and the roots of the continuous development of environmental education can be traced back to the 1960s. However, the system of environmental education in its present form began to take shape gradually after 1989, when it was supported by legislation and institutionally – as part of the agenda of the state administration, the conditions for funding were created. This led to a great diversification of educational methods and forms, often in cooperation with foreign countries – the connection with international trends contributed to a diversity of approaches, attention was paid to civic skills and attitudes, and traditional values were reconsidered. Systemic support from the public administration was declared by Act No. 123/1998 on the Right to Environmental Informa-

tion<sup>5</sup>, which explicitly defines the responsibilities of the MoE and MEYS: “... (a) to include environmental education in the sense of sustainable development in the basic pedagogical documents and (b) to promote the training of pedagogical staff in the field of environmental protection and sustainable development.”

Environmental education as recently been enshrined in policies and strategic documents, funded at various levels and based on the cooperation of a range of actors from public administration to schools, research institutions, eco-centers and other environmental education providers (MoE, 2024). There is a strong base of non-profit organizations in the country with long experience in developing relevant programs and with appropriate facilities; they also guarantee the system of quality certification (see below). Building on this tradition and experience, ESD is gradually moving into formal education. The non-formal sector in the Czech context continues to ensure the continuity of environmental education and ESD programs and contributes to the five UNESCO priority areas for action, as shown in Table 2.

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5 Section 13: Environmental Education, Education and Awareness-raising.

**Table 2.** A Cross Table of Five Priority Action Areas and Four Interconnected Global Challenges

Five Priority Action Areas	Four Interconnected Global Challenges to be Addressed			
	A. Climate change	B. Loss of biodiversity	C. Unsustainable use of resources	D. Inequality
1. Advancing policy	Strategy on Adaptation to Climate Change in the Czech Republic (2015), chapter 4.3.2. Education and awareness raising	Relevant documents issued by the Ministry of Environment: State Programme of Environmental Education, Education and Awareness and Environmental Counselling for 2016-2025, and Action plan for environmental education 2021-2025		The curriculum framework creates an environment for children that enables everyone to succeed, regardless of their socio-economic background, and helps to develop their unique talents and strengths.
2. Transforming learning environments	Decarbonisation Methodology and funding support for decarbonizing educational infrastructure has been available to schools since 2024. A whole-school approach to sustainability is part of the general education policy recommendations.	The tradition of school gardens exists. At the preschool level, the Association of Forest Schools has more than 160 members with about 3,400 children (see map).	Eco-School Project, <a href="https://ekoskola.cz/">https://ekoskola.cz/</a> – pupils and teachers work together to integrate sustainability into all aspects of school life. They look at their school from “the floor to ceiling” and see what can be improved in terms of waste, energy, water, transport, food, biodiversity or climate change. About 400 schools are involved.	The uMENÍM Platform (“Change through Arts”) combines creative education and ESD, implementing the High Functioning Classroom approach.

Five Priority Action Areas	Four Interconnected Global Challenges to be Addressed			
	A. Climate change	B. Loss of biodiversity	C. Unsustainable use of resources	D. Inequality
3. Building capacities of educators	<p>Environmental organizations provide training for both teachers and students individually (Club for Environmental Education,...) or through the Network of Environmental Education Centres Pavucina.</p> <p>The SEVER Education Centre offers teacher training in a one-year Specialisation Course for Environmental Education Coordinators who will work in schools.</p> <p>Traditionally, good practices are recognized and shared through magazines (Bedrník published by SEVER and Pavucina), websites dedicated to specific ESD topics (Climate change education, Education for responsible consumption), and through presentations at annual national conferences where environmental education and ESD programs are presented and discussed (these conferences are organized by regions and at the national level).</p> <p>Envigogika, a peer reviewed journal on environmental education and ESD, has existed for 20 years.</p>			<p>People in Need, and its Varianty Education Programme helps educators, school administrators, in-service and pre-service teachers to develop educational programs that are open to all children and that lead pupils and students to an understanding of context, global responsibility and respect for others.</p>
4. Empowering and mobilizing youth	<p>The empowerment of young people is one of the educational goals in environmental education and ESD (development of action competence and internal locus of control).</p>			<p>MEYS is setting up a Youth Council, a new Youth Department has been established, and a strategy for supporting young people is being prepared.</p>
5. Accelerating local level actions	<p>The SEVER Education Centre provides teacher training in the School for Sustainable Living Programme: <a href="https://www.skolaprozivot.cz/">https://www.skolaprozivot.cz/</a>. The program uses the method of place-based learning. Young people and whole communities learn by carrying out short-term practical local projects that benefit their immediate environment (public spaces, transport, interpretation of local heritage, etc.)</p>			<p>Regional authorities have their own strategies for environmental education and ESD; they also empower local actors through initiatives with an educational component (Local Agenda 21).</p>

## Key Themes in ESD

### *Competences and Basic Literacies*

In the FEP, key competences and basic literacies are at the top of the list of expected learning outcomes to be achieved through education; and they are linked to the expected learning outcomes of cross-cutting themes and educational disciplines (see Figure 3 above).

The revision process reduced the number of basic literacies to two (reading and writing literacy, logic and mathematics) and increased the number of key competences from six to eight (digital and cultural competences have been added)<sup>6</sup>. All the competences take ESD into account in one way or another. The most important, however, is the key competence for citizenship and sustainability, which has several components:

- Respect for life and the world
- Consideration of the interconnectedness of the world
- Working for a sustainable future
- Responsible decision-making and action
- Active citizenship, participation and empowerment

Competences are formed through practice and draw on the environmental (nature) and social context (community represented by a group or classroom, locally by the school or community, but also globally in the wider world). This approach involves continuously developing values and attitudes.

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6 Other key competences include: learning to learn; communication; personal and social competences; entrepreneurship and work; and problem solving (besides competence for citizenship and sustainability).

## *Cross-Cutting Themes*

The newly proposed FEP defines three cross-cutting themes (instead of the original 6)<sup>7</sup> that support a transdisciplinary approach to education and enable pupils to understand themselves, society and the world in a broader context and interconnectedness:

- Well-being
- Society for all
- Sustainable environment

## *Formal Education*

The principles of ESD are embedded in the framework document Strategy for the Education Policy of the Czech Republic up to 2030+<sup>8</sup>. The new FEP document sets out the values and goals of education, the conditions for its implementation, including the school culture, and the expected learning outcomes. The FEP for primary education is the basis for the development of other FEP documents, so that the whole system is coherent (see Figure 2). In practice, however, some of the upper secondary school levels may receive less attention with regard to ESD because they are struggling with other problems, typically

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7 The first FEP addressed environmental education and ESD in three of these six cross-cutting themes (environmental education, education for democratic citizenship and education for thinking in European and global contexts); the newly revised document reflects environmental education and ESD in two of the three cross-cutting themes.

8 The document states: “We want to ensure that everyone acquires the knowledge and skills necessary to promote sustainable development, including through education focusing on sustainable development and sustainable living, climate change, human rights, gender equality, tolerance, promotion of the culture of peace and non-violence, citizenship and recognition of cultural diversity, and the contribution of culture to sustainable development.”

underfunding (see above).

### ***Teacher Training***

Teacher education takes place in universities. Faculties of Education are organized around subject areas, and the training of teachers in transversal issues is part of their undergraduate education. For pre-service teachers, there is a Competence Framework for Graduate Teachers that outlines common professional competences – this framework was approved by MEYS in October 2023 as a relevant guideline for teacher training in the context of new curricula. It requires competences for interdisciplinary teaching at the level of “experienced teacher.” Teachers will be evaluated according to this new competence framework, and teacher training programs will be innovated (Novák et al., 2024).

The development of interdisciplinary competences is therefore mainly the subject of in-service training; teacher training programs in this area are also run by some of the non-governmental environmental education organizations accredited as further education institutions – by NGOs individually or through the umbrella organization for environmental education, Pavučina.

### ***Professionalization of Environmental Education Educators***

There is the position of a school environmental education coordinator who is responsible for integrating environmental issues into the school’s educational program. A teacher who is interested in environmental issues and has received professional training in environmental education (through various institutions and organizations focusing on environmental education) is appointed by the school principal as the school’s environmental education coordinator. He/she coordinates environmental education activities, organizes projects and excursions, and cooperates with more discipline-oriented colleagues, the school management and external partners. By monitoring trends in ESD, the environmental education coordinator can play an advisory role, helping colleagues

to integrate environmental issues into their teaching. The coordinator also ensures that the school meets its sustainability goals – the aim is to integrate these principles into teaching and school life (Novosák et al., 2020).

### ***Non-Formal Education***

Many schools work with local NGOs or communities on extra-curricular projects that focus on nature conservation and environmental restoration. These projects may include the restoration of waterways, the maintenance of protected areas, or biodiversity projects aimed at preserving local flora and fauna, often in partnership with environmental organizations or local governments. Non-formal education programs to promote environmental awareness and conservation efforts are also provided by conservation institutions, which include nature reserves, national parks, museums, zoos and botanical gardens. For example, national parks and nature reserves offer guided tours, workshops and interactive programs to educate visitors about local ecosystems, species conservation and sustainable practices. Zoos organize workshops and events to raise awareness of endangered species, biodiversity and habitat conservation, and the global conservation programs in which they participate. Nature and science museums offer exhibitions and interactive learning opportunities on topics such as geology, biodiversity and environmental protection. The National Museum in Prague frequently hosts exhibitions on natural history and environmental issues.

The targeted use of the rich and varied educational potential of a wide range of out-of-school actors in the context of cross-curricular education is embedded in the revised Czech curriculum (General Chapter), according to which formal and non-formal or out-of-school education are closely linked.

## *Social Partnerships*

Regional and local actors play an important role in place-based learning programs, which draw on the local resources, culture, history and natural environment of the region, thereby strengthening the link with the place where the pupils or students live – and developing their deeper understanding of and responsibility for the environment and its sustainable development. Some schools form partnerships with local actors to connect their pupils with real activities in the region, and encourage their active engagement in local communities (such as the School for Sustainable Living program; see above).

Partnerships with school stakeholders are formed through the Eco-Schools Network which has existed in the Czech Republic for 15 years and includes some 400 Eco-Schools, from kindergartens to secondary schools, involving 60,000 students (the program is managed by Tereza, a non-profit organization specializing in environmental education). Eco-Schools promote a whole-school approach through practical steps that schools can take to reduce their environmental impact, such as managing waste, saving energy or tending the school garden. Pupils/students work together with teachers and other staff to make sustainability a priority in everyday school life – through active participation in school programs and extra-curricular activities they develop knowledge and skills in sustainability and environmental responsibility, as well as social skills such as cooperation, critical thinking, decision-making and project management.

## *Indicators*

At the national level, indicators are linked to environmental education policies, and are explicitly described in the action plans of the relevant strategies (MoE, 2021). These indicators are designed and used to reflect the achievement of strategic objectives. However, there is insufficient evidence to evaluate these indicators: quantitative data on environmental education or ESD

are often incomplete, making it difficult to evaluate aggregate indicators. The available information is based on the data on environmental education activities provided by the Network of Environmental Education Centres Pavučina – processed by the Czech Environmental Information Agency in the Statistical Yearbook on the Environment (cf. the following Tables 3–6, CENIA, 2022, pp. 375-389, summarized).

**Table 3** Environmental Education Programs Within the Network of Environmental Education Centres (Pavučina) - Daily

Level of education	Number of events	Number of participants	Number of hours	Number of participant hours
- for kindergartens	3 033	56 334	4 876	94 789
- for primary schools	5 642	110 216	14 342	284 152
- for secondary schools	263	6 582	824	18 983

Source: CENIA, 2022.

**Table 4** Environmental Education Programs in the Framework of the Network of Centres of Environmental Education (Pavučina) – Residential

Level of education	Number of events	Number of participants	Number of hours	Number of days	Number of participant hours
- for kindergartens	14	271	239	53	4 879
- for primary schools	508	12 145	10 114	1 905	250 442
- for secondary schools	71	1 910	1 401	250	40 430

Source: CENIA, 2022, pp. 380–382.

**Table 5** Environmental Education Programs in the Framework of the Network of Centres of Environmental Education (Pavučina) – for Adults

Target group / type of activity	Number of events	Number of participants	Number of hours	Number of participant hours
pedagogical staff and other educators / educational programs	3 033	56 334	4 876	94 789
pedagogical staff and other educators / specialization studies	5 642	110 216	14 342	284 152
adult non-teaching staff / all activities	263	6 582	824	18 983

Source: CENIA, 2022, pp. 383–386.

**Table 6** Other Extracurricular and Awareness-Raising Environmental Education Activities Held Within the Network of Centres of Environmental Education (Pavučina)

	Number of clubs	Number of members
regular clubs for children	205	2 547
	Number of events	Number of participants
non-regular activities for children	547	16 163
public awareness events	938	258 771

Source: CENIA, 2022, pp. 386–389.

Financial support for these projects was provided by the MoE – the data on the amount of support for environmental education projects/programs, consultancy and volunteer work shows that 15 million CZK (almost 600,000 EUR) was paid per year between 2019 and 2022. At the same time, the National Programme of the State Environmental Fund of the Czech Republic covered related investment and non-investment expenditures (65 and 53 million CZK in 2022, respectively) (CENIA, 2022, pp. 390, 392).

## Features of Environmental Education and ESD

### *Tradition and high-quality expertise*

In the Czech Republic, educational issues are often part of environmental studies; there is no accredited study program specifically dedicated to environmental education and/or ESD within pedagogical faculties. However, there are several academic institutions developing environmental education and ESD pedagogy within other disciplines which also provide guidance for practice. ESD experts also play an important role in evaluation, as NGOs compete for quality and limited resources. As a result, these experts are internationally recognized and publish in national and international journals (based on the experience of the Brno research team, the Czech Republic became the host of the World Congress on Environmental Education, WEEC in 2022). To put this expertise into practice, environmental NGOs work closely with universities and academia; for example, the scientific board of Tereza is made up of experts from these institutions.

Based on this independent expertise, pedagogical methods and tools for environmental education and ESD are being developed in the context of non-formal education. Advice on how to implement environmental education in schools is elaborated in the Recommended Learning Outcomes for Environmental Education, which cover the areas of environmental awareness, principles, problems and issues, research skills and action strategies. This document has been used to outline Targets and Indicators for Environmental Education and Awareness in the Czech Republic in 2011 – formulating environmental education goals for different target groups and proposing appropriate procedures for evaluating the achievement of these goals and the effectiveness of environmental education. The latter document provides tools to assess the following indicators of environmentally relevant areas of competence development: relationship to nature, relationship to place, ecological processes and patterns, environmental problems and conflicts, and willingness to act for the

environment. Competences within these areas are defined, and indicative examples of assessment options or indicators are described. This publication is intended to serve as a guide for educators and policy-makers in the implementation and evaluation of environmental education programs, usually on a non-formal basis.

These principles are not yet fully reflected in the formal system, but new methodological materials are being developed. The Environmental Education Self-Evaluation Methodology for Schools (Činčera et al., 2016) aims to help schools identify strengths and weaknesses in the implementation of environmental education, thus contributing to the development and effectiveness of the educational process. The Methodology for Assessing Students' Environmental Literacy (Činčera & Kroufek, 2021) provides a standardized procedure for assessing the environmental literacy of children on the second level of primary school (ISCED 2), making it possible to compare the performance of pupils at different ages and to evaluate the success of public support for environmental education.

Evaluation results are used to prioritize funding; research is also an important factor in the development of educational strategies. Practice (design and implementation of environmental education and ESD programs) is thus strongly influenced by the academic approach; the professional dialogue on desired learning outcomes and relevant pedagogical methods in this field is supported by the peer-reviewed journal for environmental education and ESD, *Envigogika*, which has existed for 20 years.

### ***Grassroots initiatives and collaborative networks***

Interest in environmental issues among the population of the Czech Republic is spontaneous (Krajhanzl et al., 2018), and non-formal education programs are systematically supported by state institutions. However, the willingness to provide this support varies according to the priorities of the (changing) gov-

ernment. Non-formal activities are not yet systematically included in school curricula. Despite these obstacles, a relatively dense network of eco-centers and environmental youth clubs has developed over time, and even those NGOs that are not primarily focused on education have educational programs alongside other activities. NGOs compete for limited resources. However, some of them have been working continuously for decades and carry out many activities in the field of environmental education and ESD (see Tables 3-6 above).

NGOs are aware of the added value of networking, for example through the Network of Environmental Education Centres, Pavučina, a national NGO environmental education association with over 45 member organizations. Pavučina is a place for cooperation and exchange of experience. It supports its members in achieving high quality environmental education. It also advocates and negotiates for the implementation of environmental education at the national level and in cooperation with other partners (Novák et al., 2024). The network, through its member organizations, is also accredited for pre-service and in-service teacher training provided by its member organizations.

### ***A whole-school approach is being gradually introduced***

A whole-school approach to sustainability is part of the recommendations for schools in the Long-Term Plan for Education and the Development of the Education System of the Czech Republic (2023-2027), and the Action Plan for Environmental Education 2021-2025.

The whole-school approach to sustainability has also been included in the General Chapter of the revised curricula. Schools are encouraged to ensure that this theme is present in all relevant aspects of the institution, thus shaping the school culture. Some of them provide facilities and/or environments for relevant activities. However, there is less emphasis in the formal curricula on factors such as relations with external actors, use of local knowledge and resources, and flexibility of learning formats, which are supportive conditions

for competence development.

There is a tradition of school gardens in the Czech Republic, which has inspired many schools to create nature classrooms. These outdoor spaces provide students with hands-on learning experiences related to ecology, biology and agriculture. By engaging directly with their environment, students develop a greater understanding of natural processes, sustainability and biodiversity. In school gardens, students have many opportunities to develop their ecological literacy. These activities help students understand the importance of conserving biodiversity and adopting environmentally friendly practices in everyday life. Meanwhile, the MoE is trying to increase the number of schools actively working on decarbonizing school infrastructure and practicing climate education (see below).

### ***The role of ESD in supporting regional sustainability transformation***

The education system in the Czech Republic is relatively decentralized, with a high degree of school autonomy, and the competencies of municipalities and regions are significant. These actors also have a number of legitimate interests related to school education, as the level of education in a given municipality or region significantly affects its overall prosperity, competitiveness and the satisfaction of its citizen (Kitzberger, 2015). However, the opportunities to establish secondary and vocational schools whose graduates would serve the region are not sufficiently exploited; in general, the potential of these types of schools to contribute to concrete paths of sustainable development is rather neglected (see above).

This objective has been taken up by universities, including teacher training institutions. For example, at the Jan Evangelist Purkyně University in Ústí nad Labem (UJEP), one of the strategic projects of the Just Transition Operational Programme aims to mitigate the social and environmental impacts of the transition process (as the Ústí nad Labem region is one of the regions structurally

affected by coal mining and energy production). The project aims to improve the quality of education, the quality of decision-making, and the quality of life of the region's inhabitants. In addition to developing the theoretical background, UJEP is building an environmental center that will provide opportunities for environmental education and outdoor activities. UJEP will involve its students in reflecting on regional and local environmental/social issues, which should enrich the environmental themes in the relevant FEPs.

## Trends and Issues in ESD

### Trends

#### *Strong top-down support for bottom-up initiatives and quality assurance*

The MoE coordinates a system of environmental education and counselling, which it regards as an important preventive instrument of environmental policy. The system is embedded in policy and strategy documents, and is based on the cooperation of a range of actors from public administrations, schools, research institutions, eco-centers and other providers of environmental education. It is supported by differentiated funding programs that provide incentives for the work of environmental education centers and their networks, for environmental consultancy and for public information, education and communication. The development of methodologies that are certified by the relevant government agencies (usually MoE, more recently by MEYS) is based on the link between academic experts and practice. Coordination of environmental education at the national level is the responsibility of the Unit of Voluntary Instruments and Cooperation with NGOs (MoE, 2024), and recently ESD has also received more attention at MEYS. Top-down support is also driving the following trends.

The Pavučina Network of Environmental Education Centres is considered an official network and a partner of state institutions such as the MoE. Since 1999, it has been helping to meet the guidelines for excellence in environmental education (in cooperation with experts) and is responsible for issuing quality certificates to environmental education centers, based on a methodology approved by the MoE and the expertise of the auditors. The certification scheme examines the requirements for high quality environmental education in all aspects of relevant programs, professional development of environmental educators, and organizational and environmental management. There are already 28 educational centres certified for quality environmental education.

### ***Out-of-school learning recognized as an innovative pedagogical approach***

As environmental education is a driving force in the transition towards ESD, the development of sensitivity towards nature is one of the important educational goals. Based on a thorough literature review summarizing the results of research on children's contact with nature from around the world (Daniš, 2016), comprehensive materials and programs for outdoor learning have been developed (<https://jdeteven.cz/>). Opportunities for outdoor learning in different subjects, such as mathematics, have also been explored (<https://ucimesev-enku.cz/>).

These achievements are reflected in the Action Plan 2022–2025 to the SPEE-AC for 2016–2025, which focuses in particular on the area of research into barriers to the development of outdoor learning. It aims to ensure, through the National Pedagogical Institute, the dissemination of valid methodological materials to support outdoor learning – together with place-based learning, climate education and other emerging environmental education and ESD themes and approaches.

Methodological materials to support outdoor learning will be developed in one

of the model SEPs that will deal with outdoor learning in detail. The methodological support for primary and secondary schools will provide materials, exemplary practices and a portfolio of learning activities for outdoor learning and contact with nature.

### ***Climate education – A new strategic priority***

In Czech schools, climate change is usually dealt with only marginally, and mainly in the form of explaining scientific facts. According to experts, this is not enough given the complexity and magnitude of the impact of climate change on the lives of the next generation. The inclusion of climate change in primary and secondary school curricula is being prepared by MEYS, while the MoE's environmental education strategies have made climate change and its methodological understanding a clear priority in recent years (MoE, 2024).

This emerging issue has already attracted attention, particularly in the NGO sector – the comprehensive Facts for the Climate website aims to provide data and information in a form accessible to the public (the project leader won an award for communicating of the climate change in 2020). The non-formal sector is also a driving force in the field of climate education: the new Teaching about Climate portal was developed by seven organizations, including People in Need, Tereza, and Teachers for Climate (People in Need, 2022). The teachers and practitioners involved develop programs and share and disseminate good practice through annual conferences. The NGO, People in Need, has developed and implemented several "How to understand climate change" programs for teachers who want to address climate change in their classrooms. The behavioral aspects of this research are based on data from independent research on how to effectively engage young people in tackling climate change (provided by the NGO, Green Dock).

The increasing focus on the topic of climate change, both thematically and methodologically, includes efforts to improve the educational infrastructure

through the development of the Decarbonisation methodology by the MoE.

### ***Internationally recognized SDG 12 educational Materials***

Education for Sustainable Consumption has been supported by a comprehensive set of expert and teaching materials for schools that reflect the rapidly evolving research topic. The pedagogical tools and methodologies, designed to systematically develop knowledge and competences for sustainable lifestyles, have been tested and evaluated in Eco-Schools practice. They now provide incentives and opportunities for teachers to train, mentor and peer support relevant educational programs. The description of the good practice has been included in the United Nations University (UNU) publication on the experiences from the Regional Centres of Expertise Network (RCE) network (RCE Czechia, 2023). Subsequently, the potential of futures thinking was explored in the context of eco-design, which combines a technological perspective with the anticipation of (sustainable) needs of society and individuals. Methodological sheets for the implementation of this type of education at primary and secondary school level have been developed (Dlouhá, 2023).

### ***ESD intersects with related themes in the context of the SDGs***

The Czech government paid attention to the SDGs soon after their adoption by the UN, and developed the Strategic Framework of the Czech Republic 2030 (the Czech SDG strategy approved in 2017). Its implementation document emphasizes the importance of ESD, and delegates responsibility for cross-cutting issues (as a basis for the development of transversal competences) to MEYS and the Ministry of Foreign Affairs. Thus, global education (previously separate) has been recognized as a constitutive element of ESD, sharing some of its themes. According to the Strategy on Education and Awareness for Global Development 2018–2030, global education is thematically intertwined with education for sustainable development and citizenship education, but emphasizes the global aspect. The main themes of global education are the in-

terconnectedness and interdependence of the world; the diversity of the world; the environment; poverty and inequality; human rights; peace and conflict resolution. Global education, together with environmental education, forms two (of three) cross-cutting themes defined in the FEP (these are: society for all, sustainable environment – and the third is care for well-being).

The intersections between creativity, action and sustainability competences have also been explored in collaboration with academic institutions and creative/arts education associations. Despite many practical efforts in this direction and several academic papers elaborating the theory, the results have not yet been fully implemented in practice (Dlouhá & Henderson, 2022; Henderson & Dlouhá, 2021; Henderson et al., 2021).

## **Issue/Risks/Threats**

### ***Voluntary programs affect a minority of the population***

The long tradition of environmental education and ESD is an advantage of the Czech system, but has some shortcomings. As the programs are voluntary, the range of motivated participants is relatively narrow. These programs are also usually attended by those who can afford to participate, that is, children from middle (and upper) class families, which excludes some social groups – those from socially disadvantaged backgrounds have no opportunity for this type of activity. The current system of financial support for environmental education programmes for schools from the National EE Network programme allows for the participation of a maximum of 3% of pupils nationwide; to increase this number to 20% would require a fourfold increase in funding: EUR 1.2 million per year (SSEV Pavučina, 2020).

### ***Competitive school environment – A barrier to majority participation***

In addition, parents often demand a career-oriented education, and the overall competitive environment promoted by the schools themselves is based on

individualistic patterns of thinking that students adopt. As a result, the majority of the population does not receive sufficient information to understand the problem and the incentives for pro-environmental behavior; environmentalists then form a more or less isolated social bubble. The gap between proponents and opponents is widening, and this divide is reflected in the political sphere, where supporters of different political parties hold irreconcilable views.

### ***Complexity of ESD within discipline-based teacher education programs***

Sustainability is a complex interdisciplinary issue, and its inclusion in the curriculum remains a major challenge to effectively develop students' potential. Its implementation is particularly challenging for teacher education, as it requires an innovative approach. In pre-service education, teachers are mainly trained in discipline-oriented programs (e.g., at the Pedagogical Faculty in Prague). The Competence Framework for Graduate Teachers postpones the ability to deal with multidisciplinary problems to the level of experienced teachers (MEYS, 2023b) – so this is a challenge for their professional development.

Universities also have specialized interdisciplinary programs, some of which develop qualifications in education and training. However, not in the field of ESD – they are mostly focused on social issues (there are programs such as Social Pathology and Prevention; Educational Care of the Elderly; Special Pedagogy – Counselling), arts (Special Pedagogy – Drama Therapy; Pedagogy of Prevention Through Movement; Gallery Pedagogy and Art Mediation) or ICT (Information and Communication Technologies in Education). The social pedagogy program, Modernising Education through Diversity and Inclusion, was developed by the Masaryk University in Brno in cooperation with several departments of its Faculty of Education and higher education institutions abroad. The program was created to meet the needs of potential international applicants looking for English-language courses.

### ***Lack of space in curricula and limited use of appropriate pedagogical methods***

The FEP provides space for environmental education and ESD mainly through the cross-cutting themes defined in the FEP (i.e., sustainable environment, society for all, and care for well-being). However, the time allocated in the school curriculum may not be sufficient to develop relevant competences (in particular the key competence for citizenship and sustainability), as there are competing demands for other subject areas. The responsibility for deciding on a cross-curricular (rather than a disciplinary) focus lies with the schools, which should specify this orientation in the School Education Programmes.

Non-formal education programs complement SEPs where necessary, but the results of non-formal learning are not yet accepted by the formal system – which on the other hand lacks incentives for active learning and the use of relevant pedagogical methods in practice. The 2022/23 Report of the Czech School Inspectorate states that in primary schools

“... the use of organisational forms of teaching does not satisfactorily support pupils’ activity. Teachers most often use the purposeful frontal form of work or frontal organisation of teaching combined with independent work by pupils, less often group work or teaching in pairs. The proportion of observed lessons in which one or more pupils were passive was 9% in frontal organisation combined with independent work, 18% in purposeful and 57% in ineffective frontal organisation, in all cases several times higher than in varied or cooperative learning organisation. Not providing enough opportunities for students to engage in meaningful active learning at school places the responsibility for their education on their parents. This may be one of the reasons why further educa-

tional opportunities are negatively affected, especially for pupils from low socio-economic backgrounds” (CSI, 2023, pp. 60–61) (see Figure 4 above).

### ***Leading to a qualification, but implementation experience remains limited***

Environmental educator has recently become one of the professions in the Ecology and Environmental Protection Group of fields as defined by the National Register of Qualifications.<sup>9</sup> Graduates will be able to demonstrate their competences and obtain an official qualification – linked to employment opportunities (these competences are: Knowledge and understanding of environmental and ecological issues and of the system of Environmental Education and Awareness (EEA) in the Czech Republic; Preparation and management of environmental programs; Planning of personal professional development; Securing financing and marketing of environmental programs; and Observance of the principles of occupational health and safety and accident prevention in the implementation of environmental programs). However, there is little experience with the process so far (Novák et al., 2024).

### ***Challenges in assessing ESD learning outcomes***

The issue of evaluation is one of the fundamental conditions for the implementation of environmental education and education for sustainability – demonstrating its effectiveness is central to the research developing around these

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9 The aim of the National Qualification System is to create an environment that supports the comparability of outcomes from different educational pathways. For each qualification, a qualification standard is drawn up as a structured description of competences, and an assessment standard is drawn up as a set of criteria and procedures for assessing these competences. The web portal of the National Register provides a sitemap with information on individual qualifications, authorising bodies and means of acquiring qualifications.

concepts today. In this respect, relevant studies show that research leads to encouraging improvements in pedagogical practice, resulting in an increase in students' environmental awareness, their ability to rethink their preconceptions and to tackle complex environmental problems. On this basis, they are more likely to consider environmental issues as a personal challenge and to maintain newly acquired desirable habits in the long term. However, ESD assessment methods face many challenges, including the fact that various biases and a variety of psychosocial factors are often not considered, which affects the results. For example, it is necessary to take into account cultural values, emotional involvement and other conscious and unconscious, specific and general factors that act as stimulators or inhibitors of pro-environmental change and make it difficult to measure the impact of ESD (Dlouhá & Dlouhý, 2025).

Assessment that produces comparative results is particularly needed in formal education, where schools are responsible for delivering expected outcomes in terms of the competences of their pupils and students. However, the assessment methods used in this context are not fully suitable for ESD evaluation. Current quality control mechanisms were developed in accordance with the text of the Education Act, and the Czech School Inspectorate evaluates the quality of education on the basis of publicly available evaluation criteria approved by MEYS. Evaluating the learning outcomes of individual learners is the responsibility of the school, but the methodology of competence-based teaching, including the system of evaluating the results, is still being developed. In practice, teachers focus on what is required (and assessed) as a prerequisite for further study, usually at upper secondary or tertiary level.

## Conclusion

The Czech Republic has a long tradition of environmental education, which has now reached a certain quality and recognition at the academic level. However, although many environmental education centers exist and are supported by the government, this type of education is far from mainstream. For a long time, the formal education system has not accepted education for sustainable development as a leading paradigm, partly for political reasons, and this has only begun to change recently, mainly due to pressure from abroad. Recent strategic documents and international commitments of the Czech Republic envisage curricula in which ESD is fully integrated, and this goal is included in a curriculum revision process that is currently underway. The revision has the ambitious goal of substantially changing the education system and introducing some new methodological tools (e.g., for interdisciplinarity, assessment, etc.); however, the Model School Education Programmes that would put this impulse into practice are not yet available (so it is not clear whether the strategic ambitions will be fulfilled in reality).

When (and if) the competence-based education system is fully operational, education will face new challenges for which it is not yet prepared. In the context of even more pressing environmental problems, such as climate change and loss of biodiversity, and (often related) changes in society, we need to ask how far only partial adjustments to the school curriculum can be effective. At some point, we will need to seek a complete change to the system. This is increasingly being discussed in professional circles, with many authors expressing the belief that education for sustainability needs new, modern, alternative and innovative practices and methods to achieve its goals, and some even speak of a new learning culture or pedagogy as such (Riess et al., 2022). This deeper change in the education system, which would be put into practice, is unlikely in the current conditions in the Czech Republic.

## Acknowledgement

This chapter was written thanks to the LADEM project (SS07010474) funded by the Environment for Life programme of the Czech Technology Agency. We would like to thank our colleague Jiří Kulich, Director of the SEVER Educational Centre, for his valuable comments on the first draft of the text, and we are grateful to Jiří Dlouhý from the Charles University Environment Centre for his careful work with figures and tables.

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# **Status, Trends and Issues of Education for Sustainable Development (ESD) in Finland**

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## Abstract

The aim of this chapter is to describe the Finnish educational system and how education for sustainable development, or sustainability education, has developed in Finland. Finnish education has a worldwide reputation because of its Programme for International Student Assessment (PISA) success at the beginning of the 21st century. More recently, in 2024, Finland was at the top of the United Nation's (UN's) evaluation record of the implementation of the Sustainable Development Goals (SDGs). Despite these success stories, and despite very good intentions, the implementation of sustainability has not shown any self-evident success in Finland. Like many other countries, Finland has had to struggle against stronger winds blowing in other directions, not least other worldviews striving primarily for economic success. Nevertheless, the Finnish sustainability education journey started many decades ago with ambitious strategies, which pointed out the importance of environmental and sustainability education in all school types and at all educational levels. The strategies had company from curricula that have repeatedly gone through revisions and have increasingly emphasized sustainability issues. Still, the end destination is unclear. However, the situation is not hopeless. There are approaches that might lead to change, and there is an increasing number of committed people. This chapter describes and discusses the Finnish struggle towards sustainable schools with high quality sustainability education.

**Keywords:** Finland, ESD, sustainable development, sustainability education, Finnish curricula

## Introduction

To facilitate an understanding of the Finnish sustainability education implementation, a framework is beneficial. Finland, with its 5.6 million inhabitants, is a small country situated in Northern Europe. Since 1917, the country has been an independent republic, and since 1995 a member of the European Union (EU). Finland is also one of the five Nordic countries (together with Sweden, Norway, Denmark, and Iceland) with much cooperation within the region, including sustainability. The country is divided into self-governed municipalities (InfoFinland.fi, 2025), which, at the beginning of 2025, were 308 in number (Kuntaliitto, 2025). These municipalities are responsible for arranging education for all children and young people aged 6–18 years (OPH, 2025d). From the 1970s, the core of the Finnish educational system has been 9 years, and it is similar for all comprehensive schools for 7- to 16-year-old students. In 2023, Finland had 2,014 comprehensive schools (Statistics Finland, 2024).

### The Structure of the Schooling System in Finland

In Finland, education is compulsory, which means that children must receive education even if they are not attending school (OPH, 2025c, 2025e). Therefore, from the year they turn 7 and for the subsequent 10 years, or until they are 18 years old, Finnish children and young people are obliged to be educated. Most Finnish children go to school, but homeschooling is also allowed, according to the law. In the case where students have completed the basic education, which is the 9 years of comprehensive schooling, but are still not 18 years old, they are obliged to apply for one more year of studies (see next section) (Ministry of Education and Culture & Finnish National Agency for Education, n.d.).

## *The Finnish Course of Study*

Most Finnish children attend early childhood education and care (ECEC) before they start the obligatory pre-primary education the year, they turn 6 (exceptionally a year earlier or later) (Nordic Co-operation, n.d.-b). The pre-primary education lasts 1 year. Pre-primary education is part of early childhood and care, but legally it belongs to primary education. The year the children turn 7, they go to compulsory comprehensive school starting from primary school (grades 1-6). These 6 years are followed by 3 years of lower secondary education (grades 7-9). After that they continue for at least 1 year (compulsory) in “post-basic preparatory education” aiming at secondary education (called TUVA) or at work and independent living (TELMA), general upper secondary education, or vocational education (see Table 1). To complete a Baccalaureat, students need to attend a general upper secondary school for about 3 years. In this chapter, K-12 education includes Finnish education levels from ECEC to general upper secondary school, excluding the post-basic preparatory year as well as vocational education.

**Table 1** The Finnish Educational System

Age of students	Approx. duration in years	Education level	Institution
	4	Doctoral education	University
		Licentiate education (not obligatory for a doctoral degree)	University
	2	Master’s education	University <i>or</i> University of applied science
	3	Bachelor’s education	University <i>or</i> University of applied science
	3	General upper secondary education or vocational education	General upper secondary school <i>or</i> Vocational college

	1–3 1	Post-preparatory education: TELMA or TUVA	
13–16	3	Lower secondary education	Comprehensive schools grades 1-9 <i>or separately</i>
7–12	6	Primary education	Primary school, grades 1-6 and Lower secondary school, grades 7-9.
	1	Preparatory education in years 1–9 (if needed)	
6–7	1	Pre-primary education	Schools <i>or</i> Day-care centers
0–6	0–5	Early childhood education and care (ECEC)	Day-care centers <i>or</i> Group family day care <i>or</i> Family day care

In Finland, most schools are public, and education is free of charge from pre-primary school to the end of upper secondary school (FNAE, 2025). Material such as textbooks, other school equipment, a warm lunch each day, school transport (if the distance between school and home is far enough), and student welfare services are also free. In addition, if needed, students can receive special support such as assistive devices, interpretation, and assistance services.

As a country with two official languages, Finnish and Swedish, there are teacher education institutions and schools in both official languages. In addition to these languages, the school language may be Sami, Romani, or sign language (Nordic Co-operation, n.d.-a). In large cities, especially in the capital, Helsinki, there are schools working in English, French, German, and Russian as well (infoFinland.fi, 2024; Nordic Co-operation, n.d.-a).

Finland has a well-developed education system with academically trained teachers. At the beginning of the 20th century, the country was at the top of

the OECD ranking in the Programme for International School Assessment (PISA). In 2006, the Finnish scores were the best in both science and mathematics, and the second best in reading. The science scores were better than any country ever. Since then, there has been a decline in the Finnish learning results. However, Finland is still close to the top, especially in a European comparison, but the scores dropped remarkably in the 2022 PISA assessment. Simultaneous with this decline, the achievement gap increased between high-achieving and low-achieving students, as did the gap between students from different socio-economic backgrounds (Ministry of Education and Culture, 2023). In addition, despite the high standard of teacher education, and the relatively good results in diverse tests, sustainability is not a key focus of Finnish education, either in teacher education (Hofman, 2012; Wolff et al., 2017) or in school education (Mykrä, 2021; Saloranta, 2017).

## **Sustainability and Sustainability Education Policies and Practices in Finland**

Sustainable development and the Sustainable Development Goals (SDGs) have attained a visible position in Finland. After the Brundtland report, national reports have been published on how to implement sustainability, and many committees have worked on the issue of how to organize the implementation. The Finnish government has published three reports (2016, 2020, and 2024) on how Finland can achieve the 2030 Agenda. The Finnish ministries deal with sustainability issues and the Finnish National Commission on Sustainable Development aims to accelerate the implementation of the SDGs and to promote cooperation between various stakeholders (Prime Minister's Office, n.d.). There have been efforts to integrate the objectives of sustainable development into national policy, administration, and social practices.

## **Finland and the SDGs in Practice**

Internationally, Finland is leading the UN 2024 ranking on how the member states have achieved the SDGs (SDG index score 86.35/100 points) (Sachs et al., 2024). However, this good result is dependent on the calculation methods, since the Finnish production as well as the consumption certainly also have a negative impact on other continents. These impacts are difficult to measure in the country, both when it comes to Finland and to other top performing countries. Worthy of attention is also the status of the countries at the bottom of the SDG ranking scale, since their results might be impacted by military conflicts, security issues, or political and socio-economic instability (Sachs et al., 2024).

Even if Finland is at the top of the 193 countries on the index score list, it is still a country with overconsumption and many challenges to meet. Significant challenges are goals 15: Life on land and 17: Partnerships for the goals. Major challenges are goals 2: Zero hunger, 12: Responsible consumption and production, and 13: Climate action (Sachs et al., 2024). Ylönen and Salmivaara (2021, p. 829) also stressed that Finland's "mainstreaming of the expanded development agenda has been largely limited to the Ministry for Foreign Affairs and its development policy department. The breadth of the SDG agenda has enabled individual targets to be cherry-picked, with less attention paid to advancing the Agenda 2030 as a whole and to implementing its Leave No One Behind (LNOB) principle."

## **Development of Strategies and Curricula on Sustainability Education**

The first curriculum for the Finnish comprehensive school from 1970 emphasized humans' relationship with nature and responsibility for its wellbeing (Sjöblom, 2012). Influenced by the UN's first intergovernmental environmental conference in Stockholm in 1972 and the first environmental education conference in Tbilisi 1977, interest in environmental education arose in Fin-

land (Sjöblom, 2012; Wolff, 2011). In the 1980s and 1990s many reports on environmental education were produced. However, it was not until the 1990s that environmental education became a common concept and was included in the national core curriculum for pre-primary education, basic education, and general upper secondary education (Wolff, 2004).

In 1990, UNESCO and Finland's UNESCO Committee agreed on compiling a report on the state of the environment in Finland, and on developing an environmental education strategy (Finnish National Commission for UNESCO, 1991). The main concept in the report was "environmental education," but one page discussed the challenge of sustainable development. According to the report, environmental education should be included in all education for all age groups.

In 2006, a working group on education for sustainable development published a national strategy arguing that sustainable development must become an important focus in education policy and be promoted at all levels of education and research (Finnish National Commission on Sustainable Development, Sub-commission for Education, 2006). Eleven years later, a working group appointed by the Ministry of the Environment and the Ministry of Education and Culture studied the organization of environmental education and the promotion of environmental awareness in Finland (Ympäristöministeriö, 2015). This group called for development measures and suggested deepening and expanding the cooperation and division of labor between the administrative sectors.

## **Sustainability Education and Legacy**

The Basic Education Act (Finlex, 628/1998) defines social responsibility and capacity for learning, but not in relation to the natural environment. In 2001, the Government Decrees on the national goals of education and distribution of lesson hours in basic education appointed the instruction to promote students' agency development and encourage them to participate in the building

of a just and sustainable society (Finlex, 1435/2001). In 2018, the Act of Early Childhood Education emphasized that education must guide children towards ethically responsible actions (Finlex, 540/2018a). In the Governmental regulation of upper secondary education from 2018, sustainability was also included (Finlex, 810/2018b).

## **The Status of Sustainability Education in K-12 Schools in Finland**

In the curricula reform that took place in the beginning of the 2010s, and which resulted in new curricula for all K-12 school levels, sustainability was important. One of the main purposes was to improve students' opportunities to develop their agency and sustainable well-being (Halinen, 2018). In addition, the entire school operational culture should be in line with sustainability principles. This section of the chapter will mainly focus on the Finnish K-12 curricula in use in 2025 and their implementation.

### **Sustainability Education Indicators**

In Finland, there are no general indicators for sustainability in K-12 education. Educational institutions can voluntarily apply for a sustainability certificate and strive to fulfil specific criteria. The agencies arranging certification for Finnish schools are Eco-Schools in Finland and the OKKA Foundation. Their criteria can be found online in English (Green Flag<sup>1</sup> and the OKKA Foundation<sup>2</sup>).

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1 <https://vihrealippu.fi/wp-content/uploads/2019/12/International-Schools-Criteria.pdf>

2 [https://koulujaymparisto.fi/wp-content/uploads/SD\\_CRITERIA\\_General\\_ed.pdf](https://koulujaymparisto.fi/wp-content/uploads/SD_CRITERIA_General_ed.pdf)

In 2025, nearly 400 Finnish day-care centers and schools are participating in the Green Flag program, which is administered by Eco-Schools in Finland, a national branch of the international Eco-Schools program. Over more than 25 years, the Finnish branch has customized the program to suit the Finnish educational system. The targets are day-care centers, schools, educational institutions, and arrangers of leisure activities for children. The Green Flag program offers participants ready-made, research-based materials on environmental issues, arranged as nine topics: climate change, biodiversity, waste reduction, sustainable consumption, water, energy, a shared planet, local environment, and healthy living. The Eco-schools in Finland's website shares much material suitable for teaching on various sustainability-related topics<sup>3</sup>.

In nearly 20 years, the OKKA Foundation has also offered sustainability certification to schools and educational institutions. The target is comprehensive schools, upper secondary schools, vocational schools, liberal arts schools, basic art schools, children's cultural centers, and organizations. In addition to certification, the OKKA foundation offers assessment tools, advice, and training that support schools and educational institutions in their sustainability work. With the help of supporting material and self-evaluation tools, institutions can develop their management, teaching, and operational culture in a more sustainable direction. The OKKA Foundation shares material for formal education, but also non-formal education, and organizations on their website<sup>4</sup>.

## **Sustainability Key Competences**

There are no specific key competences for sustainable development identified for students and educators in the Finnish K-12 schools. However, all Finnish K-12 curricula identify competence areas including sustainability aims (see the next section). These competence areas are thus not directly comparable with key competencies for sustainable development (see the curriculum sec-

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3 <https://vihrealippu.fi/en/>

4 <https://okka-saatio.com/the-okka-foundation/>

tion below).

## Sustainability in the Finnish National Curricula

The Council of State decides on the national objectives of education, and on the division of instruction time between subjects and subject groups. The Finnish National Agency for Education (FNAE) prepares the framework curricula for distinct types of schools. These so-called core curricula define the objectives and main content of the instruction and give advice about assessment and schools' own curricula work, based on which the municipalities and the schools create their own specific curricula (OPH, 2025a).

Today, Finland has four main core curricula for K-12 education (see Table 2). The oldest curricula are those for pre-primary, primary and lower secondary education. They were published in 2014 and had to be applied by the latest in 2016. The latest revised version of the general upper secondary education curriculum was published in 2019 and had to be applied by the latest in 2021, and the newest curriculum is the revised version of the ECEC curriculum that is from 2022 and had to be applied in the same year. The text below describes the curricula one by one in relation to sustainability.

**Table 2** The Main Curricula Steering the Finnish K-12 Education in 2025

School level	Title of curriculum	Publishing year	Applied by
Upper secondary school	National Core Curriculum for General Upper Secondary Education	2019	2021
Lower secondary school Primary school	National Core Curriculum for Primary and Lower Secondary (Basic) Education	2014	2016
Pre-primary school	National Core Curriculum for Pre-primary Education	2014	2016
Early childhood education and care	National Core Curriculum for Early Childhood Education and Care	2022	2022

## *Early Childhood Education and Care (ECEC)*

Sustainability has a visible role and is mentioned several times in the curriculum for ECEC from 2022, which is a revision of the version from 2016. Already the goal section mentions the SDGs. First, sustainability is seen as an important obligation which guides children towards ethically responsible sustainable actions. Second, sustainability is a profound value. “ECEC is based on respect for life, human rights, and sustainable development as well as the inviolability of human dignity” (FNAE, 2022, p. 18). ECEC must follow the principles of sustainability including its social, cultural, economic, and ecological dimensions. The curriculum calls for education that guides children to both think and act in an ethically sustainable way (FNAE, 2022).

Cross-curriculum studies in the form of transversal competence areas play a major role in all the educational level curricula in Finland. Already in the ECEC curriculum, the instruction is an entity divided into transversal competence areas with the ambition to strengthen children’s “knowledge, skills, values, attitudes and will” (p. 21). The areas are: 1) Thinking and Learning, 2) Cultural Competence, 3) Interaction and Self-Expression, 4) Taking Care of Oneself and Managing Daily Life, 5) Multiliteracy, 6) Digital Competence, and 7) Participation and Involvement. Among the transversal competence areas, sustainable development is a part of Taking Care of Oneself and Managing Daily Life: “The task of ECEC is to strengthen children's skills related to well-being and safety and to guide them in making choices in line with a sustainable way of life” (FNAE, 2022, p. 23).

The ECEC curriculum wants to see children as active and responsible participants building a sustainable future (FNAE, 2022). Regarding the operational culture, sustainability is mentioned as a way of living. Sustainability is also viewed from a cultural perspective in relation to cultural diversity and language awareness. The curriculum stresses the necessity of a sustainable way of living, and a responsible relationship with nature and the environment

(FNAE, 2022). In addition, the curriculum gives specific examples of how to implement sustainability on a practical level. It is also the place where the natural environment has a visible role, but the economic perspective is also present here:

Children are guided to respect nature, its plants, and animals. Environmental education promotes the children's growth into a sustainable way of living and the practice of skills needed in it. These practical skills include not littering while on excursions, learning moderation and being economical, responsibility related to meals, saving energy as well as decreasing the amount of waste by such means as recycling, repairing, and reusing things. At the same time, children are guided to pay attention to the impacts of their actions. It is important to ensure that children feel they can contribute to a sustainable way of living through their actions, however without having to bear too much responsibility for maintaining it as children. (FNAE, 2022, p. 46.)

### ***Pre-Primary Education***

The Finnish pre-primary education curriculum does not include the words sustainability or sustainable more than nine times. However, under the headline Value Basis (orig., Arvoperusta), the curriculum text states that: “[p]re-primary education follows the principles of a sustainable lifestyle and considers its dimensions: social, cultural, economic and ecological” (OPH, 2016, p. 16, auth. transl.). Sustainability is also mentioned among the transversal skills:

The components of a broad competence support their [the children's] readiness to embark on a lifelong learning path and to create a foundation for adopting a sustainable

lifestyle. Pre-primary education focuses on the social and cultural aspects of a sustainable lifestyle. (p. 17, auth. transl.)

The holistic education in pre-primary education follows these transversal competence areas: 1) Thinking and Learning, 2) Cultural Competence, Interaction, and Expression, 3) Self-Care and Daily Life Competences, 4) Multiliteracy, 5) Information and Communication Technology Competence Expertise, and 6) Participation and Influencing (OPH, 2016, auth. transl.).

The diverse competence areas strive to support the children towards a lifelong learning path, and thus to create a basis for a sustainable lifestyle. The aim of such a lifestyle is especially emphasized in the competence area Self-Care and Daily Life Competence (OPH, 2016). In this respect, the curriculum also stresses that children must be supported to develop a positive view of the future. The area, Participation and Influencing, calls for children's participation in the creation of a sustainable future. Similarly, in the pre-primary education curriculum, sustainability is mentioned in relation to democracy education and children's development as responsible citizens who care about a sustainable future (OPH, 2016). Children shall be encouraged to participate and make decisions, and to actively influence the development of society. The ecological dimension of sustainability and nature studies are especially mentioned through the concept of environmental education:

Pre-primary environmental education offers children experiences of nature and opportunities to examine and learn about plants, animals, and natural phenomena. Environmental studies take place using the senses and with the help of field study equipment. Sometimes teaching includes small experiments. The observations are discussed, and afterwards the children practice classifying the observed phenomena. At the same time, children learn

to use concepts related to nature, to draw conclusions, and to consider cause-and-effect relationships. Children's knowledge of nature is utilized in teaching. Children are trained to search together with adults for information about things they are interested in. Teaching creates the foundation for a sustainable lifestyle when learning about nature conservation. Children are guided to take care of their environment and its contentment (OPH, 2016, p. 37, auth. transl.)

The last time sustainability is mentioned in the Finnish pre-primary education curriculum is in connection to caring about oneself and one's daily life. In this respect, the curriculum stresses the importance of encouraging consumption and choice of food, in addition to cleanliness habits in accordance with a sustainable lifestyle (OPH, 2016).

### ***Primary and Lower Secondary Education***

In 2025, Finland still uses the National Core Curriculum for Basic Education that was published in 2014. Already the first paragraph states that the main reason for the revision of the curriculum was to:

ensure that changes in the world around the school can be responded to and that the school's role in building a sustainable future can be strengthened in the organisation of education (FNBE, 2014, p. 9).

The curriculum calls for a sustainable lifestyle, and states that humans are a part of nature and are dependent on vital ecosystems. Students need to strive for sustainability and learn to understand how sustainability is linked to climate change; the development of organizational culture must reflect hope for the future and acknowledge the necessity of a sustainable lifestyle (FNBE,

2014). In addition, nearly all the school subjects include the idea of sustainability, even if often shallowly. Through the 472 pages of text (print version in Swedish), sustainable in some form of the word occurs nearly 200 times. However, the concept is never clearly defined (Jónsson et al., 2021; Zilliacus & Wolff, 2021).

When the core curriculum for basic education describes what is meant by sustainable development, the interpretation contains the concept “ecosocial Bildung” (the word bildung is inaccurately translated in the English curriculum version as “ecosocial knowledge”, since there are no direct translation). To make the interpretation still more complicated, the concepts of sustainable development and ecosocial knowledge are strongly intertwined in the interpretation:

Humans are part of nature and completely dependent on the vitality of ecosystems. Understanding this plays a key role in growth as a human being. Basic education acknowledges the necessity of sustainable development and ecosocial knowledge and ability, follows their principles, and guides the pupils in adapting a sustainable way of living. Sustainable development and ways of living comprise an ecological and economic dimension as well as a social and cultural dimension. The leading idea of ecosocial knowledge and ability is creating ways of living and a culture that foster the inviolability of human dignity and the diversity and ability for renewal of ecosystems while building a competence base for a circular economy underpinned by sustainable use of natural resources. Ecosocial knowledge and ability means that the pupils understand the seriousness of climate change, in particular, and strive for sustainability. (FNBE, 2014, p. 16)

This text continues with the claim that humans have a responsibility to develop technology that secures the future of humans and nature (FNBE, 2014). Basic education should initiate reflections on conflicts between production and consumption methods in relation to sustainability aims and strive to find ways to correct unsustainable lifestyles. Global responsibility is seen as a cross-generational issue.

The only place in which the curriculum refers to the four dimensions of sustainable development is in Environmental Studies (an integration of Biology, Geography, Physics, Chemistry), and in Health Education in grades 1-6. The social dimension is visible in the curriculum but is not called a dimension of sustainability. Social sustainability issues such as human rights, equality, and democracy are a profound part of the curriculum, but are not discussed in relation to sustainability.

In basic education, there are seven transversal competence areas, and the word competence is described as “a precondition for personal growth, studying, work, and civic activity now and in the future” (FNBE, 2014, p. 47). The competence issue is divided into seven areas. The seventh is called Participation, Involvement and Building a Sustainable Future. The others are: 1) Thinking and Learning to Learn, 2) Cultural Competence, 3) Interaction and Self-Expression, which strongly relates to social sustainability, 4) Multiliteracy, also with features of social sustainability, 5) ICT Competence, in which sustainable development is mentioned in the aim to “learn to assess the impact of ICT from the perspective of sustainable development and to be responsible consumers” (FNBE, 2014, and 6) Working Life Competences and Entrepreneurship.

### ***General Upper Secondary Education***

Finnish general upper secondary school is course-based and grade-free. It offers theoretical education and prepares students for university studies. In the

curriculum revision from 2022, sustainable development is listed as an aim of general upper secondary education. On the one hand, according to the Foreword, the aim of the curriculum revision was to strengthen citizens' educational level, and thus, Finland's potential for success during the following decades (FNAE, 2019). The first listed issue among the missions and goals is strengthening of students' transversal general competence and ability. Simultaneously, the curriculum is based on a *Bildung* ideal, which strives for truth, goodness, beauty, justice, and peace (FNAE, 2019).

The aim of upper secondary education is to support students' balanced mental, physical and social development and to promote respect for life, human rights, sustainable development, and environmental and cultural diversity. Among the objectives of instruction is to make students aware of the impacts of humans' activities on the environment and to promote a sustainable way of living. The instruction shall encourage students, so they acknowledge the ethical dimension of sustainability and are willing to discuss complex issues, and also conflicts and tensions. The instruction shall also encourage students to act for a fairer and more sustainable society, and to respect human rights (FNAE, 2019).

The curriculum emphasizes the importance of a sustainable lifestyle, and the creation of a knowledge base for an economy that supports the well-being of both the environment and the citizens. It stresses students' agency and global responsibility, especially in relation to climate change and declining biodiversity. In addition, Agenda 2030 and even world citizenship are mentioned. The curriculum asks for "active agency as part of the local, national, European and global community" (FNAE, 2019).

As in the curriculum for basic education, the general secondary education curriculum includes transversal competence areas common for all subjects. The six areas are: 1) Well-Being Competence, 2) Interaction Competence, 3) Multidisciplinary and Creative Competence, 4) Societal Competence, 5) Ethical

cal and Environmental Competence, and 6) Global and Cultural Competence (FNAE, 2019). The description of the transversal competence areas calls for an educational base, on which students will develop into good humans capable of building a sustainable future. Sustainability from a social perspective is mentioned as an aim of Interaction Competence, and strives for a sustainable future, democracy and peace. As part of the Multidisciplinary and Creative Competence area, students should be encouraged to find sustainable solutions and reflect on how these solutions relate to the environmental, economic, technical and political issues. Students should also be encouraged to envision the future from individual, collective as well as ecosystem perspectives.

As the title already states, Ethical and Environmental Competence is the transversal competence area that primarily addresses sustainability. According to this area, students should learn to acknowledge all the sustainability dimensions (FNAE, 2019). This competence area encourages agency and research-based understanding for the necessity of biodiversity and climate change mitigation. Therefore, students should learn to ethically and responsibly plan their own actions, and to know why humans must adapt to the limits of nature. This competence area also emphasizes knowledge of globalization, and activities in accordance with Agenda 2030.

The curriculum gives instruction on how to integrate the transversal competence areas in relation to the various subjects. In addition to the general and transversal competence parts of the curriculum, sustainability is also included in the individual subjects and their courses, both in obligatory and optional courses. Some courses are specifically focused on sustainability, while others deal with the topic only briefly.

## **Formal Education and Sustainability Practices**

It is easy to describe how sustainability has been incorporated into educational policy, but when it comes to practical implementation in formal education the

picture is slightly unclear. “When steering Finnish comprehensive schools, public administrators use mainly soft policy instruments like information, agreements, strategies, and action plans” (Mykrä, 2023, p. 89). This means that they are only guidelines, and not decrees, and curriculum blueprints are not common in Finland.

The outcomes of sustainability education in Finnish schools have been nationally evaluated twice, in 2001 and in 2012, but not since then. There are no national test or exam results to refer to either. Finnish basic education (grades 1-9) does not assess students’ learning outcomes by compulsory national tests. The first compulsory national test (matriculation exam) takes place at the end of general upper secondary education.

However, there are a few studies to refer to. According to Saloranta’s (2017) study, which included 2,230 sixth-grade students, 321 teachers, and 80 principals, the implementation of sustainability in Finnish schools varied greatly. Even if many schoolteachers and principals found sustainability important, they did not have the time or resources to implement the topic in the school’s daily life and in their teaching. Saloranta found the school leader’s role as most significant in the implementation process in the entire school culture, from aims to tangible daily activities (cf. Mykrä, 2021).

In a study including 442 Finnish lower secondary subject teachers, Uitto and Saloranta (2017) found large differences in how teachers in various subjects taught the sustainability dimensions. Teachers of biology, geography and history were more actively teaching sustainability in a multidimensional holistic way, while teachers of other subjects considered only two or three sustainability dimensions. Teachers of mathematics, physics, chemistry and languages commonly used only one dimension of sustainable development. This gives the impression that they taught what they were best at. According to Mykrä (2021), who for 3 years performed a large ethnographic study in two Finnish basic education schools and interviewed 42 staff members, many teachers

saw teaching ecological sustainability as non-essential work, or that recycling was the easiest way to treat the topic (Mykrä, 2021). Maybe, therefore, the teachers who participated in ecological sustainability in-service training were those who already knew about the topic, and not those who would need it most. Generally, teachers were more interested in quick transferable teaching tips than in initiating value discussions and challenging their own and their students' worldviews, and thus searching for a whole-school approach. These worrying results turn the attention towards teacher education.

### **The Role of Sustainability in Finnish Pre- and In-Service Teacher Training**

Finnish teacher education has a long academic tradition; it entered universities in the 1970s. To become a primary school teacher in Finland, it is necessary to complete a master's degree at one of the eight universities offering teacher education. Primary school teachers require a degree of 300 credits with education as a major subject. Subject teachers in lower or upper secondary education have to study a master's in their subject with 60 credits (separately or included) in education, whereas pre-primary education teachers must complete a bachelor's degree.

Finnish pre-service teacher training is research-based and aims to foster educational experts prepared to continue their professional development throughout their careers. The Finnish school success in international assessments such as PISA has partly been seen as an outcome of the high quality of teacher education (Sahlberg, 2011; Välijärvi et al., 2002). However, since the education of Finnish school teachers mainly strives to make the student teachers ready to teach school subjects, most of their studies consist of compulsory courses. Sustainability has not been compulsory and, therefore, has often been left behind.

In the 1990s, environmental education was established as a part of school in-

struction, and of teacher education. At that time, at least some of the teacher education institutions arranged up to 60 credits in environmental education (Cantell et al., 2020). However, this did not become established.

A study from 2010 focused on the frequency of courses in sustainability in teacher education in Finland (Hofman, 2012). The result was that most teacher educators had not received any training or education in how to integrate sustainability into the school subjects. In addition, they could not reply whether their departments had included the concept of sustainable development in their policy or not. The study also showed that none of the eight Finnish universities offering teacher education gave compulsory courses in sustainability at the basic level. At the advanced level, the number of courses differed between the institutions.

Ten years later, Cockerell (2020) studied the implementation of sustainability at the same eight Finnish universities as Hofman did. The focus in this study was the institution strategies, the teacher department programs, and every course in each of the 10 separate teacher education branches (a total of 860 courses), including bachelor as well as master level courses. Cockerell's study showed a very varied appearance of sustainability in the university strategies. In addition, the department programs were seldom in line with the strategies. According to the study, sustainability was mainly the content of optional courses and was absent from obligatory courses. Cockerell's study clearly showed that sustainability courses were not usual at the Finnish teacher education universities in 2020. In a master's thesis 4 years later, Oravasaari and Varis (2024) collected data from study guides of seven Finnish primary teacher education institutions' courses organized at the bachelor's level. The study showed that sustainable development was integrated into the teacher education curricula, but the presence of its dimensions varied greatly. In particular, the economic dimension was rarely present, but also the ecological was much less frequent than the social and cultural dimensions. In Koskela and Kärkkäinen's study (2021), among 180 student teachers, their courses had basically included

sociocultural views of sustainability.

However, since student teachers study at a university, it is worth noting that in 2020 the Council of Rectors at Finnish universities (UNIFI), as a collective voice of all universities in Finland, agreed on the 12 “Theses on sustainable development and responsibility” to be implemented before 2030 (UNIFI, 2020). More than 400 people participated in the formulation of these theses. Thesis no 4 states that everyone that has graduated from a Finnish university must act responsibly and understand how to promote and develop sustainability. Thus, all studies at Finnish universities must include a basic course on sustainability and responsibility in accordance with the SDGs. Yet, in Finland mostly other interest groups have hereto taken care of sustainability education.

### **Social Partnerships in Sustainability Education**

From the very beginning, many interest groups and organizations, primarily non-governmental organizations (NGOs), have participated in the promotion of sustainability education in Finland. These groups arrange teacher training and seminars, provide teaching material, collaborate with governmental officials and school staff, and write statements and proposals. In addition, they take initiatives and put pressure on governmental and municipality staff as well as decision makers.

Among the first bodies active in the environmental education field were environmental organizations, such as the national NGOs, the Finnish Association for Nature Conservation<sup>5</sup> (SLL, Suomen Luonnonsuojeluliitto) with its youth organization, the FANC<sup>6</sup> (Luonto Liitto), and SLL’s Swedish-speaking counterpart, the Finnish Society of Nature and Environment (FSNE, Natur och Miljö)<sup>7</sup>. These organizations are members of the International Union for Con-

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5 <https://www.sll.fi/en/>

6 <https://luontoliitto.fi/luontoliitto-in-english/>

7 <https://www.naturochmiljo.fi/om-oss/vem/in-english/>

servation of Nature and Natural Resources (IUCN).

FSNE started the first nature school in Finland in 1986, and now Finland has about 50 nature and environmental schools collaborating through the Finnish Association of Nature and Environment Schools. Some of them are owned by organizations, others by municipalities. These nature and environmental schools operate in many parts of the country, where they arrange teaching both for adults (mainly teachers) and students of various ages. The association develops and maintains the LYKE-network<sup>8</sup> with a website called MAPPA<sup>9</sup> which provides a huge number of materials, services, and information for educators interested in nature, the environment and sustainability teaching topics; it has about 50,000 users a year. LYKE also regularly participates in the arrangement of a big event on outdoor teaching for educators. Initially, the Ministry of Environment and the Ministry of Education and Culture financed the network.

In 1991, people involved in the implementation of the environmental education process in Finland founded the Finnish Society for Environmental Education (now the Foundation for Environmental Education FEE Suomi), the organization for Green Flag (see Sustainability education indicators).

The Peace Education Institute<sup>10</sup> offers services for teachers in formal and non-formal education settings, like schoolteachers, youth workers, and activists. The organization focuses specifically on peace, anti-racism, equality, and global citizenship, and has a large material bank for educational purposes. In 2020, the Ministry of Foreign Affairs in Finland together with the Peace Education Institute produced substantial online material and a book in Finnish and Swedish about how to work with Agenda 2030 and climate change in schools.

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8 <https://www.luontokoulut.fi/?lang=en>

9 <https://mappa.fi/sv/startsidea/>

10 <https://rauhankasvatus.fi/agenda-2030-teemapaivat/>

The World Wide Fund for Nature<sup>11</sup> (WWF) Finland arranges courses for teachers, produces material (alone or together with others), and supports schools in various ways. They have a website with ideas and teaching materials for various groups, both for nonformal and formal education. They also engage large groups of people in activities such as oil spill prevention.

Besides its other tasks, Pääkaupunkiseudun kierrätyskeskus<sup>12</sup> (the capital area's recycling center) teaches children in day-care and school students and their teachers, but also other groups, about environmental and sustainability issues. The center's environmental school, Polku, serves about 40,000 people a year.

The UN Association of Finland, or in brief, UNA Finland<sup>13</sup>, promotes and supports the actions and principles of the United Nations. The UN School Network is a collaboration network for schools and educational institutions. The network focuses on issues such as human rights, peace and security, and sustainable development to make them a part of the schools' teaching and operating culture. There are now 150 schools and educational institutions from Finland involved. There are also numerous other organizations than those mentioned here involved in sustainability education.

## **Non-Formal Education and Sustainability Education**

In addition to formal education, sustainability education courses and material addressing nonformal education students have emerged. The organizers of these courses are official educational institutions, organizations, companies, and others. Similarly, the targets vary and so does the context. It is easiest to get an idea through a few tangible examples. To start with the public administration: The 15 Centres for Economic Development, Transport and the

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11 <https://wwf.fi/opettajille/>

12 <https://polkuedu.fi/environmental-education/>

13 <https://www.ykliitto.fi/kasvattajille/yk-koulut>

Environment<sup>14</sup> (ELY Centres) are responsible for implementing and developing tasks given by the central government. Among these tasks are sustainable development and the mitigation of climate change. The ELY Centre in Central Finland is responsible for sustainability education and have funding calls for a broad target of children, young people, and adults every year. This agency also coordinates environmental education groups.

A state-owned provider of environmental services for a diverse group of customers, from private individuals to big companies, is Metsähallitus<sup>15</sup>. This agency addresses the protection of biodiversity, facilitates the recreational use of nature, and promotes employment. Every year, hundreds of young people are employed on internships or in summer jobs in the Finnish outdoors. Metsähallitus arranges guided activities, such as exhibitions, nature trail tours, and events, provides support and training for teachers, and maintains online teaching sites.

Many cities in Finland have ambitious plans and programs on how to achieve the SDGs; this is obvious in the capital area in the cities (Espoo, Helsinki, Kaunianen, & Vantaa) (together approx. 1.3 mill. inhabitants), but also in many other cities such as Oulu and Tampere. These programs are in general connected to international partners and frameworks. Education and involvement of citizens is a part of the activities. Smaller municipalities also have similar programs.

The Lutheran church frequently organizes sustainability courses for both its own staff and others. Many universities arrange open university courses on sustainability issues, and summer university courses in collaboration with adult education centers, which also arrange their own courses. The target of these courses is the public, with a focus on adults.

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14 <https://www.ely-keskus.fi/web/ely-en>

15 <https://www.metsa.fi/en/outdoors/nature-education/>

## Performed Actions

When the sustainability education in Finland is compared to the aims of education in UNESCO's Sustainable Development: A road map for schools (2020), it is obvious that there is still a lot to do to make it a daily issue in formal and non-formal education in Finland. Table 3 is an attempt to sketch the situation. Sustainability is much mentioned in the curricula, but not clearly interpreted. Climate change and biodiversity protection play minor roles as topics. Research shows the necessity of a whole-school approach to develop sustainability in schools (Mykrä, 2021; Saloranta, 2017; Tilbury & Worthman, 2005), and international policy documents especially call for transformation of learning environments (UNESCO, 2020, 2024). This has not occurred to any great extent in Finland. Neither teacher education nor educational authorities have actively strived to build capacities for sustainability implementation among educators. Thanks to various organizations, this has taken place, but since it has not been equally easy everywhere in the country, and since it has demanded the teachers' own activity, the capacity building has been uneven. The empowerment of youth is more a result of their own activity rather than that of the schools. In particular, the well-known Swedish activist, Greta Thunberg, has had a great influence on young people (see Trends below). There are municipalities that actively try to accelerate local actions involving both schools and others. However, this happens randomly and is largely dependent on individual interests. There are good examples of this (see Competitive Orientation below).

**Table 3** A Cross Table of Five Priority Action Areas and Four Interconnected Global Challenges

Five Priority Action Areas	Four Interconnected Global Challenges to be Addressed			
	Climate change	Loss of biodiversity	Unsustainable use of resources	Inequality
Advancing policy	Is not much mentioned in the curricula.	Is scarcely mentioned in the curricula.	Is mentioned in the curricula.	Is mentioned in the curricula
Transforming learning environments	Improvement necessary.	Improvement necessary.	Improvement necessary.	Improvement necessary.
Building capacities of educators	Material has been produced by various agencies to help teachers and students.	Material has been produced by various agencies to help teachers and students.	Material has been produced by various agencies to help teachers and students.	Material has been produced by various agencies to help teachers and students.
Empowering and mobilizing youth	The youth have started actions on their own, but improvement is necessary.	Improvement necessary.	Improvement necessary.	Improvement necessary.
Accelerating local level actions	Improvement necessary.	Improvements necessary.	Improvement necessary.	Improvement necessary.

## Features, Trends and Issues in Finnish Sustainability Education

The local and national culture, but also international trends and current issues have influenced Finnish education, and still do. Therefore, Finland has developed its own sustainability educational features. Even if all is not at its best, much has been done and much is taking place. Still, many issues can be discussed and addressed.

## Features

Four main features influence Finnish sustainability education implementation. They are, first, pretty words instead of execution, second, competitiveness, third, teachers' independence, and last, relying on one solution.

### *A land of pretty words?*

As already stated, sustainability education in Finland has a feature of more pretty words in strategies and curricula than changed ways of acting in teacher education and schools. A good vision may be a good start, but to make a change, other things are also needed, like a tangible plan, allocated resources and time, people responsible for the plan, and understanding of the reasons to make changes. Focusing on sustainability requires commitment and few conflicting interests. It is a topic that ought to involve all people in schools, not only at a strategic level, but as a basic value obvious in instruction, school operations, administration, and in all daily life in school. Meanwhile the situation in the world is changing with the approaching climate change, declining diversity, and steadily increasing global inequality; a change of the entire schools is the only possibility (e.g., Mykrä, 2021; Wolff, 2011).

### *Competitive orientation*

Finland is a country where it is important to be best, and both the country and municipalities are very eager to become top runners in the sustainability race. A good thing, though, is that the top runners try hard to find solutions. Some municipalities have also created models to develop sustainability education. For instance, in the capital of Helsinki (approx. 650,000 inhabitants), general upper secondary school staff and students have been involved in the development of a course in sustainability that is compulsory for all first-year students. The city of Vantaa (approx. 250,000 inhabitants) has developed a Roadmap to

Resource Wisdom<sup>16</sup>, including an eco-support system. Thus, every school has its own eco-pedagogue, a teacher responsible for inspiring the entire school community to engage more deeply with sustainability. This was something that the teachers in Mykrä's study (2021) saw as important and well-functioning. The examples from these two cities are ideas showing that sustainability races can lead to progress, if the end does not outweigh the means. Nevertheless, glossy stories are not the most important; it is also important to share experiences of failures, and to learn from others' mistakes.

### ***Independent teachers and high-quality education***

Finland has high-quality teacher education, and trusts that teacher educators can decide what to teach. However, when it comes to issues that are difficult to teach, and neither teachers nor teacher educators are trained in, it is easy to leave these topics out. Nevertheless, if teacher educators decide to teach the urgent sustainability topic, they can also independently choose the view. To try to integrate the topic from diverse viewpoints in all courses is therefore a challenge. High-quality education is not the same as high-quality sustainability education, if teachers are not well-trained in the topic. It needs further effort.

### ***Searching for one single solution***

A general feature in sustainability discourses and education is to engage in one single idea and to try to fulfil the tasks through this individual topic, for instance recycling. Yet, the sustainability dilemmas are complex, and education needs to be based on discussion of a diversity of facts, ideas, and methods. Sustainability education is much about learning to think, listen, and discuss. In addition, emotional and ethical aspects cannot be neglected. With Finland as an example, electric cars and artificial intelligence (AI) have a strong position

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16 [https://www.vantaa.fi/sites/default/files/document/Vantaa\\_Resurssiviisaudentiekartta\\_EN\\_9\\_2022.pdf](https://www.vantaa.fi/sites/default/files/document/Vantaa_Resurssiviisaudentiekartta_EN_9_2022.pdf)

in the politics and technology debates. However, these kinds of sustainability-related issues need to be considered from broader perspectives that acknowledge a wide ethical angle in both time and space. Ethics related to new technology are not easily manageable issues but need to be addressed as higher socio-technological issues, including human rights and power structures (Bolte & Van Wynsberghe, 2024), at least with secondary education students and student teachers.

## **Issues**

The list of issues to consider could be very long. However, this time the focus is on seven problems related to schools with competing social aims, teachers that are not ready to act, and a lack of resources. The other issues are that small steps are not enough, problems with unclear ideas, but also unclear concepts, and a lack of policy guidance.

### ***Competing social aims***

Both schools and universities in Finland strive to be competitive. Therefore, sustainability must match many, often even strongly, contradicting goals (Uljens et al., 2016). Education institutions involve diverse stakeholders outside schools, such as parents, politicians, and municipality administrators. Universities are dependent on funding agencies, politicians, and managers. In addition, they have leaders, teachers, and students with their own interests. Besides goal divergence, sustainability must combat the complexity of sustainability issues, and the epistemological differences between the disciplines (Wolff et al., 2017). An evaluation of how the curriculum for pre-primary and that for basic education (both from 2014) have been implemented in Finland shows that the norms are interpreted in various ways at the municipal level, and that it has been difficult to find a shared understanding (Venäläinen et al., 2020).

### ***Teachers are not ready to act***

In a study by Yli-Panula et al. (2023), most of the science subject student teachers were interested in sustainability. Yet, they did not regard themselves as solvers of the problems. Even though the curriculum is the basic tool for the development of teaching, all teachers do not find the curriculum important in their work (Venäläinen et al., 2020). Therefore, the evaluation of the basic education curriculum from 2014 calls for more collaboration and teacher participation in the school development and curricula implementation. Conflicts between daily life in school and the teaching content may occur (Mykrä, 2021), which makes the daily school life more complicated, and calls for collaboration and discussions between teachers.

### ***Lack of sresources***

“Allocating resources to wide-ranging communication and provision of information during the implementation of the curricula will help to clarify the direction and the objectives of the reform to all participants” (Venäläinen et al., 2020, p. 13).

Sustainability has not been convincingly realized: the implementation process must go on. Implementing ideas requires resources other than economic. However, sustainability work is time consuming, and time is expensive. It might, for instance, be a question about paying substitute teachers when the formal teachers participate in courses. Similarly, the course arrangements are dependent on money. Web-based material is not enough to learn about complex issues such as sustainability, including climate change and biodiversity protection. Collaboration and networking also incur costs.

### ***Small steps are not enough***

When discussing sustainability, people used to say that it is important to take

small steps. However, with a huge number of environmental problems, this idea might be obsolete. Taking a little step could be to focus on waste sorting, but students need to see larger sustainability perspectives, too. According to Mykrä (2021), it would be better that the school community jointly and creatively search to solve larger problems, and to plan their sustainability more holistically. Nevertheless, wider and cross-curricular viewing starts from teacher education.

### ***Unclear ideas***

The writing of the 2014 core curriculum for basic education involved numerous authors. A huge number of researchers, teacher educators, teachers, administrators, and other stakeholders had their say (Halinen, 2018). Therefore, the document is far from being a unified document with a clear ideological foundation. On the contrary, it is a document filled with contradictions (Jónsson et al., 2021; Zilliacus & Wolff, 2021).

The introduction of transversal competencies is not only ideological, as the concept is in line with the idea of 21st century skills and the OECD's aim to educate a workforce that is productive and competitive (Tahirsylaj, 2023; Zilliacus & Wolff, 2021). No wonder understanding of how to implement the transversal competence areas varies between schools (Venäläinen et al., 2020). Bildung, which is another basic idea in the curricula, on the other hand "is not only about 'the what' of education, but it is primarily concerned with 'the why' of education, which is not solely about being successful in the labour market" (Tahirsylaj, 2023, p. 334). Since the implementation of new ideas takes time, guidance and staff training are required, according to Venäläinen et al. (2020). Of especial importance is leadership.

### ***Unclear concepts***

Not only ideas but also concepts are unclear. According to the evaluation by

Venäläinen et al. (2020), the Finnish National Agency for Education must clarify the concepts in the curricula texts and provide support during the implementation process. Sustainability is such a concept. Another example of an unclear concept in the curricula is ecosocial Bildung. It was also mentioned in the curriculum for upper secondary school education from 2015, but it was removed from the newer version (2019) upon teachers' request as they found the concept too unclear (Cantell, 2023).

### ***Lack of sustainability policy guidelines in teacher education policy***

Wolff et al. (2022) studied two fundamental policy documents outlining Finnish teacher education. The first was *Guidelines for the Development of Teacher Education: Ideas and Suggestions for the Teacher Education Forum* in 2016. The second was *Becoming the Most Competent Teachers of the World: Evaluation of the Teacher Education Forum in 2016–2018*. Thus, the second was an evaluation of how the first was implemented. Sustainability was a rare topic in these reports. Therefore, the result of the policy study was:

that even if several UNESCO policies documents for years have called for a transformation toward sustainability through education, the Finnish teacher education policy has not yet fully acknowledged sustainability issues and teachers' transformative agency in addressing them, but emphasize other aims. Therefore, it is mainly up to the individual teacher educators and the leaders of their faculties to decide on how to prepare student teachers not only to deal with changes in general, but to particularly bring about changes towards sustainability (Wolff et al., 2022, p. 15).

## Trends

Many interesting trends have emerged in the educational landscape. These are, for instance, an increased interest from the top, and a lot of people acting in the middle and across and beyond the schools. Additional trends are rejected fundings, forthcoming evaluations, a change in the role of the universities, and an increased interest from below.

### *Interest from the top*

An interesting trend is that the Finnish governmental organizations have increasingly started projects, produced website material, and announced calls for grant applications to support the schools' sustainability work in accordance with Agenda 2030. In 2019, the Finnish National Agency for Education ran a project on climate change education together with various stakeholders.

In 2025, the FNAE website presents information and shares material about how to implement sustainability in schools. On this site, the Teacher's Climate Guide can also be found (OPH, 2025a). In 2022 the agency announced a grant call on climate change and sustainability education in basic and secondary education, offering 5 million euros to enable change in the operating culture of comprehensive schools, general upper secondary education "towards a more ecologically sustainable lifestyle and to strengthen learners' knowledge, skills and attitudes related to climate change mitigation and adaptation" (OPH, 2025f, n.p., auth. transl.). In addition, the grant offered further funding (nearly 800,000 euros) the following Spring, 2023. The outcome of the use of the grants was presented in a webinar in February 2025. At the University of Jyväskylä, a research project has received funding for 2025-2027 for a study examining the journey of the five million euros granted by the government (see above); it follows what happens from advocacy work to daily life in schools (University of Jyväskylä, n.d.).

From 2023 to 2024, the Finnish National Agency of Education and the City of Oulu's Educational and Cultural Services financed a project that aimed to develop climate and sustainability education in general upper secondary schools in Finland. Examples of the outcome are published as a roadmap for teachers (Ratava & Tomberg, 2024). The booklet contains theoretical articles and experiences from the project.

### ***Increasing collaboration and activity***

An increasing number of people are involved in the sustainability education field. When things start to happen in the top-level educational administration, the reason is often pressure from NGOs. The schools are not left alone. However, while it has become easier to produce and distribute online material, it may be difficult to search for a specific topic. Yet, the earlier described MAP-PA-material is a good well-developed website, serving both many of those offering content and those searching for information (see the earlier section Social Partnership in Sustainability Education, and the next section Rejected Funding).

### ***Rejected funding***

Unfortunately, there are sad stories. In 2021, a large group of people started to collaborate on the sustainability education topic by initiating *Kestävä koulu*<sup>17</sup> (the Sustainable School), a project idea involving 20 NGOs. The project was a draft of a nationwide program for environmental and sustainability education with an aim to promote especially ecological sustainability with K-12 and teacher education as its targets. Nevertheless, the government rejected the project, even though the Ministry of Education and Culture had paid the FNAE for an initial investigation from 2021-2023. This shows that even if people are willing to create networks and do the job, the government does not

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17 Hallbar-skola-programmet-2024-2026-12.2022.pdf

turn on the money taps for the implementation of curricula and strategies and realizing ideas. Unfortunately, this is not the only example of how requests for funding have been rejected. The SYKLI Environmental College<sup>18</sup> has educated numerous teachers and environmental educators in sustainability, but due to cuts by the government, many study tracks in vocational education will be closed. Unfortunately, this is an old trend, that is, transferring responsibility and resources from one authority to another without anybody taking responsibility for making sustainability education real.

### ***Forthcoming evaluations***

To better understand the sustainability implementation process, evaluations and research are necessary. Even if an increasing number of researchers study sustainability education, they most often follow up with short-term projects in specific contexts. What the country now needs is large-scale knowledge about how teachers manage with the implementation of sustainability in daily school life. Intervention studies, especially on how the transversal competence areas are included in the school program are necessary. A beginning is the Finnish Education Evaluation Centre's plan for 2025-2027 (FINEEC, 2024). The plan includes thematic evaluations in three fields. Besides the evaluation of competence and quality in general, one field is *Fostering Social, Ecological and Economic Sustainable Development*. The target of this evaluation is broad—not only K-12 education, but also vocational education and non-formal education for adults. Even if this evaluation will take place at the institutional level and not at the student level, it is very welcome. One of its aims is to promote policy makers with information to help them in their decision process.

Hopefully this evaluation will lead to a trend shift, and kick off more evaluations. How sustainability is implemented in teacher education is also acutely in need of evaluation. Therefore, a part of the university quality assessments

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18 <https://sykli.fi/en/educational-programs/>

could measure how well sustainability is addressed in the university curricula (e.g., Jónsson et al., 2021).

### *A change in teacher education*

The Council of Rectors' thesis of the university may make a change. The sustainability courses are now arranged in various ways, for instance in Helsinki and Turku. At the university of Helsinki five-credit sustainability studies have been compulsory for many faculties since 2023, for instance in ECEC and primary teacher education. Of these five credits, three have common content, and two are specific for the field of study. All five are realized as online studies. The University of Turku offers a basic course of 10 credits and an advanced one of 15 credits for all their students, but participation is voluntary (University of Turku, n.d.). However, in Turku the courses are close-up studies.

Cockerell's (2020) study revealed inconsistency between the university strategies, teacher education program descriptions, and teacher education courses. In that light, it is interesting that the Council of Rectors' thesis no 6 calls for university management, administration and campus activities in line with the SDGs (UNIFI, 2020). This speaks for a quest for a more holistic sustainability approach as a model already in teacher education. Yet, things take time (TTT), and most likely this process will too.

### *Interest from below*

There is growing interest in sustainability issues among some young Finnish people. The reason for this is not Finnish education, but rather a strong international influence from radical youth that are working to stop climate change. Since 2018, the social movement, Extension Rebellion Finland<sup>19</sup> (XR, Fi. Elokapina), has communicated with a broad audience of governmental, financial, and cultural institutions with the aim of enhancing Finnish climate

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19 <https://elokapina.fi/en/about-us/>

policies (Mononen, 2023). In 2025, activists in the Finnish branch of the big international network comprise thousands of young people acting in several cities around the country. They use non-violent civil disobedience to halt the progression of climate change and environmental crises. One of XR Finland's communication forms is roadblocks and art performances, or what they themselves call "activism."

## Conclusion

Since the 1980s, numerous official strategies and policies focusing on environmental or sustainability education have seen the light in Finland (Jónsson et al., 2021). These policy reports have been written by diverse expert groups, often with participants from both governmental organizations and NGOs. Since the 1990s, Finland has also produced several curricula for different school levels; in these curricula, sustainability has become increasingly visible.

While there have not been any regular evaluations of the implementation of the strategies either in educational practice or in teacher education, the outcome of the strategies and curricula is unclear. Neither the National Education Evaluation Centre (FINEEC) nor more than a couple of doctoral researchers have actively studied the implementation process and its outcomes. This has been more of an interest of graduate students. For this reason, this chapter also leans on a few master's theses. However, the authors of these theses talk the same language as doctoral and postdoc researchers. It is obvious that the implementation of sustainability education in Finnish schools (Saloranta, 2017) and teacher education varies (Oravasaari & Varis, 2024). According to Saloranta's doctoral thesis, to make a change, schools need to develop sustainable school cultures, in which school leaders and other staff members strongly

commit to sustainability (see also Mykrä, 2021). Mykrä, as a researcher with long experience in the field, is also pessimistic:

While the Prime Minister's Office praises the Finnish schools for a long-term, integrated approach to sustainable development, closer analysis of the situation shows that the whole picture is not so rosy (Mykrä, 2023, p. 99).

Education that wants to make a visible change towards sustainability meets many hindrances on the road from high-level policy to everyday school reality in Finland, and this road is not straight (see also Mykrä, 2023). A conclusion of the situation when examining how sustainability has been implemented in Finland could be that there has been official money and willingness to discuss and write pretty words. However, no-one has had the responsibility, power, and economic resources to make a real change. Maybe the right word would be unwillingness. The implementation, as well as the evaluation, has not been completed. The important implementation work has been left to mainly NGOs and other actors outside the educational system. They have persistently offered education for both students and teachers, distributed educational material, and arranged seminars and long-term programs for schools and school staff. Without the very important work these organizations and their people have done, the sustainability education situation in Finland might have been catastrophic. The Finnish National Agency of Education has come to take much responsibility for the sustainability implementation. It looked like the Marin government (2019-2023) was willing to prioritize sustainability education and economically support its development in schools, but it remained an illusion.

As Oravasaari and Varis (2024) pointed out regarding teacher education, the curricula need to be steadily updated to meet the global sustainability requirements and prepare teachers to promote sustainable development in all its dimensions. The same could be said about the national curricula guiding school education. However, it is also a question of practice. The implementation of a

very demanding and complex issue such as sustainability must simultaneously take place at all levels of the educational system to have a chance to become successful. Simultaneously, professional research must support the development and evaluation work. Yet, education cannot alone change the world. Other elementary measures must also be considered. Global as well as local politics, economics, and technology development make a strong impact on the course of the world.

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# **Status, Trends and Issues of Education for Sustainable Development (ESD) in Hong Kong Special Administrative Region (HKSAR)**

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## Abstract

The report of Education for Sustainable Development (ESD) in Hong Kong K-12 schools starts with the discussion of the overall policies and practices, including the definition of sustainable development held by the HKSAR Government and the goal of Environmental Education that is applicable to ESD. Supported by examination of a range of related curriculum documents, policy bureaux papers and websites, and also non-government organizations (NGOs) from the period since the late 1990s to the present, the actions and performance of ESD, key themes including indicators, competence, curriculum, formal education, teacher training, non-formal education, and social partners, and the features of ESD are deliberated and discussed. From the above, the emerging trends of implementing ESD across all sustainable development goals (SDGs) to all students including subject teaching as the main vehicle, ESD in line with policies, influences of Chinese culture to ESD, bottom-up complementary efforts by teachers, and the issues of knowledge-focused learning, a cross-curricular, immersive curriculum, further demand for teacher training, and homogeneous non-formal education programs have been identified. To bridge the gap between awareness-attitude and actions, and to overcome the psychological barriers such as psychological distance, belief systems and skepticism, and pluralistic ignorance (APA, 2021), the author asserts that STEMaker projects are a better way to implement ESD.

**Keywords:** STEMaker projects, design cycle, designerly well-being, psychological barriers, transformative education, transformative actions

## **Introduction: The structure of the schooling system in Hong Kong**

In Hong Kong, the education system consists of kindergarten education, primary education, secondary education, post-secondary education and vocational education (see Table 1). A total of 12 years of free and compulsory education are provided at the primary and secondary levels. For the scope of this report, the K-12 levels are discussed<sup>1</sup>.

### ***Kindergartens (3 years)***

Kindergartens and kindergarten-cum-child-care centers provide services for children from 3 to 6 years old. The aim is to nurture children to attain all-round development in the domains of ethics, intellect, physique, social skills and aesthetics.

### ***Primary Education (6 years)***

Primary schooling starts at the age of around 6, and there are 6 years of schooling at the primary level. There are three modes of operation of primary schools, namely morning, afternoon and whole-day. Most primary schools adopt whole-day operation. Chinese is the language of instruction in most schools, with English as the second teaching language. The aims are to provide a balanced and diverse school education that meets the different needs of our students; to help them build up knowledge, values and skills for further studies and personal growth; and to enhance their biliterate (i.e., English and Chinese) and trilingual (i.e., English, Putonghua and Cantonese) abilities.

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1 <https://www.gov.hk/en/about/abouthk/factsheets/docs/education.pdf>

## *Secondary Education (3+3 years)*

Secondary schooling starts at the age of around 12, and there are 6 years of schooling at the secondary level. There are three main types of local middle schools: government schools, aided schools and caput schools that are subsidized by the Government, and schools under the Direct Subsidy Scheme (DSS). The secondary school curriculum provides diverse learning experiences inside and outside the classroom, enabling students to realize their potentials in the domains of moral, intellectual, physical, social and aesthetic development.

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- 2 <https://www.studyinhongkong.edu.hk/en/hong-kong-education/education-system.php> and <https://www.gov.hk/tc/about/abouthk/factsheets/docs/education.pdf> are referred to in preparing this part of the report.
  - 3 Schools under the Direct Subsidy Scheme (DSS) “...are allowed to have greater flexibility in various areas including resources deployment, curriculum design and student admission, .... may collect school fees for the provision of additional support services and school facilities.” (<https://www.edb.gov.hk/en/edu-system/primary-secondary/applicable-to-primary-secondary/direct-subsidy-scheme/info-sch.html>).

**Table 1** The Structure of the Schooling System in Hong Kong<sup>2</sup>

Stage (Age Group)	Local Schools: Government school, Aided Schools & private / DSS <sup>3</sup> schools	Degree Programs	Sub-degree Program	Vocational Education	International Schools
Post-graduate Level		Taught and Research PG programs		Career pathways	
	undergraduate qualification				
	Post-Secondary (4 years)	Degree program by 22 local degree-awarding institutions	Top-up degree (2 years)	self-financing higher diploma programs by post-secondary education institutions	
			Sub-Degree (2 Years)	Pre-employment and in-service Vocational and professional education and training programs by the Vocational Training Council	
	Hong Kong Diploma of Secondary Education				
Key Stage 3- 4 (12-18)	Secondary (6 years)				purported to meet the demand for school places from overseas families living, working or investing in Hong Kong
Key Stage 1- 2 (6-12)	Primary Education (6 years)				
K (3-6)	Kindergartens (3 years)				

## **The Overall Education for Sustainable Development (ESD) Policies and Practices**

It is generally agreed that the policy regarding Environmental Education (EE) was introduced by the issue of the “The Guidelines on Environmental Education in Schools” by the Education Department (hereafter Guidelines; ED, 1999).

Although there have been discussions of the evolving conceptions of and relationship between EE and ESD (e.g., UNESCO, 2009 cited in Ma, 2024), it is speculated that ESD took shape in Hong Kong schools in around 2005, as evidenced by the launching of a sustainable development (SD) focused School Outreach Programme (SOP) by the Council for Sustainable Development (SDC, 2005).

Given the background and juncture when it was published, the Guidelines set the overall tune for the principles and purposes of EE/ ESD in Hong Kong. The adopted definition of SD is “...development meeting the needs of the present without compromising the ability of future generations to meet their own needs” (WCED, 1987 cited in ED, 1999, para. 1.3) and “...the fundamental goal of environmental education is the promotion of sustainable development through the development of responsible environmental behaviour” (ED, 1999, para. 2.2).

Regarding the recommendation for implementing ESD, the Guidelines stipulate that “[E]nvironmental education should be made a ‘whole school concern’ that implies for EE, and ESD to be delivered, it has to be permeated in aspects of the school life, include[ing] but not limited to policies, curriculum, administrative and campus management, etc.” (ED, 1999, para. 3.9).

### **The Status of ESD**

In preparing this section, a set of literature and materials was analyzed and ex-

tracted to facilitate the reporting of ESD in HK K-12 schools. These include:

- ESD-related governmental sources, such as relevant K-12 curriculum documents, teachers' professional development materials, and significant policy announcements from relevant policy bureaux<sup>4</sup>.
- Information of statutory bodies and non-governmental organizations (NGOs) that have jointly organized programs with Government bureaux/ departments, or organized programs or Other Learning Experiences (OLE) including webpages, reports, position papers and the likes.
- Data generated from semi-structured interviews<sup>5</sup> with stakeholders.

To reflect a recent picture of the development of K-12 ESD, only the latest version of information in the same series of policy documents is referred to. The information of relevant but not quite mentioned subjects in policy documents (e.g., ED, 1999; ACE, 1999; EDB, 2010), or those that were introduced after those policy documents is also included to complement the discussion.

## **Actions Taken and Performance Achieved for ESD**

The results of the aforementioned analysis of documents were compared, distilled and categorized into Table 2.

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- 4 A recent development that is worth mentioning is the increasing significance of the Environment Bureau (EB, which was replaced by the Environment and Ecology Bureau, EEB since 2022) over the policies in SD and ESD in collaboration with the Education Bureau (EDB, which subsumed the function of ED in 2003).
  - 5 Interviewees include one retired secondary school principal, one retired primary school headteacher, two secondary teachers teaching Geography and Liberal Studies (currently Citizenship & Social Development) with Earth-science and Geography backgrounds respectively, one primary Science subject panel chair and one EE specialist. Except for the EE specialist and one of the teachers who had worked for less than 5 years, other interviewees had over 15 to more that 30 years of experience in schools.

**Table 2** A Cross Table of Five Priority Action Areas and Four Interconnected Global Challenges

Five Priority Action Areas	Four Interconnected Global Challenges to be Addressed			
	A. Climate change (SDG 13)	B. Loss of biodiversity (SDGs 14/15)	C. Unsustainable use of resources (SDG 12)	D. Inequality (SDG 10)
1. Advancing policy	<ul style="list-style-type: none"> <li>Strengthening education, publicity &amp; training to disseminate climate change knowledge (SDC, 2020)</li> </ul>	<ul style="list-style-type: none"> <li>Enhance education activities to incorporate the concept of biodiversity in the curriculum</li> <li>Enhance the resources for early childhood education on nature conservation (EB, 2016a; OWLHK, 2019)</li> </ul>	<ul style="list-style-type: none"> <li>Environmental Protection Department (EPD) &amp; Environmental Campaign Committee (ECC) to launch educational and promotional campaigns on waste reduction and recycling (EEB, 2021)</li> </ul>	<ul style="list-style-type: none"> <li>Adoption of Agenda 21: SD (ED, 1999)</li> </ul>
2. Transforming learning environments	<ul style="list-style-type: none"> <li>Learning elements (LEs) on climate change &amp; global warming (EDB, 2010) &amp; Other Learning Experiences (OLE) programs (WWF, 2024)</li> </ul>	<ul style="list-style-type: none"> <li>Interdependence of living things &amp; biodiversity; Impact of human activities &amp; responsibilities in environmental conservation (EDB, 2010)</li> <li>OLE on ecological environments &amp; HK's biodiversity (OWLHK, n.d.) &amp; about biodiversity loss (WWF, 2024)</li> </ul>	<ul style="list-style-type: none"> <li>Pollution; resource depletion &amp; over-exploitation; Waste reduction &amp; recycling (EDB, 2010)</li> <li>Green &amp; environmental-friendly practices in schools (ED, 1999)</li> </ul>	<ul style="list-style-type: none"> <li>Fair trade and consumerism; The rich and the poor (EDB, 2010)</li> </ul>

Five Priority Action Areas	Four Interconnected Global Challenges to be Addressed			
	A. Climate change (SDG 13)	B. Loss of biodiversity (SDGs 14/15)	C. Unsustainable use of resources (SDG 12)	D. Inequality (SDG 10)
3. Building capacities of educators	<ul style="list-style-type: none"> <li>Professional development program (PDP) resources &amp; school exemplars on climate change (EDB, 2010), global warming (EDB, 2022b), &amp; WWF teaching materials on SDG 12 13 15 7 6 11 (WWF, 2024)</li> </ul>	<ul style="list-style-type: none"> <li>Capacity building for teachers (EB, 2016a; OWLHK, 2019)</li> <li>PDP on biodiversity conservation (EDB, 2022b) &amp; WWF teaching materials (WWF, 2024)</li> </ul>	<ul style="list-style-type: none"> <li>Multimedia resources on green living, green consumption, low-carbon diet (EDB, 2022b)</li> <li>Resources &amp; school exemplars on energy saving &amp; air pollution (EDB, 2010)</li> <li>WWF teaching material about <i>Green Cities</i> on sustainable living &amp; shopping, recycling (WWF, 2024)</li> </ul>	<ul style="list-style-type: none"> <li>WWF teaching materials about <i>Green Cities</i> on sustainable living &amp; urban development (WWF, 2024)</li> </ul>
4. Empowering and mobilizing youth	<ul style="list-style-type: none"> <li>Outdoor Education Camp Scheme (OECS) (EDB, 2022b)</li> <li>Slogan cum poster design competitions for schools (EDB, 2022b)</li> <li>School outreach programs: seminars, workshops &amp; field trips (EEB, 2024)</li> </ul>	<ul style="list-style-type: none"> <li>Outside school activities in real situations conducted by the schools or student groups (ED, 1999; ACE 1999, EDB, 2012)</li> <li>Sustainable Development Ambassador Program &amp; School Outreach Program seminars, workshops &amp; field trips (EEB, 2024)</li> <li>"<i>Forest Ecologist</i>" program leads students into the forest to experience forest research (OWLHK, n.d.)</li> </ul>	<ul style="list-style-type: none"> <li>Tree planting, beach cleaning &amp; visits to polluted areas (ED, 1999)</li> <li>Waste Separation and Recycling Scheme in schools to reinforce students with the three Rs (ACE, 1994)</li> <li>OECS &amp; slogan cum poster design competition on "Practicing Low Carbon Living" (EDB, 2022b)</li> <li>"We-recycle@ School" activity on knowledge of waste reduction &amp; recycling, &amp; making better use of school &amp; community recycling facilities (EPD, 2024)</li> </ul>	<ul style="list-style-type: none"> <li>Visits to polluted areas conducted for students to see the effects of people's actions or inaction (ED, 1999)</li> </ul>

Five Priority Action Areas	Four Interconnected Global Challenges to be Addressed			
	A. Climate change (SDG 13)	B. Loss of biodiversity (SDGs 14/15)	C. Unsustainable use of resources (SDG 12)	D. Inequality (SDG 10)
5. Accelerating local level actions	<ul style="list-style-type: none"> <li>• Strengthening, publicity and training to disseminate climate change knowledge (SDC, 2020)</li> </ul>	<ul style="list-style-type: none"> <li>• Organize annual festivals for engaging partners in promoting biodiversity to the public (EB, 2016a; OWLHK, 2019)</li> </ul>	<ul style="list-style-type: none"> <li>• Organized <i>Waste Recycling Competition in Housing Estates</i> with 132 public &amp; private housing estates participating (ACE, 1999)</li> </ul>	

In the action area, Advancing Policies, it is observed that in the earlier stage, the purpose of EE and the promotion of SD responsible behavior are proclaimed (ED, 1999; Ma, 2024) with the implementation matters, for example, curriculum content, teacher training and resources (EB, 2016a; OWLHK, 2019). In the later stage, “education” expands to the notion of “education and publicity” in public engagement (EEB, 2021) and more public-oriented concepts<sup>6</sup> are put forward.

The challenge, Unsustainable Use of Resources, has received the most actions. Obviously recycling and waste reduction activities are comparatively easier to weave into school life (e.g., the Green Prefect Programme ECC, 2024a). It is natural that more efforts are dedicated to addressing SDG 12 related challenges in HK schools.

The efforts and practices addressing the Loss of Biodiversity challenge include more NGO activities in nearly all priority action areas except for Advancing Policy. These items are primarily out-of-classroom, OLE activities focusing on nature and ecology; these are the strengths of NGOs which are wildlife and outdoor specialized.

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6 Including: Circular Economy, Polluter pays & MSW charging, Producer Responsibility, etc.

The number of actions in Empowering and Mobilizing Youth is the greatest. This is because of the synergy of the policy-driven measures and the long-lasting tradition and endeavors to promote EE in school and among youngsters. Moreover, school programs have the potential to spin off the message and action to the community, which makes those student and school programs promising.

Efforts addressing the Inequality challenge tend to “...involve values and judgment affecting behaviour...formation of attitudes lead to environmental ethic” (ED, 1999; Ma, 2024) as a departure that leads to the actions stated in the Values Education Curriculum Framework (Pilot Version; CDC, 2021):

"actively practising green living” (CDC, 2021, p. 28)  
and "possessing a global perspective ... concerned about  
global environmental issues and the challenges in attain-  
ing sustainable development."

It is safe to say that not just inter-generation equality (ED, 1999; Ma, 2024) but also intra-generation equality is promoted by these efforts.

## **Key Themes in ESD**

### ***Indicators***

The Guidelines also describe the characteristics of a “green” school (ED, 1999; Ma, 2024) to indicate the desirable state of EE/ ESD implementations in schools, which cover aspects of school ethos, administration, learning and teaching, environmentally-friendly practices and linkage with the community (ED, 1999; Ma, 2024).

Moreover, the EDB states that the "Performance Indicators for Hong Kong Schools" (PIs) could be used to facilitate continuous improvement of schools in responding to the “integration of environmental, social and governance

(ESG)” as well as “concepts and proper values related to *environmental education*, social responsibility and principles of governance...*sustainable development*” (LC, 2023) in the school curriculum.

In order to illustrate how the PIs can inform the assessment of ESD implementation, the characteristics of a “green” school (ED, 1999; Ma, 2024) are categorized in Table 3.

**Table 3** Categorizing Characteristics of A “Green” School According to the Performance Indicators

<b>Performance Indicators</b>	<b>Characteristics of a “green” school (ED, 1999; Ma, 2024; re-writing undertaken)</b>
Management and Organization	<ul style="list-style-type: none"> <li>• The school has a whole-school environmental policy &amp; strong support for EE</li> <li>• Training opportunities for staff and students on EE</li> <li>• The school reduces its energy and water consumption, and adopts environmentally-friendly practices</li> </ul>
Learning and Teaching	<ul style="list-style-type: none"> <li>• EE forms an integral part of the curriculum</li> <li>• EE efforts are well-coordinated &amp; regularly evaluated</li> <li>• Developing students’ environmental experience through fieldwork</li> </ul>
School Ethos and Student Support	<ul style="list-style-type: none"> <li>• Ethos &amp; values reflect a concern for the environment</li> <li>• The school takes an active part in community environmental activities links with other schools, organizations in promoting EE</li> </ul>
Student Performance	<ul style="list-style-type: none"> <li>• Teachers &amp; students participate in different types of environmental activities</li> </ul>

## **Competence**

Discussion of the ESD competence to be developed in students is anchored in the paper titled “Education for Sustainable Development in Hong Kong Schools” (EDB, 2010). It states the three major aspects for the planning of ESD in school in the form of a tripartite framework to depict the essence of ESD, that is, “[T]hrough enhancing the *awareness* of students on environmental issues and cultivating their positive *attitudes* towards conservation work,

students will be more willing to take *actions* in solving various environmental problems” (EDB, 2010; emphasis added).

“Awareness” also stands for the “awareness that human and natural systems interact with each [other]...and ... are mutually influencing one another” (Ed, 1999; Ma 2024).

From awareness it points to the cultivation of attitudes and ethics “to appreciate and love nature... from environmentally-friendly behaviour and lifestyles that are conducive to the sound management of the environment” (ED, 1999, cited in Ma, 2024, para. 2.5) and the values that serve as the basis of decision-making and courses of action, including “Perseverance, Respect for Others, Caring, Responsibility and Commitment” (EDB, 2010, p. 2) and “diligence, being grateful and treasuring what we have” (LC, 2023, para. 4).

Similar postulations appear in the aims of the Kindergarten Education Curriculum Guide “[T]o help children develop good living habits ...an interest in learning, an inquisitive mind and ... [I]nstil...positive values and attitudes [including sustainability, betterment of human kind etc.]” (CDC, 2017a).

Also, it is purported to nurture students to “*understand* the complexities of the topics, and the challenges and processes involved in decision-making for making law-abiding, rational and affective analysis, and learning how to handle conflicting values” (CDC & HKEAA, 2021), which hopefully will inspire them to take action to preserve the environment.

## ***Curriculum***

The Guidelines (ED,1999; Ma, 2024) put forward that “In the existing school curriculum, elements of environmental education permeate a great number of subjects” (ED, 1999; Ma, 2024). The EDB later explained the recommendation of ESD implementation by stating that “[A]ppropriate elements of sustainable development have been included in the curricula of different KLA

and subjects...” (EDB, 2010; KLA stands for Key Learning Area). In short, the ESD learning elements are *distributed* among the curricular content of a number of subjects across different year levels.

For the purpose of illustrating the ESD curricular prescription, the set of common ESD-focused themes stipulated in the EDB paper submitted to the SDC (EDB, 2010) is employed to serve as an advanced organizer to categorize the distributed learning elements into a fuller and more coherent picture of ESD in the curriculum.

During the identification of the learning elements, a list of related subjects at the different levels of schooling are coded in Appendix A.

In order to exemplify the topics/ learning elements prescribed, curriculum documents of relevant subject or policy papers are analyzed with the Common Themes and subject codes in Appendix B. Items identified are categorized with the labels A, S, and K to indicate Attitude, Skills and Knowledge. The labels H, M, and L have been added to indicate the extent of the relationship between the themes or learning elements with respective SDGs.

The theme “Climate change and global warming” includes the greatest number of topics in many subjects. Likewise, the theme “Impact of human activities on the balance of Nature” reflects the concern to develop in students an awareness of anthropogenic actions. Turning to the level of schooling, it is shown that DSE level, that is, the new senior secondary school, includes most subjects and topics that fall into the greatest number of themes, and it is interesting to see that they are accentuated in the above two themes as well.

The tallies of the words and concepts also reveal that factual or descriptive terms, such as the previously mentioned “environment/al,” “sustainable development,” “conservation,” “quality” (used with “living”  $n = 10$ ), top the chart. They are usually spread across the themes examined and are used to align with

the purposes of EE/ ESD, whilst the terms “energy,” “climate/tic change,” “impact,” and “resources” are likely theme-specific.

At the kindergarten level, the learning elements related to the common theme SD focus on attitude development:

- To develop curiosity about the environment...[and] nature;
- To care for and appreciate the beauty of nature, animals and plants; and
- To develop attitudes and habits of protecting the environment & cherishing resources (CDC, 2017a).

On the other hand, the topics that are related to the development of skills, for example, “Product evaluation,” “Engineering Design Process Skills,” “Simple solutions to energy problems” and the likes, are implemented in General Studies (GS) subjects in primary school, the science subjects and technology education such as Home Economics, Design and Technology in junior secondary school, and Design and Applied Technology at the DSE level.

### ***Formal Education***

It is stated that “EE elements are incorporated in different subject groups of sciences, humanities, languages and cultural and technological subjects” (ACE, 1999; emphasis added) and that “[S]chools are encouraged to adopt a cross-curricular, whole-school...approach in the promotion of ESD...” (EDB, 2010).

At the kindergarten level, this integration can be readily achieved through “family,” “festivals” and “community” themes that are incorporated into the learning area, “Nature and Living” to offer multiple-sensory experiential experiences to connect ESD learning with their life “through observation, prediction and comparison” (CDC, 2017a), whilst in primary school Science, teachers can make use of the flexible time allotted to offer “Subject-based/ interdisciplinary project learning” (CDC, 2024a) to promote ESD.

An example is presented in the Guidelines (ED, 1999; Ma, 2024) to illustrate the roles of different subjects as follows:

- Science: nurturing of “skills of scientific investigation, understanding concepts related to the natural environment”
- Language: develop skills of communicating ideas about the environment; different types of texts to get exposed to differing views and values related to EE
- Religious and Moral Education: learn and clarify values regarding environmental issues
- Art and Music: aesthetic appreciation of the environment (ED, 1999; Ma, 2024)

With a view to demonstrating how to achieve a more tightly knit co-ordination to promote ESD, the EDB has worked with secondary teachers to develop a cross-subject collaboration exemplar on climate change in the form of a resource pack containing three interrelated plans for Science, Geography and Liberal Studies subjects (EDB, 2010, Appendix 3).

First, it is undertaken by Science under the proposition “global warming is a scientific fact or a myth,” that aims at developing a range of quantitative and scientific skills (EDB, 2010).

Second, the plan for Geography leads students to learn the “...consequences of climate change and to formulate possible solutions for its negative impacts...” which is followed by reflecting and evaluating on “...the climate change issues through change in life-style...” (EDB, 2010).

Lastly, Liberal Studies, with the “enquiry” and “multiple perspective” approach, will lead students “[T]o conduct in-depth discussion and analysis on the contrasting viewpoints and attitudes of different stakeholders” so as to understand “how a commonly acceptable solution can be formulated through

compromise and mutual understanding” (EDB, 2010).

### ***Teacher Training***

Since 1997, professional training for primary teachers has been a joint effort by the then ED (later EDB) and EPD with a view to “deliver[ing] messages on basic environmental concepts and to encourage teachers to promote environmental education in schools”(ACE, 1999, Section 2B Para. (b)). As time has passed, the professional development programs (PDPs) have gradually evolved in terms of both the focus of the activities and the variety and types of activities (see Table 4).

**Table 4** Examples of in-service PDPs Offered by the EDB Detailed in ESD-related Government Sources

<b>Period</b>	<b>Offered By</b>	<b>Types of activities</b>	<b>Topics/ Focuses of Activities</b>	<b>Number of Activities</b>	<b>Number of teachers involved</b>
2003 (EPD, 2003)	ECC and EPD	workshops	<ul style="list-style-type: none"> <li>• on various environmental themes</li> </ul>	7	No figure
2008/09 school year (EDB, 2010)	EDB, EPD and the ECC	seminars, workshops and field trips on SDE [sic]	<ul style="list-style-type: none"> <li>• “Heading Towards the Green School” cum green school visit</li> <li>• renewable energy [SDG 7], climate change and roof-greening</li> </ul>	8	600

Period	Offered By	Types of activities	Topics/ Focuses of Activities	Number of Activities	Number of teachers involved
2020/21 to 2022/23 school years	<ul style="list-style-type: none"> <li>• EEB, the HK Green Building Council, etc. (LC, 2023)</li> <li>• 4 PDPs were held by EDB and EPD in 2022 (EDB, 2022b)</li> </ul>	<ul style="list-style-type: none"> <li>• Seminar, green school visit (LC, 2023)</li> <li>• 5 seminars SD, climate change &amp; biodiversity (EDB, 2022b)</li> <li>• Visit to Low Carbon Energy Education Centre [SDG 7] (EDB, 2022b)</li> </ul>	<ul style="list-style-type: none"> <li>• green living, green consumption, green building, climate change mitigation, energy saving and biodiversity conservation (EDB, 2022b)</li> <li>• the importance of low carbon energy &amp; solar energy as renewable sources (EDB, 2022b)</li> <li>• standards &amp; requirements with respect to business sustainability, energy saving &amp; green buildings (LC, 2023)</li> </ul>	80 (about 27 activities per year; 8 in 2022 per EDB, 2022b)	6,700 (about 2,233 teachers per year)

Besides, there are PDP efforts provided by NGOs. From their websites it is noticed that the PDP activities offered by NGOs are largely anchored on the scopes and specialisms of the organizations that are reflected by the venues and facilities they maintain and manage.

**Table 5** Examples of In-service ESD-related PDPs Offered by NGOs

Period	Offered By	Types of activities	Topics/ Focuses of Activities
2024	WWF-Hong Kong's ESD Network	PDP Programs: workshops & field trips	<ul style="list-style-type: none"> <li>helps teachers design &amp; implement activities &amp; experience-sharing among teachers</li> </ul>
From the website of OWLHK, assessed in Nov 2024	OWLHK	training activities	<ul style="list-style-type: none"> <li>promotes school-based environmental education (esp. Field-based EE) &amp; assists teachers in organizing activities and project-based learning</li> </ul>
From the website of GreenPower, assessed in Nov 2024	GreenPower	<ul style="list-style-type: none"> <li>workshops and training (on-campus available under request)</li> <li>waste audit in schools</li> </ul>	<ul style="list-style-type: none"> <li>how to integrate "waste reduction" into different teaching areas</li> <li>utilizing data obtained from waste audits to support the determining of waste reduction strategies</li> </ul>

Although it is far from being representative, there are two programs in the pre-service teacher training courses that are worth mentioning. The first is the Environmental Education module of the Post-Graduate Diploma of Education of The Chinese University of Hong Kong. It is a 1.5 unit module covering understanding environmental issues, as well as concepts and considerations in planning and offering EE programs in schools (CUHK, 2024). Another is the Outdoor Environmental Education Experiential Learning Project which is an experiential learning program offered by the Faculty of The Education University of Hong Kong for undergraduate students of all disciplines. The one-semester project also covers concepts of EE, and students work in teams to collaborate through a range of classroom and outdoor learning experiences (HKU, 2024).

### ***Non-Formal Education***

The notion of non-formal or informal education in the Guidelines (ED, 1999; Ma, 2024) is denoted as

a wide range of activities both inside and outside the school...to foster responsible attitudes and caring action ...encourage participation and involvement on the part of the students. (ED, 1999, cited in Ma, 2024, para. 3.12).

Activities including school assemblies, form-teacher periods and extra-curricular activities are also regarded as informal education (ACE, 1999). Since then, the conception of informal education allows for the inclusion of student groups, such as Green Clubs in schools and the activities they organize (ACE, 1999).

Two main informal education contributions by policy bureaux and related statutory bodies are identified. The first is by the EEB (formerly EB) which works with the SDC under the conception of “education and publicity” and with the label “Green School 2.0”<sup>7</sup> (EEB, 2024). The SOP mentioned in the former section and the SD School Award Programme, which is sub-divided into the SD Participation Award (SAP) and the SD Community Project Award are also the main features of the EEB cum SDC effort (EEB, 2024).

The other is by the EPD<sup>8</sup> that works closely with the government-appointed Environmental Campaign Committee (ECC) to undertake outreach to the community and schools (EPD, 2003), focused on raising public environmental awareness. It includes the Student Environmental Protection Amba-

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7 There are 5 programs under the “Green School 2.0”: Solar Harvest, Energy Smart, Food Wise (including supporting events like “Plastic-free lunch, “Food Waste Composter”), Recycle Clean, and Schools Go Green (supported by ECC).

8 Under the Government structure, the EPD is the department that supports the implementation of environmental protection policies stipulated by the EEB and enforces environmental legislations. Although they undertake different roles (EDB, 2013; ISD,2024), they both plan and offer activities pertaining to ESD but with differing focuses.

sador Scheme (SEPAS) and the Hong Kong Green School Award (HKGSA) launched in 1995 and 2000 respectively (ECC, 2019; EDB, 2023). Currently these efforts are subsumed under Schools Go Green (ECC, 2024). Besides the SEPAS and HKGSA (which became the Hong Kong Awards for Environmental Excellence (Schools Sector)), Schools Go Green also includes the GreenLink-Environmental Education Support Programme (GreenLink-EESP<sup>9</sup>), the Green Prefect (GP) Programme and the Waste Separation and Recycling Scheme (ECC, 2024a).

Although they are mentioned separately, the EE and ESD efforts of both the EEB cum SDC and ECC cum EPD are complementary and in some cases (i.e., those programs which appear in both Green School 2.0 and Schools Go Green), they are jointly promoted to schools.

The SEPAS is purported to engage primary and secondary school students; its details and enrollment figures are depicted in Tables 6 and 7.

**Table 6** Student Environmental Protection Ambassador Scheme (SEPAS)

Purpose	<ul style="list-style-type: none"> <li>• to participate “in environmental activities and organizing green and EP activities in schools” (EPD, 2003)</li> <li>• “To nurture leadership ... to take positive initiatives in improving the environment” (ECC, 2021)</li> </ul>
Enrollment	<ul style="list-style-type: none"> <li>• Schools can nominate 20 new SEPA every school year. Enrolled SEPAs will serve throughout their primary/ secondary years (ECC, 2021).</li> </ul>

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9 Schools can look for appropriate non-formal education-related field trips, visits and activities in the GreenLink-EESP.

Mode of Training/ promotion protocol	<ul style="list-style-type: none"> <li>• training and submit reports of works accomplished (EPD, 2003)</li> <li>• Environmental Badge System: fulfill requirements to attain the Basic Environmental Badge (BEB), then promote to the Specific Environmental Badge (SEB) (ECC, 2021)</li> <li>• SEB topics include Low Carbon Living, Waste Reduction &amp; Management, and Nature &amp; Biodiversity (ECC, 2021)</li> </ul>
Activities	<ul style="list-style-type: none"> <li>• Training Camps, School Honour Award Project Exhibition, Outward Bound Training, Environmental Drama and overseas/mainland study visits (ACE, 1999)</li> <li>• Seminar topics include Environmental Policy, Local and Global Environmental Issues, Approaches for Citizens to Protect the Environment (ECC, 2024c)</li> </ul>
Incentives	<ul style="list-style-type: none"> <li>• Rewarded with a trip overseas or an environmental leadership summer camp (EPD, 2003)</li> <li>• Badges of BEB or SEB according to the level attained. E-certificate with different award levels (Gold, Silver, Bronze and Merit) will be awarded (EPD, 2024)</li> </ul>

**Table 7** Enrollment Figures of SEPAs

<b>Statistics over the years</b>	<b>1998 (ACE, 1999)</b>	<b>1999 (ACE, 1999)</b>	<b>2003 (EPD, 2003)</b>	<b>2010 (EDB, 2010)</b>	<b>2022 (EDB, 2022b)</b>	<b>2024 (Cumulative; ECC, 2024)</b>
No. of schools	181	332	724	N.D.*	227 #	N.D
SEPA enrolled	1016	4284	11097	18000	6452 #	157,969

On the other hand, the EEB worked with the SDC to initiate SDAP in 2013 to develop students into SD Ambassadors (SDA) to “help spread and promote SD messages to their peers and the community” (SDC, 2019b). Its details and enrollment figures are depicted in Tables 8 and 9.

**Table 8** Sustainable Development Ambassador (SDA) Program

Purpose	<ul style="list-style-type: none"> <li>• ... to enhance their understanding of the concept of SD with Major Role ...[T]o participate &amp; assist schools in the planning &amp; implementation of activities related to the promotion of SD (EEB, 2024)</li> </ul>
Enrollment	<ul style="list-style-type: none"> <li>• Participating schools of the SD Community Project Award nominate 10 students to become SD Ambassadors</li> </ul>
Mode of Training/ promotion protocol	<ul style="list-style-type: none"> <li>• Through SOP events</li> <li>• Leadership training sessions</li> </ul>
Activities	<ul style="list-style-type: none"> <li>• Technical visits to various SD-related facilities including: Eco-park, SENT Landfill, the Swire Institute of Marine Science, etc. (SDC, 2016)</li> <li>• Field trips to Nuclear Power Station Marine Life Center, etc. (EEB, 2024)</li> </ul> <p>Services</p> <ul style="list-style-type: none"> <li>• participate in the activities in public engagement in the Sustainable Consumption of Biological Resources (SDC, 2016) and the Long-term Decarbonisation Strategy conducted by the SDC from June to September 2019 (SDC, 2019b)</li> </ul>
Incentives	<ul style="list-style-type: none"> <li>• invited to attend youth and regional forums</li> <li>• received certificates of merit as recognition (SDC, 2014)</li> </ul>

**Table 9** SDAs Enrollment and Activity Participation Figures up to 2019\*

Year	Duration	Technical visit	Services	Education/ Training	Yearly Total of SDAs participating	SDA Recruited number (cumulative)
2013	April - Dec	138	15		153	
2014	Mar- Oct	73	9		82	330 from 20 schools
2015	April - Dec	54		28	82	385 from 24 schools
2016	April- Oct	28	18		46	386 from 25 schools
2017	Jun		7		7	397 from 27 schools.
2018	Feb-Dec	24	13		37	400 from 28 schools
2019	Mar-Sept			5	5	No figure

Source: SDC, 2014; SDC, 2015a; SDC, 2016; SDC, 2017; SDC, 2018; SDC, 2019b

Worth mentioning is the condition for schools to nominate SDAs (a maximum of 10 students), which is related to the SD Community Project Award category of the SAP. This results in a smaller enrollment which implies that SDAP is an elite, leadership development program complementary to the SAP (EEB, 2024).

On the other hand, the SOP was originally launched in 2002 to promote the SD understanding and attitudes to act of senior secondary students, and later was extended to other levels through offering interactive drama, seminars, workshops and field trips (EEB, 2024). Schools can choose a range of activities provided in various venues that cover topics related to SDG 11, 12, 13, and 14/15 (see Tables 10 and 11).

**Table 10** Number of Topic Choices and SDG-related SOP Activities Offered to Schools in the 2024-2025 School Year

	SDG	No. of topic choices for primary schools	No. of topic choices for secondary schools	
Seminars	12	8	7	
	13		2	
	14,15	4	4	
Minimum capacity		120	120	
Workshops			<i>Option 1*</i>	<i>Option 2#</i>
	11	1		1
	12	10	5	10
	13		1	
	14,15	2	1	3
Field trips	14,15	2		2
Average range of capacity per event		Around 15-40 students with teachers	Around 15-40 students with teachers	Around 15-40 students with teachers

Note: \* One 1.5-hour field trip session and one 1-hour topic discussion session;

# one free field trip program and/or one subsidized field trip program (about 1-3 hours).

Source: EEB, 2024.

**Table 11** Number of SOP events enrolled in by schools since the Twelfth Round

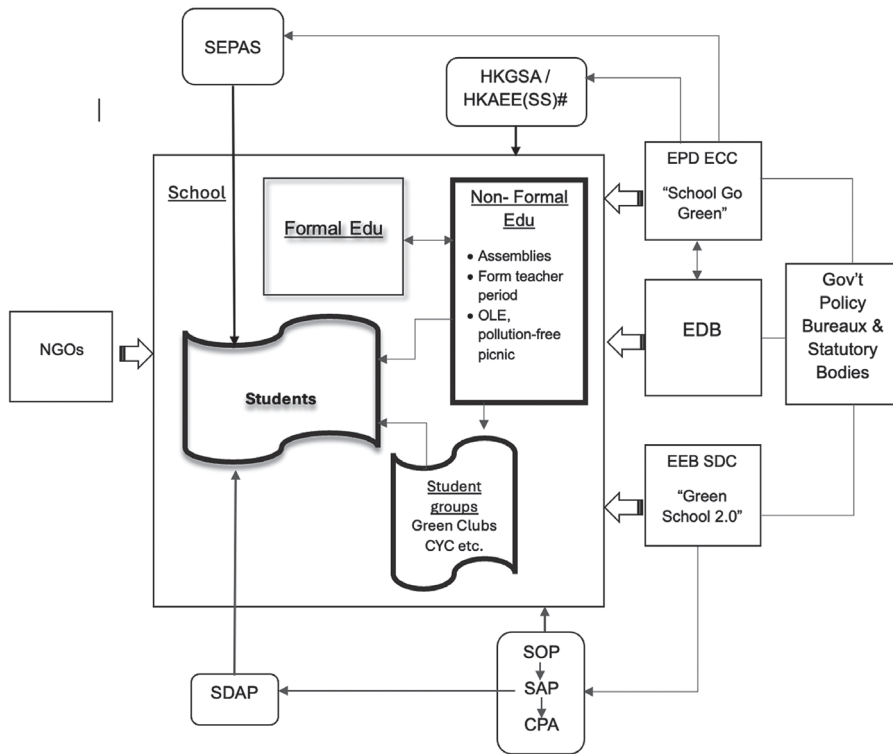
School year	No. of Seminars/Talks	No. of Workshops	No. of Interactive Dramas	No. of Enrolled Schools	Students & Teachers Headcount
2013/2014	24	15	40	48	17,500
2014/2015	21	18	36	52	No figure
2015/2016	23	11	53	57	No figure
2016/2017	21	11	70	81	186,000*
2017/2018	16	9	80	82	25,000
2018/2019	17	11	79	86	25,000
2019/2020	18(8)	11(2)	81 (29)	86(36)	(8,500)
2020/2021	27	6	109	104**	31,000
2021/2022	35	41	93	101#	No figure

Note: \* Cumulative figures; \*\* 85 secondary and 19 primary schools; #78 secondary schools and 23 primary schools; for 2019/2020, figures in brackets are the actual number of events held during the COVID-19 pandemic.

Source: SDC, 2014; SDC, 2015a; SDC, 2016; SDC, 2017a; SDC, 2018b; SDC, 2019a; SDC, 2021a; SDC, 2021b.

In a nutshell, Figure 1 intends to depict the general picture of the above discussion of non-formal ESD in HK.

**Figure 1** Non-Formal ESD



Note: # Will be discussed in the “Social Partnership” sections

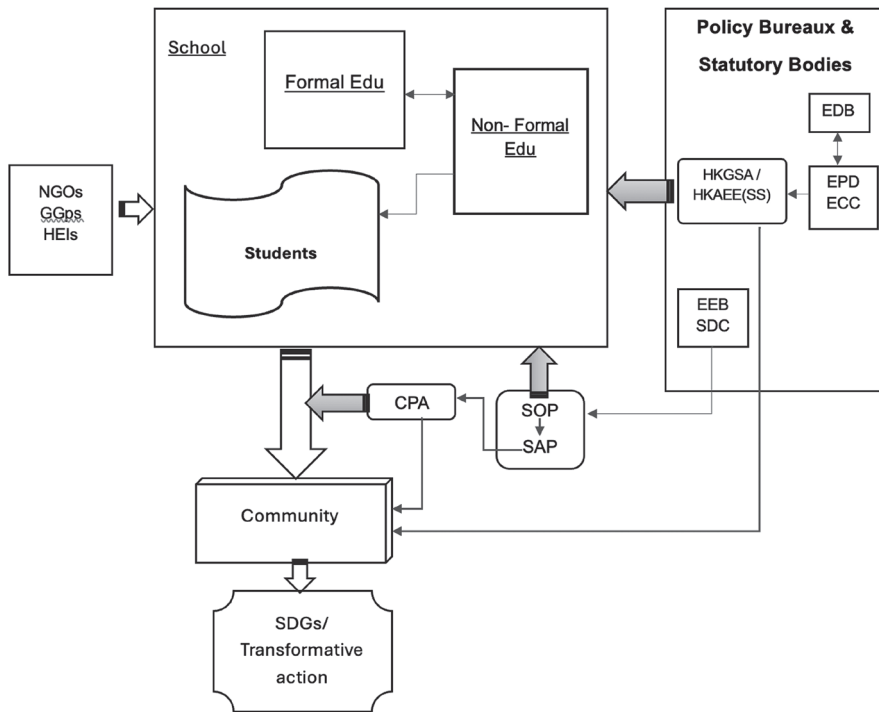
The contributions by NGOs to non-formal EP and SD education permeate the actions and efforts of statutory bodies and schools. For example, guided school visits to the Mai Po Education Centre, which is a collaboration between EDB and WWF-Hong Kong (EDB, 2022b), and those mentioned in previous sections are evidence of the inputs of the NGOs.

### ***Social Partnership***

There is plenty of interfacing in K-12 schools with partners in the community to achieve the synergy of developing environmental awareness of the

entire society in at least three aspects, namely, efforts of statutory bodies with schools, the contributions and collaborations of NGOs to the schools, and lastly, the schools are empowered by the above efforts then reach out to bring about changes in the community (see Figure 2).

**Figure 2** The Synergy and Interfacing of K-12 Schools and Social Partners in Non-formal ESD



Two noticeable efforts in the form of award programs from the policy bureaux of the government are (1) SAP and CAP (EEB works with SDC), and (2) HKGSA and later HKAEE(SS) (joint endeavors of the EPD and ECC with collaboration from the EDB).

There exists a progressive and incentive relationship between SOP, SAP and CAP as the promotional strategy. SAP aims “to create a sustainable community network ... to promote [the] concept of SD to parents, members of the community, district organizations & institutions” (EEB, 2024). To be awarded the SAP – SD Participation Award, schools are required to participate in at least two SD-related activities (EEB, 2024), of which one can be an activity from SOP with at least 300 students participating.

Furthermore, schools can opt to extend their efforts to the community by joining the Sustainable Development Community Project Award (CPA), which is the prerequisite condition for schools to nominate SDAs to organize activities involving the community and the public (with at least 300 participants) to promote SD concepts and messages (EEB, 2024). As incentive and encouragement, there are subsidies in the form of reimbursement to support schools in participating in the SAP (maximum HK\$2500) and CAP (maximum HK\$12500; EEB, 2024).

The HKAEE(SS) aims to recognize schools’ efforts to promote EE and ESD, and manage their campuses with environmentally-friendly practices (ECC, 2024a). The assessment criteria lay great emphasis on inciting schools to promote and implement EE and ESD as the criteria for “Green Leadership” and “Programme and Performance,” including the requirements of “Education for Sustainable Development / Environmental Education Plan in School Curriculum” (ECC, 2024b). Equal weight also goes to inspiring schools to establish synergy with social partners including “Parents and Families; School Network; Community Members / Other Organisations” (ECC, 2024b) and the likes. As recognition, three levels of prizes (Gold, Silver and Bronze) along with cash prizes will be awarded.

Worth mentioning is that the “Bonus point” arrangement in the HKAEE(SS) will award extra points to participating schools if they also participate in other environmental schemes, which includes the SAP and CPA programs. This

further exemplifies the complementary spirit of the two main efforts from the EEB cum SDC and ECC with EPD in the promotion of ESD.

Many NGOs' efforts that support schools in imparting ESD and environmental awareness and out of schools and outdoor activities have been discussed in the former sections.

It is noteworthy that the supports of NGOs have a greater significance to kindergartens (Interviewee T). Given the young age of pre-school children, the workload and person-power demands in organizing and undertaking out-of-school and outdoor ESD activities are usually higher than for their primary and secondary school counterparts. By using the EDB's "Kindergarten Activities Subsidy" (幼稚園活動津貼 in Chinese), kindergartens can hire services from NGOs to implement the activities<sup>10</sup>.

Other than that, NGOs may opt to apply to the "Quality Education Fund" (QEF) to implement a mid-term (e.g., 3 school year duration) project to promote ESD in school. For example, the "Mainstreaming Sustainability into Local Primary School Curriculum" by the WWF includes aspects of "nurturing of school culture and ethos," "curriculum integration," and "interflow and collaboration between schools" (WWF, 2019).

NGOs, green groups (GGps) and higher education institutions (HEIs) can apply to the Environment and Conservation Fund (ECF) "Publicity and Education Projects" category to launch supports including classroom resource development, non-formal education activities, and teacher training, and to enhance students' environmental awareness and understanding (ECF, 2025). The deliverables have been made available on ECC's GreenLink-EESP platform for schools to identify supports appropriate to them. The tally of ECF "Publicity

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10 The author is also in debt to a Kindergarten headteacher for the generous and detailed explanation of the "Kindergarten Activities Subsidy" subsidizing kindergartens' out-of-school activities, with or without EE/ ESD focuses.

and Education Projects” that are school-related from 2018-2024 is presented in Table 12.

**Table 12** Tally of ECF “Publicity and Education Projects” That Are School-related in 2018-2024

Level of schooling	Duration	Funding Recipient				SDG					Target				
		NGOs	HEIs	GGps	Others	14/15	13	12	11	Across SDGs	Outdoor	Student	Teacher	Parents	Public/Citizens
Kindergarten	2018-2019		1	3		1		3			2	4			
	2019-2020	1	2	3		3		1		2	6	[2]	[1]		
	2020-2021		1			1					1				
	2021-2022		1			1						1			
	2022-2023	1					1					1			
Primary	2023-2024				2	2	1					3			
	Total	2	5	7	2	8	2	4		4	15	3	1		
	2018-2019	5	1			2	2	1	1		6	[1]			
	2019-2020	2		1	1	1	2		1		4				
	2021-2022	2	1	2		3	2				5				
Secondary	2022-2023	1			1	1					2				
	2023-2024		1	3	1	2	2	1			5				
	Total	10	3	6	3	9	7	3	1	2	22	1			
	2018-2019	2		1		1				1	3	[1]			
	2019-2020	2		2	2	1	2		2		5	[1]			
Public/Citizens	2020-2021	1		1		2	[1]				2				1
	2022-2023				1	1									
	2023-2024		2	2		2	1		1		4				[1]
	total	5	2	6	3	5	4	2	4	1	14	2			1

Note: Numbers in [ ] showing the projects that may be included in more than one type of target/ SDG

## Features of ESD

### *Implementing ESD distributively and immersively with "multi-pronged and co-ordinated" collaborations*

Located at the opposite side of the estuary of the Pearl River, Macau and HK share not only geographical proximity, but also the characteristic of a multi-cultural society, as both had their sovereignty returned and became Special Administrative Regions (SAR) of the People's Republic of China in 1999 and 1997, respectively.

Albeit the differences in demographic figures<sup>11</sup>, EE and ESD are found in schools in both Macau and HK. Schools in Macau and HK adopt similar approaches, namely "immersive" (Kwong, n.d.) and "distributive" (see previous section) respectively in implementing ESD. In Macau schools, the EE learning elements appear in Natural Science, Geography, History, Chemistry and Biology subjects (Kwong, n.d.), which is not unlike the situation in HK.

Although there is "no specific mandated program dedicated to teaching sustainable development or the Sustainable Development Goals (SDGs)" (Zhang, 2023, para. 4), Government bureaux and schools in Macau actively implement EE in order to achieve the development of environmental awareness and concern over climate change in students through the adoption of school conditions and background specific strategy (Kwong, n.d.). Furthermore, the Environmental Protection Bureau (DSPA)<sup>12</sup> facilitates schools' implementation of ESD through organizing the "Green School Recognition Scheme"<sup>13</sup> which

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11 The population in HK is approx. 10 times that of Macau, and the K-12 student enrolment number of HK is about 9 times that of Macau.

12 "環境保護局" in Chinese and "Direcção dos Serviços de Protecção Ambiental" in Portuguese, which the counterpart of EEB in Macau.

13 "綠色學校嘉許計劃" in Chinese and "Plano de Atribuição de Louvores às "Eco-Escolas"" in Portuguese

is composed of (1) the “Environmental Protection Lesson Plan Design Award Scheme”<sup>14</sup> and (2) the “Environmentally Friendly Campus Fun Award”<sup>15</sup> (DSPA, 2024). The “Environmental Protection Lesson Plan Design Award Scheme” encourages teachers in non-tertiary education (i.e., K-12) to develop school-based EE/ ESD curricula that are relevant to students. The DSPA also launched the Green Schools Partnership Program,<sup>16</sup> which is similar to HKAEE(SS) and includes the requirement for schools to derive EE teaching plans and implement them with a whole-school management perspective (DSPA, 2024).

As mentioned, the Guidelines (ED, 1999; Ma, 2024) with the latter documents (e.g., EDB, 2010) set the directions, stipulate the themes and exemplify the practices for promoting and implementing EE/ ESD in HK. It is clear that the multi-pronged and co-ordinated (LC, 2023) collaborations of policy bureaux and statutory bodies, NGOs, SMBs and HEIs are in place for ESD promotion and implementation.

Therefore, subjects in different KLAs can develop and offer “...cross-curricular learning and teaching plans...” (EDB, 2010, cited in Ma, 2024, para. 11) to students. This is parallel with Macau counterparts’ efforts in school-specific strategies (Kwong, n.d.) and the Environmental Protection Lesson Plan Design Award Scheme (DSPA, 2024).

Regarding the implementation of EE/ ESD, the co-ordinated collaborations in the informal curriculum among schools and social partners “...encourage participation and involvement on the part of the students” (ED, 1999, para. 3.12).

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14 “環保教案設計獎勵計劃” in Chinese and “Projecto Pedagógico de Educação Ambiental” in Portuguese.

15 “環保校園嘉Fun獎” in Chinese and “Fãs de Escola Ecológica” in Portuguese

16 “綠色學校伙伴計劃” in Chinese and “O Plano de Parceria “Eco-Escolas”” in Portuguese

They include policy bureaux and statutory bodies<sup>17</sup>, NGOs, and GGps alike, which contribute in the form of outreach-to-school and out-of-school activities and teacher training, in some cases have financial support from Government funding (e.g., QEF, SCF).

The multi-pronged approach does not just cover the stipulation of aims, content and teaching methods (as stated in e.g., ED, 1999; EDB, 2010; LC, 2023), but also the school self-evaluation of ESD compliance through Performance Indicators (LC, 2023), in particular in the Domains of Learning and Teaching and Student Performance (EDB, 2022a; LC, 2023).

### ***The growing importance of Ecology Security and SDG 16 in ESD***

After conducting a longitudinal examination of the documents, it was observed that there is a supplementation of generic EP qualities (e.g., Awareness of environmental issues, making informed decisions, action-oriented, as mentioned previously) with more specific SDGs (Goal 16) to be developed in ESD offered to HK students. In particular, the Goal 16.3: “Promote the rule of law at the national and international levels and ensure equal access to justice for all” (UN, 2015) has received increased mention and stipulation related to EE and environmental awareness. The importance of Goal 16.3 was manifested after the announcement of the “Curriculum Framework of National Security Education in Hong Kong and frameworks on NSE for 15 subjects at the primary and secondary level” by the EDB (LC, 2021).

In this light, a multi-pronged and co-ordinated approach (LC, 2021) is adopted to support schools

... to develop in students a sense of belonging to the

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17 E.g., the EEB cum SDC organize SOP, SAP, CPA and SDAP and “Green School 2.0” initiatives, ECC with EPD organize and support SEPA, HKGSA and later HKAEE(SS) and “Schools Go Green” initiatives

country, an affection for the Chinese people, a sense of national identity, as well as an awareness of and a sense of responsibility for safeguarding national security... (LC, 2021, para. 1).

In the implementation in schools, NSE's goal will be translated through the aforementioned framework into ESD-related learning elements to be imparted at different levels of schools (LC, 2021). For instance, in primary school Humanities and Science, the following understandings and values will be developed:

- Recognize the importance of sustainable development and environmental protection to maintain ecological security (CDC, 2024b)
- Understand how the government overcomes the limitations imposed by the natural environment to increase land supply; understand the need to strike a balance between the needs of society & the ecological environment in urban development (CDC, 2024a).

At the senior secondary level, students learn about “[T]he rationale of sustainable development ...of environmental conservation of our country, Hong Kong and other regions...” (CDC & HKEAA, 2021). Further, to enhance their belonging to the country, they will learn about the “Practical Experiences of Our Country in Environmental Conservation.”

### ***The multitude of learning supports for ESD implementation***

Learning and teaching resources developed and provided by the EDB and other government agencies are alternative means to promote ESD in schools in an integrative manner. They are mostly offered in the form of exemplars with worksheets under topics such as energy saving and air pollution. More recently, “life event” exemplars covering current issues of “green living, low-carbon diet, green consumption, and global warming” (EDB, 2022b) have also

been available for teachers.

Other than the “Climate Change” resource pack involving Science, Geography and Liberal Studies subjects, electronic sources including CD-ROMs, websites (e.g., the “Web-based Learning Package on Environmental Education: Education for Sustainable Development in Schools in Hong Kong” mentioned in EDB, 2010) and multimedia have been made available.

Similar developments also appear in the inputs of NGOs. For instance, a range of teaching material is offered on the WWF-Hong Kong websites. As mentioned previously, their themes are specific to their organizational expertise and focuses, and are related with, in particular, SDG 14 and 15 (WWF, 2024). They are available in the format of information charts and exhibition panels.

Another example of supports is the educational multimedia resource (EMM) series named “Life Discovery” made available on the web by the EDB, “consisting of 14 videos, seven animations and seven songs including tips on environmentally friendly lifestyles” (EDB, 2022b). Competitions are also organized as a means “to help students understand the rationale and importance of sustainable development...[in the form of ]... slogan and poster design competitions, [and] online quiz[zes]” (LC, 2023).

# Trends and Issues in ESD<sup>18</sup>

## Trends

### *To implement ESD across all rather than specific SDGs to all K-12 students*

As manifested in the identification of the “Actions taken and performance achieved for ESD” in HK and the observations of interviewees, EE/ ESD is implemented with less emphasis on specific SDGs, as they are addressed, in most cases, in an across-all-SDGs manner (see Table 13).

**Table 13** Across-SDGs Actions Taken and Performance Achieved for ESD

Across-SDGs efforts	
1. Advancing policy	<ul style="list-style-type: none"><li>• EE consists of (1) understanding about the environment; (2) learning in the environment; (3) attitude for the environment (ED 1999)</li><li>• a lifelong &amp; forward-looking concern for the environment, make informed decisions &amp; action (ED, 1999; ACE, 1999; EDB, 2010; CDC, 2021)</li></ul>

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18 Perceptibly the identification of major trends and issues in HK ESD predominantly resulted from the previous discussion regarding the “Key Themes” and “Features.” Yet, to keep the length of the chapter manageable, readers may refer to those previous sections for a fuller picture of the trends and issues that also exist in ESD.

2. Transforming learning environments	<ul style="list-style-type: none"> <li>• issue-enquiry approach (ACE, 1999), Case Study (CDC &amp; HKEAA, 2007a), Theme-based Learning with modelling (CDC 2007), Direct teaching (EDB, 2023), skills of scientific investigation (ED 1999)</li> <li>• development of awareness &amp; ethics, values, attitudes of respect &amp; responsibility for the environment (ED, 1999; CDC, 2007; EDB, 2010; CDC, 2017; LC, 2023; CDC, 2024a)</li> <li>• the inclusion of Poverty &amp; unemployment [SDG 8]; Food &amp; hunger [SDG 2]; Energy saving &amp; alternative energy resources [SDG 7]; Town planning &amp; urban development strategies &amp; Urbanization &amp; housing problems [SDG 11] (EDB, 2010)</li> <li>• OLE programs covering wetlands, oceans, the ecological footprint, nature-based solutions, and other conservation issues [SDG 11] (WWF, 2024)</li> </ul>
3. Building capacities of educators	<ul style="list-style-type: none"> <li>• PDP including seminars, green school visits (EDB, 2010) &amp; educational facilities (EDB, 2020)</li> <li>• teaching materials “Green Cities” including water, energy, transport, urban development, environmental balance [SDG 12 13 15 7 6 11] (WWF, 2024)</li> <li>• (see also Table 6 and Table 7)</li> </ul>
4. Empowering & mobilizing youth	<ul style="list-style-type: none"> <li>• ESD in life-wide learning on environmental issues. (EDB, 2010)</li> <li>• Green School Campus organized competitions, online quiz competitions &amp; courses (LC, 2023)</li> <li>• Empowered young people through various hands-on experiences to take action to conserve biodiversity &amp; promote sustainability (WWF, 2024)</li> </ul>
5. Accelerating local level actions	<ul style="list-style-type: none"> <li>• SDAs assist schools in the planning &amp; implementation of SD activities in the community (EEB, 2024)</li> <li>• SAP-organized community activities (EEB, 2024)</li> </ul>

Moreover, the EP-related decision-making process not only requires value judgement, but also “how to strike a balance between different considerations in evaluating...such as choosing between... an environmentally-friendly material versus an increased cost” (CDC, 2017c). All these converge in the ef-

forts to facilitate the development of the skills to take action, to “participate in protecting and improving the environment” (ED, 1999; Ma, 2024) in a holistic manner for all HK students.

### ***Subject teaching as the main vehicle to implement ESD***

As mentioned previously, the learning elements of EE/ ESD are distributed across subjects. The exercise in the “Categorization of ESD Topics/ Learning Elements according to Common Themes” in the “Curriculum” Key Theme section reveals that subject teaching is the pre-emptive means to promote and impart ESD in HK schools, which necessitates school-based collaboration and integration.

It is not surprising to find that the DSE subject LS falls into the greatest number of themes, as it “aims to broaden students’ knowledge base and enhance their social awareness through ...Energy Technology and the Environment” (CDC & HKEAA, 2007b). Its flexible subject nature enables EE/ ESD to be imparted in the “issue-enquiry approach” learning (ACE, 1999; CDC & HKEAA, 2007b). Further, Jackson et al. (2016) argued that it is “...the key place for young people to learn about environmental sustainability in Hong Kong” as it “focusses on social, political-economic or cultural issues related to sustainability and sustainable development” (Zhu et al., 2014). Its successor, CSD, “adheres to the rationale of [LS]... [and] helps students acquire a broad knowledge base” to support the implementation of ESD.

The tally result in the “Curriculum” Key Theme section also manifests that the GS subject is at the core of primary learning to promote ESD as its “curriculum is designed ...[such] that students’ learning experiences should be connected...[and] enables students to gain basic understanding [including ‘People and Environment’]...” (CDC, 2017b). In the same vein as its successors, that is Science and Primary Humanities, it also plays a crucial role.

Although the number of appearances of Geography in this survey is not the

highest, still it is one of the indispensable subjects that facilitates ESD learning at the secondary level.

### ***Promoting ESD in line with policies to act on priority areas***

The trend of the longitudinal evolution of the top-of-the-list terms in the “Categorization of ESD Topics/ Learning Elements According to Common Themes” reveals a similar trend of evolution in environmental policies.

For instance, some themes and related terms or concepts including “Climate change and global warming,” “Resource depletion and over-exploitation,” “Impact of human activities on the balance of nature and our responsibilities in environmental conservation,” and “Interdependence of living things and biodiversity” see their contributions span throughout the years.

Yet, it is observed that the counts of some terms or concepts gradually grew after the year 2020 in certain subjects under certain themes. One of the themes that has seen such growth is “Waste reduction and recycling,” which is in line with the intent of the government stipulated in the “Waste Blueprint for Hong Kong 2035” (EEB, 2021) to tackle the issue of Municipal Solid Waste (MSW). Another theme that has seen growing importance is related to “National Education (NE), National Security Education (NSE), significance of the rule of law and public order” (LC, 2021), which conforms with SDG 16.3.

### ***The influences of Chinese cultural background to HK ESD***

It is a common understanding that under the Confucian principles of traditional Chinese culture, great importance and paramount status are given to school education.

Meanwhile, among the theses devoted to exploring Daoist thought in ancient Chinese culture to seek inspiration regarding nature-human harmony and sustainability, Ho (2022) argued for the case to enlighten learners in HEIs through

the wisdom in the philosophical text of Laozi, the “Dao De Jing” (The Book of Logo and Virtues). As a start, he highlighted the core premise of “Dao,” or the “way,” from a “Logoist Perspective” to denote “the grand unifying and rational Principle of the Universe” in the indigenous Daoist belief. Deriving from the “Logoist Perspective” on Sustainability is the conception of the “Supremacy of Nature” which obligates the attitude to “appreciate Diversity in Nature.” It is not frivolous to assert that there is great consistency with the essence of SDG 14/15.

Furthermore, there is the elaboration of how the “Dao” informs the “Aims Regarding Lifestyle,” namely “beware of vanity and focus on simplicity” since “[T]here is no sin greater than desire; there is no misfortune greater than not to know when one has enough” (Hsia, 1992, cited in Ho, 2022) and that “...overconsumption can harm and contaminate both humanity and nature... never-ending economic growth is illogical... and that ‘good life’ is reached only—and can only be reached— when humans seek to live plainer lives in harmony with nature.” One may find these conceptions valuable for promoting SDG 12 as well the objectives of EE to develop students’ environmentally-friendly behavior and lifestyles (ED, 1999; Ma, 2024).

Although the above thesis is primarily pitched at tertiary learners, with slight adjustments and rephrasing it is also applicable to K-12 students. For instance, referring to the learning content of the Humanities Subject for Primary 1 pupils: “Understand the Chinese traditional virtues of diligence and frugality, develop the habit of not wasting, know that natural resources are limited, and understand the importance of saving resources and practising green and low-carbon living” (CDC, 2024a, Learning Theme 1.4.1), it is apparent that the Daoist conception of harmonious living with nature can also be relevant and operationalizable in the learning of young children.

### ***Bottom-up complementary efforts by teachers to promote ESD***

There have been bottom-up endeavors by frontline teachers that are purported to address the SD challenge of “inequality” that has received lesser efforts, as well as efforts related to other SDGs.

From the case reported by Interviewee B, these teacher-initiated actions are to some extent based on teachers’ idiosyncratic experiences and beliefs. From the teachings in LS and Geography subjects and in response to arranging non-formal ESD activities (i.e., Geography Clubs in school, and SEPAS, SOP, etc.), Interviewee B expressed that “there is less-observed presence of the official documents regarding the promotion of specific SDGs including ‘Reduce inequality’.” Yet, from the teaching of LS topics including “Quality of Life,” “Poverty,” “Climate Change” and the entailed extreme hot weather, Interviewee B is moved by “the dire situations of the underprivileged in HK,” including the street-sweeping janitors, dwellers in the tiny and compact sub-division units (SDU) (renamed as basic housing units (BHU) after the Policy Address, 2024), and the homeless people.

In face of the “lesser-impact and static seminars and talks,” as well as the recognition of the difficulties to motivate students’ environmental protecting action from teaching of knowledge topics, called by their own personal meaning, Interviewee B has started to look for learning experiences that are more likely to develop environmental awareness and encourage students to take actions to address the inequalities in the community entailed. As such, Interviewee B seeks and takes the advantage of a free hand in OLE activities. By working together with “Geography Club members, we gather surplus mooncakes at home. We then organize their distribution to those who cannot afford to buy them for themselves. Through these experiences, students will develop an understanding and awareness of the value of equality” (Interviewee B).

Further, Interviewee B leads the Social Service Team (SST) to organize col-

laborative activities with an NGO that makes use of recycling edible surplus food materials from restaurants and food factories to prepare them into servable meals and to distribute them to those in need. The first-hand experiences can not just bring about a rise in the awareness and emotional engagements of the SST members, but the whole school also benefits from the talk and sharing by the NGO and students who participated, as their messages are more relevant and specific.

Although working at a different level of schooling, Interviewee S shared a reflection that “direct-teaching of facts and bits of knowledge is not an effective way to promote ESD when compared to hands-on learning experiences.” Taking the opportunities opened up by the promotion of STEM/ STEAM in school, Interviewee S worked with colleagues to set up an “Ecology Garden” in school which “incorporates IOT, AI technologies and systems to monitor the environmental parameters in the garden and also the growth of the plants...these activities are easier to implement and open up more possibilities to facilitate students’ understanding of the SDGs and their importance...” (Interviewee S).

## **Issues**

### ***Reckoning the priority of EE/ESD to be included in Schools’ Major Concerns (MCs)***

From the authors’ personal observations, the display boards posted on the campuses of local schools usually convey the MCs of the schools, and may include self-regulated learning, promoting students’ mental well-being, National Education, and so forth. Under the “school self-improvement cycle” (EDB, 2025), schools are advised by the EDB to undertake the proposal of a School Development Plan for the 3-year development cycle. In each school year in the cycle, the school will derive an Annual School Plan with MCs set as the goals and direction of the school development in this year. For the sake of

manageability, schools are advised to focus on three MCs, and the determining process reflects the priorities of the school in terms of the background of students and the school, emerging challenges and opportunities, and education-related government policies.

It happens that all the interviewees responding to the author unanimously stated that EE/ ESD is not currently included in the MCs of their schools. Furthermore, it is argued elsewhere that the status of EE is largely peripheral in school education (OWLHK, 2019). Jackson et al. (2016) agreed with this assertion by quoting Stimpson (1997), who stated that "...incorporation across existing mainstream school subjects is generally not occurring [...] half the schools in total who replied were not intending to follow the recommendations of the guidelines" (i.e., the ED, 1999). This may largely be off track with the EDB's recommendation in the "Guidelines" to implement EE/ ESD with a "cross-curricular approach" [and the whole-school and action-oriented approaches stated in EDB, 2010] yet EE "was not more formally included in the curriculum as an independent subject" and together with the presence of the "centralized public examination system" in HK implies the situation that "if a subject is not related to the test, teachers often overlook it" (Leal Filho & Behrens, 2003 cited in Jackson et al, 2016; Leung, 2002; Stimpson, 1997).

Having said this, from an alternative viewpoint, and based on personal experiences in serving as the middle management of a secondary school, the author argues that the not-so-frequent inclusion of EE/ ESD in the MCs of schools is basically not an elimination, but rather the reckoning of priorities. Being one of the "life-wide learning experiences" (EDB, 2018) in the HK school curriculum, ESD is promoted with a "multi-pronged and co-ordinated" approach (LC, 2023). As the priority is elevated under policy-wise demand and the schools identify the needs, ESD along with the introduction of National Education (LC, 2021) and learning elements like "ecology security" that relates to SDG 16.3 is beginning to appear in schools' MCs (from the comments of Interviewees B, D and S).

### ***Further demand for professional development and teacher support for ESD implementation***

Interviewees W, S, and B pointed out the eminent need for PDPs and supports to schools regarding EE/ ESD. This implies their perceived inadequacy of the knowledge expertise (see the survey result from Cheng and So (2012) on GS teachers cited in OWLHK, 2019) and pedagogical know-how (as stated by Interviewee S) to be facilitators of learning that guide students through the development of environmental concerns and awareness and the readiness to take transformative action in mitigating the challenges entailed from climate change. As mentioned previously, ESD is promoted in the curriculum through a distributive and multi-pronged manner. Furthermore, the initial training of Hong Kong teachers is subject-specific, and they are good at teaching knowledge in particular subjects, so it is not surprising that the implementation of ESD would pose a huge challenge.

Besides the education community, concern over the development of teachers' efficacy is also shared by motivated youngsters in HK (LOCY, 2023) to recommend PD and teacher training for ESD. They further voice the role of teachers' passion for ESD as a determining factor of its effectiveness in shaping students' awareness. Their observation was reflected in Seow and Ho's observation (2016, cited in Jackson & Pang, 2017) regarding the influence of teachers' perceptions of the imparting of ESD-related issues and challenges on their approaches and the effectiveness of their lessons. Furthermore, the extent of teachers' ownership and internalization of the purpose of ESD have a direct impact on the way in which environmental issues and topics are presented in the learning activities, which then affect the development of students' perceptions of the relevancy of those challenges to their own life (Chang, 2015; Dal et al., 2015; Ozdem et al., 2014, cited in Jackson & Pang, 2017). To avoid the chance that student might perceive mitigation of climate change and preserving the environment as a fad, teachers' ownership of ESD matters.

In discussing the limitations of PD in supporting educational change, Fullan (2003) stated that success lies in the development of a change in leadership (Fullan, 2003) and collegiality (Fullan, 2007) among the school and teachers involved, with the basis being a shared vision and purpose of ESD to provide moral purpose (Fullan, 2017) to tackle the challenges which emerge and sustain the undertaking of the change.

### ***The plentiful yet homogeneous non-formal education programs for schools and students***

Given the various policies from different bureaux, it is inevitable that there are different policy agendas and roll-out pacing in the publicity and education on SD. A wide spectrum of non-formal education efforts from different policy bureaux have been discussed in previous sections.

In view of the student ambassador programs, including the SEPAS and SDAP that are pitched at schools, Interviewee W shared the viewpoint of frontline teachers:

“because there are a large number of activities, their nature and content are repeated... besides the previous student program that has been held for many years, a new program asks schools to nominate eight students to join...but it requires a responsible teacher to accompany students to attend all the events over the school year... which is very demanding in addition to the already busy school work.”

As further affirmed by both Interviewees S and W, the overwhelming volume of student activities (and those held by the HEI and NGO programs) are mostly focused on a small group of selected and motivated students rather than on all students. It would appear to schools at the receiving end that the extent of

the impact of these programs is largely bounded by the participation and contribution of the involved student ambassadors.

Having said that, the aforementioned SOP and the synergy of the “Schools Go Green” and “Green School 2.0”, HKAEE (SS) and SAP are undertaking to promote ESD with a whole-school scope. There are also competitions that serve to arouse and enhance students’ interest and their sense of commitment to preserving nature and the environment, as mentioned previously. Furthermore, it would be preferable that the clarity of policy and purpose among the educators involved (Fullan, 1993, 2003) be enhanced in order to rally for their passion, participation and collegiality (Fullan, 2007) in the wide spectrum of programs and efforts in promoting ESD in school. The proposal of OWLHK (2019) “[to] set up new high-order committee [preferably at the policy level] for overseeing and coordinating EE/ESD” (para 5.2.3) could be a departure to achieve this end.

### ***The gap between "awareness & attitude" and action in ESD, influenced by psychological and societal barriers***

In the tallies of the frequency of appearance of labels in the Categorization of ESD Topics/ Learning Elements, the first aspect that comes to our attention is the overwhelming number of knowledge-related topics ( $n = 85$ ) in the analysis. This is supported by the tally result from the wordcount in which “environment/environmental” ( $n = 26 / n = 15$ ), “sustainable/development” ( $n = 9 / n = 8$ ), “conservation” ( $n = 13$ ), “quality” ( $n = 11$ ), etc. topped the lists, and thus indicates that conceptual and factual understandings comprise a big proportion of the intended ESD curriculum.

However, the mentioning or appearance in the curriculum prescription without thoughtful strategies and considerations of implementation does not guarantee the nurturing or development of understanding and attitude intended. For instance, the term “Biodiversity” frequent appears in the ESD actions and per-

formance. However, as Martin and Rollason (2017 cited in OWLHK, 2019, Para 4.1.4) put it, although the younger generation (aged 18-29) is the highest scoring group who “demonstrated both awareness and concern, still 67% of them were not aware and concerned about biodiversity loss.”

In the same vein, Interviewee S expressed that “ESD in schools is not [implemented] deeply enough,” whilst Interviewee W also commented from personal experience that, “EE and ESD are scattered across different subjects...which is not so effective in terms of developing attitude from the knowledge established, let alone encouraging action.”

Nevertheless, Interviewee S stated that “[although] there is a lack of [environment transforming] actions in the entire society as a whole, students can experience the action in school through ESD.”

The tripartite aim of “awareness,” “action” and “attitudes” stated in the Guidelines (ED, 1999; Ma 2024) depicts the importance of “promot[ing] ... students [to participate in] *taking action* that would lead to the *creation of sustainable environments* in which they can live and work” (emphasis added). Therefore, it is not frivolous to conclude that the aim of EE also highlights the importance of “transformative actions” (UNESCO, 2020) in achieving SD and a better tomorrow.

It is admitted that the previous discussions and elaborations of the “Themes” and “Features” of HK ESD attempt to describe the intended measures and efforts to achieve the aforementioned aim as well as the relevant SDGs. Yet it has been widely discussed (e.g., Barth et al., 2012; Portus et al., 2024; Swim et al., 2009) that to increase the willingness of students to take action is problematic in ESD, as “secondary students...expressed low levels of concern for the environment, and unwillingness to actively participate in environmental protection” (Jackson et al., 2016 citing Yeung, 1998).

Similarly, in reporting the survey titled “Working Towards Sustainable Consumption,” Youth I.D.E.A.S. (2023) revealed that 79.3% and 82.6% of the respondents ( $n = 740$ , ages ranging from 15- 34) agreed that “Practicing low-carbon life is a citizen’s responsibility” and “Consumers have a responsibility to choose products that help protect the environment” respectively, and only 16.9% agreed that “The issue of climate change has nothing to do with me.” Yet, 47.8% and 54.1% admitted that they did not quite *understand* the concepts of “SD consumption” and “carbon neutral” respectively, and 57.2% of them seldom or never “care about their carbon footprint.”

Moreover, among the 73.3% respondents stating their willingness to “reduce consumption to protect the environment,” 58.7% disagreed that “I am willing to pay more for environmentally friendly products” and more of them (67.95%) disagreed to “pay more taxes to protect the environment.”

Further looking into factors affecting consuming behaviors, 53.5% were concerned about “The materials of the product are environmentally friendly,” yet 96.9% and 76.9% regarded “cost” and “popularity and good will of the brand” as important. When asked: “What are the reasons why you don’t often practice sustainable consumption,” 44%, 40.8% and 37% replied “too expensive,” “too troublesome/ not convenient” and “lack of sufficient information,” respectively. This invites the question: “Is consumption the *way of our life*?” (Lebow, 1992 cited in Leonard, n.d.).

Although the result may not be conclusive due to the sample size, it is indicative that the gap between “awareness & attitude” and action does exist, which is quite alarming, in particular to the HK ESD community.

In contemplating a similar division between concerns and actions, APA (2021) identified “Psychological distance” as one of the “Psychological Barriers to a Proactive Response” that denote the indifferences to or disengagement from the environmental crisis given its “other-ness,” “remote-ness” and “some-

times-ness.” Moreover, the temporal and spatial constraints of the human mind also contribute to this distancing.

The mental burden of envisioning longitudinal weather variation on a daily basis (APA, 2021 citing Hulme, 2009; Swim et al., 2009; Weber & Stern, 2011) may lead people to experience numbness about the piecemeal changes in climate. Also, as Sachs (2023) put it, given our pre-historic experience of striving for survival on the African savannah, “our evolutionary psychology is probably somewhere around the scale of 60 people who were in the same band”; thus, humans are not born with the ability to think globally.

Although the magnitude and urgency of climate change and environmental depletion are so imminent, the mentality of “future discounting” (Saylan & Blumstein, 2011), that is, marking down the deferred and remote benefits of the enduring, seemingly fruitless undertaking of environmentally-friendly endeavors today, contributes to opting for inaction.

As such, UNESCO (2020) advocated for the imperative to empower students by means of ESD to undertake transformative actions to help build a better future, including encouraging them to address the “structural issue” rooted in the material culture that celebrates unrestricted consumption by means of a “balancing act between economic and sustainable development” and to “encourage learners to explore alternative values to consumer societies,” that is, bridging the gap between awareness & attitude and action, and facilitating a tipping point (UNESCO, 2020) to overcome the barriers (APA, 2021).

### ***How STEMaker projects can effectively address the gap between awareness, attitudes, and action in Environmental Sustainability***

Jackson and Pang (2017) observed in interviews that not all student participants are “proactive and organized in combatting climate change” (p. 15). They preliminarily suggested that the difference may stem from the different

teaching approaches and foci in international and local schools. This seems to answer the concerns of the interviewees including Interviewee B about the effectiveness of non-formal education (e.g., visits, poster design, seminars), and further illustrates that enhancing experiential learning and engaging students can make a difference.

Naturally, project-based learning (PBL; UNESCO, 2020; LOCY, 2023) seems to be a promising trend for bringing about transformative change. PBL is endorsed with the hope of being a successful pedagogical practice to achieve the 17 SDGs through ESD (UNESCO, 2020) as it was found that "...policy documents...show that ESD is mostly associated with the teaching of scientific knowledge on the environment... [but] not enough to bring the transformative power of education to its full force" (UNESCO, 2020, p. 5). Thus, Pavalova (2012) argued that "transformative education ... to be an appropriate way to 'deliver' ESD through technology education, implies teaching and learning processes that help students to construct and appropriate new and revised meaning of experiences" to overcome the barriers of "belief systems, skepticism" and "pluralistic ignorance" (APA, 2021).

Elsewhere, based on the Design and Technology (D&T) and project-learning tradition, the author and colleagues put forward "STEMaker Education" (Wan, 2019, 2022, 2023, 2024; Wan & Leung, 2022; Wan & Wong, 2016; Wan et al., 2020) to provide holistic and authentic learning experiences through STEMaker projects in STEM education. The author asserts that a STEMaker project is PBL with a relevant story by means of the power of the "situation/ scenario" in overcoming aforementioned issues and barriers.

In face of the current situation that ESD is distributed among subjects and is knowledge-focused, the author would argue that STEMaker projects can realize the strength in the possibility of facilitating integrative learning (Sanders, 2009) coined "SD in Edu" (equivalent to "STEM in Edu" stated in Wan & Wong, 2016) in *dedicated* lessons (e.g., D&T, Technology Education, STEM)

in the timetable. Given the ongoing promotion of STEM/ STEAM education, it is in HK schools already. Usually STEMaker projects serve as the “integrator” (ITEA, 2007) in the DT/ TE lessons, while teachers of other STEM subjects can concentrate on subject teaching of knowledge & skills supporting the hands-on innovations. More likely this provides an edge in realizing the SDGs smoothly in formal education settings.

Furthermore, the author argues that the learning experiences offered in STE-Maker projects are holistic, as the broader definition of technology (e.g., resources, time, cost, manpower, and information; adapted from de Vries, 1996) is observed and the multitude of subject-related learning elements is involved in the all-inclusive design and making process through the preferred pedagogy “design cycle” (CEATE Awardees’ Workshop [CAW], cited in Wan, 2019, 2023, 2024), which is both the procedural knowledge for students and the teaching strategy and pedagogy for teachers that consists of a list of stages<sup>19</sup> (Wan, 2023, 2024).

By undertaking purposeful and authentic problem solving and inquiry in STE-Maker projects via the design cycle to bring about changes in the natural and man-made world, students will learn how to manipulate materials, resources and equipment to create *tangible outcomes*. At the same time, through mindful and duteous planning by teachers, those learning experiences can be transformative, as they allow students to interact with the real-life scenarios to address environmental issues and challenges, albeit in a reduced, controlled or designed manner. The *immediate effect* experienced by students from the *realization and completion of the tangible outcome* in the STEMaker project is a kind of effective and plausible change, or at least an incremental change that may further nurture students’ personal meaning to the challenge they are ad-

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19 Usually these include “get to know the situation/ scenario,” “identifying a problem,” “factor analysis and specification,” “generating ideas and developing solutions,” “planning and production of solutions,” and “evaluation.”

dressing so that they can overcome the environmental psychological distance in the long run.

Fun is an essential characteristic of STEMaker projects, which obligates teachers to offer problem-solving challenges that are relevant to students' interest, along with excitement, openmindedness, satisfaction and enjoyment. It is envisioned that the stereotypical image of environmentalists or green-living practitioners can be offset to overcome the barriers of “Belief Systems and Climate Skepticism” (APA, 2021) in these learning experiences.

Through the author's experiences in the PDP activities in CAW, it is confirmed that thoughtfully and purposefully deriving the extent of richness, and “wicked-ness” embedded stories, scenarios and situations that are relevant to students (interests, capabilities & existing resources) can facilitate them in “making sense of, emotionally related, create empathy, create personal meaning, that drive engagement” (Barth, 2020) and nurture “ownership” (Barth et al., 2012) of their endeavors in STEMaker projects.

**Table 14** Illustrative Examples of How STEMaker Projects Contribute to Transformative ESD via “SD in Edu”

STEMaker Project	Level and collaborating subjects	Description	Novelties contributing to ESD
2035 Global Blackout	Secondary 1 Sci, Maths, D&T, Geog	<ul style="list-style-type: none"> <li>• Project scenario in year 2035 when the UN announces the measure of “Global Blackout” at 6:00pm daily to cope with the energy crisis and mitigate extreme weather</li> <li>• A part of the D&amp;T workshop was transformed into an all-senses installation.</li> <li>• Students were immersed in the surreal experiences as citizens in 2035 to understand the environmental causes and entailed challenges of the “Global Blackout” through a fabricated TV news program and newspaper, spotlight, heater and the cramped space set to experience the heat of the extreme weather and the dire situation of the underprivileged living in the SDU/ BHUs.</li> <li>• Integrating the “first-hand” experience from these simulations and the learning in Science and Geography subjects, students were commissioned to design and make a solar-powered cooling device, and by participating in the volunteer visit by the Civil Education Department of the school to distribute their products to those in need.</li> </ul>	<ul style="list-style-type: none"> <li>• The benefit of “scenario” (in design cycle) is maximized by the all-senses immersive installation in that students were engaged, nurtured awareness, ownership of the urgency of the climate crisis, and the empathy to the dire situation of the underprivileged. Students’ perspective and the design capabilities to enhance the well-being of others (Stables, 2013) are also developed.</li> <li>• The project also enables the achievement of SDGs 10 and 13, also the motto “think globally, act locally.”</li> <li>• Tangible outcome gives the student visual proof that the project is effective, and can solve problems with a result, so they will be reinforced and motivated to undertake transformative actions.</li> </ul>

STEMaker Project	Level and collaborating subjects	Description	Novelties contributing to ESD
Marine Conservation	Secondary 1 D & T, Sci	Make use of drone technology to monitor coral reef ecosystems to integrate drone technology and scientific knowledge in coral ecology. Working in groups of 4, students go through preliminary exploration to locate the checkpoints (coral reefs, simulated by photos of coral on the workshop floor), and measure the distance between them to make a map to perform a conservation mission.	The scenario engages students in the monitoring and conservation of a coral reef so that they can relate to, recognize and familiarize themselves with the importance of coral reef ecosystems, and ocean ecology at large [SDG 14]; i.e., act locally (in terms of project scenario and simulation) and understand the challenge globally.
Smart water dispenser	Secondary 1 Value Edu, Sci, D&T, Computer	Through learning about “National food security,” “National Agricultural Science and Technology Development - Drip Irrigation,” conditions of plant growth, and the programming and use of Micro:Bit, students in groups of 4~5 design and make a “Smart water dispenser” that can schedule the irrigation of plants and at the same time, conduct an investigation to identify the best soil humidity for plant growth.	Addressing both current educational policy need (e.g., National Security Edu, i.e. SDG 16.3) and environmental awareness in ESD (SDG 2) at the same time through integrative learning in formal education.

Whilst there is not much discussion in the former section on assessment in ESD, it is quite readily in place in the STEMaker recommendations with the following characteristics (Wan, 2021):

- Focus on hands-on, practical experiences
- Openness in assessment design

- Product & process equally important
- Assessment is ongoing and embedded practice, i.e. assessment for learning.

The goal of an “Anthropocentric Perspective” in STEMaker education stipulates the development of caring attitudes towards others and the environment (Wan & Wong, 2016) and the “peculiar human qualities including intuition, imagination, insight, perseverance, intentionality and the likes” (Capel, 1992; cited in Wan & Wong, 2016).

This is in line with the notion of “designerly well-being” (Stables, 2013) that highlights the importance of developing a “capability-based conception of well-being (as opposed to a ‘desire’ or ‘happiness’ based concept; Nussbaum 2000, 2011; cited in Stables, 2013) through the undertaking and realization of design tasks which “present a spectrum of living, from bodily health and integrity to practical reason, imagination and thought, emotion, affiliation, play, and life itself.” Following in this vein, the author would argue that STEMaker projects can help in developing the design capability that supports well-being in others, which can be conducive to the cultivation of love and respect for nature, the responsibility to protect the environment, and to build up the momentum of the transformative action in the younger generation.

Moreover, Stables (2013) pointed out that the purpose of developing design capabilities is not just to breed future designers, as not every student studying design may become a designer after all. The author would argue that the learning in design, especially in the performing of factor<sup>20</sup> analysis and the formulation of specifications (Wan, 2021, 2024) that are related to SD / EP

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20 Examples of design factors may include but are not limited to: Function, Safety, Users’ needs and preferences, Size and weight, Aesthetic appearance, Manufacturing processes, Structure and construction, Material, Ergonomics and anthropometry, ACCESSFM, and the likes.

(such as users' need, material, manufacturing process, second life for products, etc.) could enable them "to be critical consumers and users of the designed and made world [and the steward of the nature world]" at the other end. At least students will be more able to decode the business strategies of "planned obsolescence" and "perceived obsolescence" (Leonard, 2011) that hinder us in breaking away from the "linear system of material economy" and furthermore to have deeper deliberation upon the contrived needs and wants in people's mindset to counter the unsustainable use of resources and unlimited consumption.

Could that not be the dim yet flashing starlight at the end of the long tunnel?

## Conclusion

This chapter reports the efforts of various stakeholders in ESD in Hong Kong in the form of policies, measures and actions. With the goal of "promoting ESD through the development of responsible environmental behaviors," the Guidelines (ED, 1999) set the framework of EE and ESD in multi-pronged and co-ordinated efforts that are substantiated by the works of the former ED and then EDB in collaboration with other partners including NGOs in the implementation of ESD via formal and non-formal education. Whilst the efforts of other policy bureaux and statutory bodies, for example, EEB and SDC, as with the EDB's, reflect the evolving policy-wise emphases on promoting ESD to students over the course of development.

Besides, the promotion of ESD in formal education is distributed among the school subjects, while in terms of non-formal education programs, a great deal are initiated and supported by policy bureaux to facilitate the implementation of ESD. To further enrich the volume and variety of the non-formal education

programs and activities, the policy bureaux also encourage NGOs, HEIs and SMBs to bid for environmental funding to organize programs and to provide long-term on-site support for schools.

The identification of the emerging trends reveals that ESD efforts in HK are mostly across all SDGs, although some have received more attention (e.g., SDG 12, SDG 13, SDGs 14/15). As a result of the recommendation of “permeating in a number of subjects,” the ESD learning elements are imparted mainly through subject teaching, which enjoys the advantage of Chinese culture highly praising and respecting school education. Moreover, the nature-human harmony embedded in the culture also provides a well-received belief to support the nurturing of students’ environmental awareness and behaviors. Furthermore, the bottom-up efforts by frontline teachers enhance the impact of the ESD given the edges of relevancy and proximity. On the other hand, there are issues including the effectiveness of promoting the ESD with a knowledge-focused and immersively implemented curriculum, and the plentiful but homogeneous non-formal education programs, which render the efforts to overcome the psychological barriers problematic, further widening the gap between awareness and attitudes to be developed and the transformative actions.

Therefore, the author, in agreement with the UNESCO recommendation of PBL for ESD, asserts that holistic, authentic and integrative STEMaker projects are a better way to supplement the ESD implementation efforts in previous sections. Taking advantage of the engaging “scenario” and the anthropocentric “design factors” (e.g., users’ needs”) in the design cycle, and incorporating Stables’ (2013) notion of designerly well-being, it is envisioned that the tipping point to bridge the action-gap can be facilitated in students, so that Marvin Gaye’s question: “Where did all the blue skies go?” half a century ago can be radiantly addressed by the enduring endeavors across the generations.

## Acknowledgement

The author is grateful to the interviewees for their inspiring comments and remarks. Gratitude also goes to Dr C.C. Lam and Dr Xoni Ma for providing inspiration for the manuscript. And the author would like to express profound gratitude to Mr. Ho Shing, Fan, Mr. Chi Yeung, Chan and Miss Wai Kwan, Pang of Ling Liang Church M H Lau Secondary School, Mr. Lok Hang, Chan of TWGHs Kap Yan Directors' College and lastly Mr Chun Ho, Cheng and Mr Chin Ting, Jeff, Lee of De La Salle Secondary School NT for their generous consent to present their projects to illustrate how ESD can be benefitted. Finally, this work is dedicated to my wife Tammy for her forbearance, support, and love. Any shortcomings in the text are of course the author's own responsibility.

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## Appendix

### Appendix A Subjects and Learning Area Including ESD Topics and Learning Elements

Level of Schooling	Subjects/ Learning Area	Code
Kindergarten	Learning Area-Nature & Living	[K-N]
Primary level	General Studies	[P-GS]
	Humanities	[P-H]
	Science	[P-S]
Junior secondary level (S1-S3)	Geography	[JS-G]
	Science	[JS-S]
	Citizenship, Economics and Society	[JS-CSE]
	Technology Education- Design and Technology	[JS-DT]
Cert level (S4-S5)	Biology	[Ct-B]
	Human Biology	[Ct-HB]
	Chemistry	[Ct-C]
	Physics	[Ct-P]
	Science and Technology	[Ct-ST]
	Technology Education - Computer and Information Technology	[Ct-CIT]
	Home Economics	[Ct-H]
	Geography	[Ct-G]
A-level (S6-S7)	Geography	[A-G]
	Liberal Studies	[A-LS]
DSE (S4-S6)	Biology	[D-B]
	Business, Accounting and Financial Studies	[D-BAFS]
	Design and Applied Technology	[D-D]
	Health Management and Social Care	[D-H]
	Information and Communication Technology	[D-J]
	Technology and Living	[D-TL]
	Geography	[D-G]
	Integrated Science	[D-IS]
	Liberal Studies	[D-LS]
	Citizenship and Social Development	[D-CSD]

**Appendix B** Categorization of ESD Topics/Learning Elements According to Common Themes

SDGs	Common Themes	Topics/ Learning Elements (Attitude, skills and Knowledge)	Policy/ Curriculum Documents
/	Sustainable development	<ul style="list-style-type: none"> <li>• [K-N] To develop curiosity about the environment &amp; to enjoy exploring the surroundings &amp; nature <b>(A)</b>; To appreciate, respect &amp; care for nature and live an environmentally-friendly life <b>(A)</b>; Care for and appreciate the beauty of nature, animals and plants <b>(A)</b>; Develop attitudes and habits of protecting the environment &amp; cherishing resources <b>(A)</b></li> <li>• [P-GS] environmental conservation <b>(K)</b></li> <li>• [P-S] Recognise the importance of sustainable development &amp; environmental protection to maintaining ecological security <b>(K)</b></li> <li>• [JS-G] sustainable development, ecological conservation <b>(K)</b></li> <li>• [Ct-B] Ecology <b>(K)</b></li> <li>• [Ct-ST] Environmental Science <b>(K)</b></li> <li>• [D-B] conservation of the ecosystem <b>(K)</b></li> </ul>	EDB, 2010 CDC, 2017a LC, 2023 CDC, 2024b
13* (H)	Climate change and global warming	<ul style="list-style-type: none"> <li>• [Science subjects]- skills of scientific investigation; understanding concepts related to natural environment <b>(S)</b></li> <li>• [P-GS] Weather changes and how they affect our daily life <b>(K)</b></li> <li>• [P-GS] effects of climate change on people and individuals <b>(K)</b></li> <li>• [P-H] Climate and weather changes in HK &amp; their impact on everyday life &amp; how people respond to these changes <b>(K)</b></li> <li>• [P-S] Be aware that animals respond to changes in environmental conditions, <b>(K)</b> Show concern for environmental and climate change <b>(A)</b></li> <li>• [JS-S] Balance of carbon dioxide &amp; oxygen in Nature; Radiation &amp; conduction of heat <b>(K)</b></li> <li>• [JS-G] Climate change <b>(K)</b></li> <li>• [Ct-B] [Ct-HB] [Ct-C] [Ct-P] - biotic &amp; abiotic factors affecting the environment <b>(K)</b></li> </ul>	ACE, 1999 EDB, 2010 EDB, 2022 LC, 2023 CDC, 2024a CDC, 2024b

SDGs	Common Themes	Topics/ Learning Elements (Attitude, skills and Knowledge)	Policy/ Curriculum Documents
		<ul style="list-style-type: none"> <li>• [Ct-G] Climatic Anomalies <b>(K)</b></li> <li>• [Ct-P] Temperature &amp; heat; Heat/Energy transfer process <b>(K)</b></li> <li>• [A-G] Climatic system <b>(K)</b></li> <li>• [D-LS] Weather &amp; Climate <b>(K)</b></li> <li>• [D-IS] [D-G] [A-G] Weather &amp; air quality <b>(K)</b></li> <li>• [D-H] [D-TL] Global warming <b>(K)</b></li> <li>• [D-G] Global Warming—Is it fact or fiction? <b>(K)</b></li> <li>• "life event" exemplars on global warming <b>(K)</b></li> </ul>	
14, 15 (M)	Impact of human activities on the balance of Nature	<ul style="list-style-type: none"> <li>• [P-GS] the impact of human activities on the balance of Nature; our responsibilities in environmental conservation <b>(K)</b></li> <li>• [P-GS] "The Living Environment"; "The Natural World" <b>(K)</b></li> <li>• [P-H] understand the importance of conserving the natural environment <b>(K)</b></li> <li>• [Humanities]- from historical, sociological, economic &amp; geographical perspectives to learn about interaction between human beings &amp; their environment <b>(K)</b></li> <li>• [Ct-B] [Ct-HB] [Ct-C] [Ct-P] the inter-relationship between biotic and abiotic factors &amp; the role human beings play <b>(K)</b></li> <li>• [Ct-B] Human impacts on the environment; Human responsibility for environmental conservation <b>(K)</b></li> <li>• [A-G] The impact of urbanisation and industrialisation on the quality of the environment <b>(K)</b></li> <li>• [A-LS] What are the implications for the future as humans continue to disrupt the world environment? <b>(K)</b></li> <li>• [D-BAFS] Business Ethics and Social Responsibilities <b>(K)</b></li> <li>• [D-D] Environmental responsibility <b>(K)</b></li> <li>• [D-IS] Balance in Nature <b>(K)</b></li> <li>• [D-I] technological innovations can bring major benefits &amp; damage society <b>(K)</b></li> <li>• [D-LS] environment &amp; sustainable development; Quality of life <b>(K)</b></li> </ul>	ED, 1999 ACE 1999 EDB, 2010 LC, 2023

SDGs	Common Themes	Topics/ Learning Elements (Attitude, skills and Knowledge)	Policy/ Curriculum Documents
14, 15 (H ~M)	Interdependence of living things and biodiversity	<ul style="list-style-type: none"> <li>• [P-S] Inter-relationship between living things &amp; the natural environment <b>(K)</b>; recognise endangered species &amp; understand living things in ecosystem compete for resources <b>(K)</b></li> <li>• [JS-S] Interdependence amongst living things <b>(K)</b></li> <li>• [Ct-B] [Ct-HB] [Ct-C] [Ct-P] -interplay of people and their environment. <b>(K)</b></li> <li>• [D-B] biodiversity <b>(K)</b></li> <li>• [D-CSD] understand the interconnectedness among areas of economy, science, technology, SD, public health &amp; the related impact <b>(K)</b>; Protection of biodiversity <b>(K)</b></li> </ul>	ACE, 1999 EDB, 2010 CDC & HKEAA, 2021 CDC, 2024b
12 (H) & 14,15 (L)	Pollution	<ul style="list-style-type: none"> <li>• [P-GS] local and national environmental issues <b>(K)</b></li> <li>• [P-H] learn &amp; enhance the awareness of EP, e.g. ways to reduce greenhouse gas emissions <b>(K) (A)</b></li> <li>• [JS-G] How clean is our atmosphere? <b>(K) (A)</b></li> <li>• [D-H] Forms of Pollution and their impact on health <b>(K)</b></li> <li>• [D-B] global environmental issues, e.g. acid rain. <b>(K)</b></li> </ul>	EDB, 2010 LC, 2023 CDC, 2024a
12 (H) & 14,15 (L)	Resource depletion and over-exploitation	<ul style="list-style-type: none"> <li>• [P-GS] The Earth as a source of resources <b>(K)</b></li> <li>• [P-H] Developing environmentally-friendly living habits &amp; individual responsibilities <b>(A) (K)</b></li> <li>• [P-S] Framework of Engineering Design Process Skills: select the suitable design solution considering environmental friendliness <b>(S)</b></li> <li>• [Ct-C] Consequences of using fossil fuels <b>(K)</b></li> <li>• [JS-DT] [D-D] Product evaluation – Analyse, evaluate, make critical comments manufactured products <b>(S)</b>; Environmental responsibility - Consider the environmental issues related to design; production &amp; the sale of products <b>(A) (K)</b>; Make informed decisions on purchasing manufactured products <b>(S)</b></li> </ul>	CDC, 2007 EDB, 2010 CDC 2017b CDC, 2024a CDC, 2024b

SDGs	Common Themes	Topics/ Learning Elements (Attitude, skills and Knowledge)	Policy/ Curriculum Documents
		<ul style="list-style-type: none"> <li>• [D-D] Appropriate technology - Understand the needs of resource conservation; consider sustainable development in designing and appraising products <b>(A)</b> <b>(K)</b></li> <li>• [D-H] Exhaustion of natural resources e.g. water, land, food <b>(K)</b></li> <li>• [D-CSD] Practical experience in responsible consumption and production <b>(K)</b></li> </ul>	
12 (H) & 4* (M)	Developing a healthy lifestyle	<ul style="list-style-type: none"> <li>• [P-GS] "Healthy Living", "The Living Environment"; a lifestyle which promotes sustainable development; Care of the environment <b>(K)</b> <b>(A)</b></li> <li>• [Ct-H] Sustainable living <b>(K)</b></li> <li>• [Ct-CIT] issues related to health, environment or a change in life-style; environmental issues <b>(K)</b></li> <li>• [D-D] Principles in developing strategies for sustainable development (e.g. use of clean &amp; alternative technologies, implementation of eco-labelling &amp; energy-labelling schemes) <b>(K)</b> <b>(S)</b></li> <li>• [D-TL] Factors affecting family ties &amp; lifestyle-environmental <b>(K)</b></li> <li>• 4 "life event" exemplars on topics of green living, low-carbon diet, green consumption <b>(K)</b></li> </ul>	ACE, 1999 EDB, 2010 CDC, 2017b EDB 2022
12(M) & 7* (H)	Energy saving and alternative energy resources	<ul style="list-style-type: none"> <li>• [P-GS] ways of conserving resources; renewable &amp; non-renewable resources available on Earth; Simple solutions in solving energy problems; Planning &amp; managing resources to develop solutions in daily life situations <b>(K)</b> <b>(S)</b></li> <li>• [P-H] renewable and non-renewable energy; energy problems &amp; their impacts on the environment <b>(K)</b></li> <li>• [JS-G] Struggle for power resources <b>(K)</b></li> <li>• [JS-S] Energy sources and we; fossil fuels; alternative energy sources; saving energy <b>(K)</b></li> <li>• [Ct-C] Fossil fuels <b>(K)</b></li> <li>• [Ct-H] Use of energy saving light bulbs and electrical appliances <b>(S)</b></li> </ul>	EDB, 2010 CDC, 2017b LC, 2023 CDC, 2024a

SDGs	Common Themes	Topics/ Learning Elements (Attitude, skills and Knowledge)	Policy/ Curriculum Documents
		<ul style="list-style-type: none"> <li>• [D-D] Energy and energy resources; integrate design &amp; control concepts to develop systems satisfying energy saving <b>(S)</b> <b>(K)</b></li> <li>• [D-LS] The influences of energy technology <b>(K)</b></li> </ul>	
12 (H) & 4* (M)	Waste reduction and recycling	<ul style="list-style-type: none"> <li>• [P-GS] Ways of minimising generation of waste in daily life <b>(K)</b></li> <li>• [D-LS] Quality of life <b>(K)</b></li> <li>• [D-CSD] Practical experience in environmental conservation: Sustainable waste management <b>(K)</b></li> <li>• [P-H] Understand the Chinese traditional virtues of diligence and frugality, develop the habit of not wasting, know that natural resources are limited; learn about the four major principles of saving resources: reduce, reuse, replace &amp; recycle; practising green consumption &amp; green living <b>(A)</b> <b>(S)</b> <b>(K)</b></li> </ul>	CDC, 2010 CDC & HKEAA, 2021 CDC, 2024a
10 (H) & 12(H)	Fair trade and consumerism	<ul style="list-style-type: none"> <li>• [JS-DT] Design consideration: how technology influences business &amp; daily life, in respect of environmental issues and possible ways of protection; impact of consumers' choices including environmental, technological, social &amp; economic factors <b>(A)</b> <b>(K)</b></li> <li>• [D-D] Make critical comments on manufactured products with balancing criteria, &amp; exercising value judgment <b>(A)</b> <b>(S)</b></li> <li>• [D-LS] Quality of life; Globalisation <b>(K)</b></li> </ul>	CDC, 2007 EDB, 2010
1 (L) & 10 (M)	The rich and the poor	<ul style="list-style-type: none"> <li>• [D-LS] Quality of life; Globalisation <b>(K)</b></li> <li>• [D-BAFS] business management functions; how business ethics &amp; social responsibilities affect business decisions; <b>(K)</b></li> <li>• [D-CSD] roles &amp; responsibilities of business in promoting environmental conservation <b>(K)</b></li> </ul>	EDB, 2010 LC, 2023
2* (H)	Food and hunger	<ul style="list-style-type: none"> <li>• [D-LS] Quality of life; Globalisation <b>(K)</b></li> </ul>	EDB, 2010
8* (H)	Poverty and unemployment	<ul style="list-style-type: none"> <li>• [D-LS] Quality of life; Globalisation <b>(K)</b></li> </ul>	EDB, 2010

SDGs	Common Themes	Topics/ Learning Elements (Attitude, skills and Knowledge)	Policy/ Curriculum Documents
11* (H)	Town planning and urban development strategies	<ul style="list-style-type: none"> <li>• [D-G] Building a Sustainable City—Are environmental conservation &amp; urban development mutually exclusive? <b>(A)</b> <b>(K)</b></li> <li>• [D-LS] Quality of life <b>(K)</b></li> <li>• [D-CSD] Practical experience in environmental conservation: Low-carbon transportation system <b>(K)</b></li> </ul>	EDB, 2010 CDC & HKEAA, 2021
11* (H)	Urbanisation and housing problems	<ul style="list-style-type: none"> <li>• [P-H] understand how the government overcomes the limitations imposed by the natural environment to increase land supply; understand the need to strike a balance between the needs of society &amp; the ecological environment in urban development <b>(A)</b> <b>(K)</b></li> <li>• [A-G] The impact of urbanisation and industrialisation on the quality of the environment <b>(K)</b></li> <li>• [D-LS] Quality of life <b>(K)</b></li> </ul>	EDB, 2010 CDC, 2024a
16* (H)	National Edu, National Security Edu, significance of the rule of law and public order	<ul style="list-style-type: none"> <li>• The rationale of SD &amp; the practical experiences of environmental conservation of our country, HK &amp; other regions <b>(K)</b></li> <li>• [JS-CSE] understand social systems &amp; their operational procedures, and realise the significance of the rule of law and public order <b>(K)</b></li> <li>• [JS-CSE] [JS-G] nurturing among students the commitment to making contributions to our country &amp; society in the aspect of environmental conservation <b>(A)</b></li> <li>• [D-CSD] Practical Experiences of Our Country, HK &amp; Other Regions in Environmental Conservation <b>(K)</b></li> </ul>	CDC & HKEAA, 2021 EDB, 2023 LC, 2023

Note: \* Involved SDGs other than those related to the “Four Interconnected Global Challenges”

# Other emerging themes

Source: EDB, 2010.

# **Status, Trends and Issues of Education for Sustainable Development (ESD) in Iceland**

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## Abstract

The aim of this chapter is to provide an insight into Education for Sustainable Development (ESD) in the Icelandic context at the preschool, compulsory and upper secondary school levels. The Icelandic school system is introduced, together with laws and policies concerning ESD. The main picture of monitoring student and school progress is explained. Recent revisions of education policy and curriculum are put into context, and an attempt is made to provide an overview of the status of ESD in Iceland. Following are some actions taken and performances for ESD introduced with an emphasis on transforming learning environments, and how to build educators' capacity. Finally, the key themes in ESD for Iceland are summarized. In sum, the concept of sustainability is not explicitly mentioned in Icelandic laws for preschools, compulsory schools or upper secondary schools, but sustainability is one of six educational pillars of the curriculum, making it an intrinsic part of all school activities. In line with Nordic emphasis, the Icelandic curriculum prioritizes the development of student action competence, with reference to the present and future roles of being responsible citizens in a democratic society. Recent research has indicated that the key predictor of young people's good citizenship and pro-environmental behaviors is their sense of social justice. This suggests that social justice is a key element motivating young people to take interest in common and global welfare, to develop sustainable mindsets, and to become agents of change. This is difficult to assess in standardized tests but could be an underestimated factor for advancing ESD in the Nordic context, including in Iceland.

**Keywords:** Iceland, sustainability, action competence, key competences

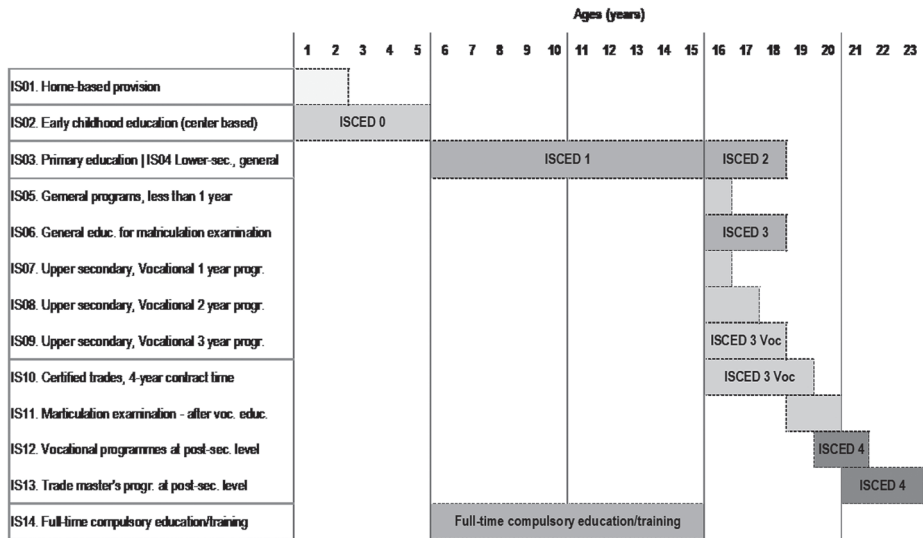
# Introduction

Iceland is a country of 400,000 inhabitants, an island of 103,00 km<sup>2</sup> located in the North-Atlantic Ocean. It is one of the Nordic countries, with standards of living generally considered good. These countries have close relations, for example, in individual citizen rights and educational structure (Government of Iceland, 2019a).

## The Icelandic School System

As in the other Nordic countries, the Icelandic school system is defined as three school levels. Figure 1 presents the school system using categories defined by Eurydice (Eurydice, 2025) which are pre-primary school [í. *leikskóli*] category ISCED 0, compulsory school [í. *grunnskóli*] category ISCED 1-2, and upper secondary school [í. *framhaldsskóli*] category ISCED 4 (Eurydice, 2025).

**Figure 1** The Icelandic School System



Pre-primary education is defined by law as the first level of the educational system, providing education and care for children who have not reached 6 years of age, at which point compulsory education begins. Compulsory education is organized as a single structure system, that is, primary and lower secondary education form part of the same school level and generally take place in the same school. Legislation on compulsory education stipulates that education shall be mandatory for children and adolescents between the ages of 6 and 16. Upper secondary education is not compulsory, but anyone who has completed compulsory education has the right to enter an upper secondary school. Students are in general 16–20 years old. General academic education is primarily organized as a 3-year course leading to a matriculation examination, which is the general requirement to enter university. The length of the courses in vocational education varies, lasting from one semester to 10, but most prevalent are 3-year courses (Eurydice, 2025; Government of Iceland, 2025). To become a qualified teacher in Iceland and to get a license to teach in any of the three school levels, one needs to have a formal university degree in education (Law on education ..., No 95/2019).

Jónsson et al. (2021) explain how the current law on teacher education (95/2019) defined the requirements to become a qualified teacher. In the law it is stated that a student must complete a master's degree (total of 300 European credits, ECTS) and have both general competence (such as competence to create a motivating learning environment and evaluate the progress of students) and specific competence which consists of having completed at least 90 ECTS in a specific school subject.

There are different paths towards the license. The three most common paths are, first, a 3-year bachelor's degree in education and a 2-year master's in education; second, a bachelor's degree in any of the subjects of the schools and a master's degree in education; and third, a trade master (level IS13) plus a bachelor's degree in education. Whatever path one chooses to take, since

2019, one gets the license to teach at any of the three school levels; that is, there is currently only one type of teaching license in Iceland.

### **Information on Student and School Progress in Iceland**

The Ministry of Education is responsible for the evaluation and monitoring of educational institutions in the educational system in Iceland. There is no culture of school inspection similar to how many Western countries organize their data collection on schools' progress, including inspectors visiting schools, visiting classes and collecting information about both individual school curricula and actual practice.

External evaluation is organized by the Ministry of Education and can include evaluation of schools/institutions, evaluation of internal evaluation methods or other defined parts of school activities. Most aspects of the process belong under the auspices of the Directorate of Education and School Services. At the pre-primary and compulsory school levels, the municipalities are, by law since 2008, responsible for their own evaluation of schools and school activities (Government of Iceland, 2011). This approach seems practical, keeping in mind the size of the nation. The general guidance of this school self-evaluation includes addressing if the self-evaluation is formal, is holistic and reliable, and if it is collaborative, reform-oriented and both institution- and individually-focused. The self-evaluation should also be descriptive, analytic and public (Government of Iceland, 2011). Despite these good intentions, the Icelandic municipalities differ in size and capacity to fulfil this role. Thus, many municipalities have relied on data from standardized national exams for grades 4, 7 and 9 in both the Icelandic language and mathematics, indicating how well their students are doing according to curricular requirements. Since the abolishment of the national standardized exams in 2020, no such data are available and are not foreseen, according to the policy of new assessment criteria since 2024 (Ministry of Education and Children, 2024). In fact, in the year 2025, the only standardized information available in Iceland about student performance

in key academic subjects are the PISA results (Programme for International Student Assessment). The PISA test is an extensive international test assessing 15-year-old students' reading comprehension, and their literacy in science and mathematics. The Icelandic results show a steep 15-year decline in all three parts, with Iceland scoring the far lowest of the Nordic countries (Government of Iceland, 2023).

As with the preschools and compulsory schools in Iceland, the upper secondary schools are obliged to do their own school self-evaluation. However, there are no standardized test across the Icelandic upper secondary schools in any subject so far. This means there are no formal criteria of what competences, skills and knowledge graduating students from academic study lines have when they finish their matriculation “exams.” The actual exam in this context is to have finished a certain number of credits, and the number of compulsory credits in each subject varies between study lines.

## **ESD Policies and Practice in Iceland**

Policies on Education for Sustainable Development (ESD) in Iceland come mainly from three sources. First, from the Law on Pre-School (No 90/2008), Law on Compulsory School (No 91/2008) and Law on Upper Secondary School (No 92/2008); second, a general section of the national curriculum which is the same for all three school levels (e.g., the Icelandic national curriculum guide for compulsory schools: General section, 2011), where each school level has its own section, for example, the compulsory school level has a section about subject areas, which was revised in 2024 (Government of Iceland, 2024a). The third source of policy concerning ESD in Icelandic schools is a white paper on educational reform from 2014 (Ministry of Education and Culture, 2014).

In Iceland preschools, compulsory schools together with music schools fall under the responsibility of each municipality. In the year 2025, there were 264

preschools in the country and 174 compulsory schools. The associations of municipalities state they follow the governmental agenda for climate change issues and the Sustainable Development Goals (SDGs) (Government of Iceland, 2021), and larger municipalities (measured in number of inhabitants) have plans to conduct *Voluntary Local Reviews*, reports on the progress for each SDG. Also, the association of municipalities promotes the governmental website on the SDGs including explanations of the SDGs, a dashboard with Icelandic progress, and some Toolboxes for the SDGs, both for municipalities and companies. The association of municipalities include in their own website and reports links to the website of the United Nation Association Iceland which provides translated teaching material to be used in formal and non-formal education contexts for age levels of the three school levels (United National Association Iceland, n.d.-c). This source of ESD information is one of the two major resources teachers and other educators have access to, including verified quality material on ESD.

The upper secondary schools in Iceland are the responsibility of the state, not municipalities, and thus are funded by the state. The number of upper secondary schools in the country is 27 and, like preschools and compulsory schools, each school has to receive accreditation from the Ministry of Education. There are four main types of upper secondary schools, including 3-year academic studies for a matriculation exam (although not standardized), diverse types of vocational education, and various types of art education. Additionally, many upper secondary schools provide study lines for those who managed to graduate from compulsory school with minimal grades (Government of Iceland, 2024b). The preschool and upper secondary school levels are not compulsory in Iceland.

## **Sustainability in the Laws on Education in Iceland**

A Nordic report on the implementation of UN SDG 4.7 in compulsory education aimed to provide an overview of how well each of the Nordic countries

had integrated the UN SDGs into their educational policies and practices (Jónsson et al., 2021). The main focus of the report was on the SDG 4 sub-goal to “ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture’s contribution to sustainable development.”

Although the concept of sustainability is not explicitly mentioned in the current laws, from 2008, these laws address issues such as democracy, human rights, equality, and respect for nature which are elements of sustainability education (Pálsdóttir, 2014). The law seems silent on nature, the natural environment, and the climate, as either an important subject or as an issue of concern for the educational system (Jónsson et al., 2021). As Jónsson et al. (2021) explained, there is a separate chapter in the law for compulsory school that deals with educational content, organization, course offerings, evaluation, and operating time. A list of 12 subjects or subject areas are introduced on which the national curricula should elaborate, but it remains almost entirely within the cognitive domain. However, the law itself says little about this but points to a subsequent specification in the national curriculum (pp. 21–22).

Jónsson et al. (2021) explained how the curriculum from 2011 places a strong emphasis on sustainability understood in a way similar to the one given in the Brundtland report from 1987. Also, the curriculum goes beyond the cognitive domain to the intentional domain by emphasizing *action competence* as an aim of ESD when emphasizing “the role of schools to develop active and responsible students along with their capability to make decisions. Focus shall be on critical examination of issues rather than teaching specific knowledge” (Jóhannesson, 2017, p. 3; see also Pálsdóttir, 2014). However, Jónsson et al. (2021) explained, there is no clear indication of the curriculum advancing towards

“transformative level of learning, both at individual and whole society levels, that radical movement towards sustainability requires.” Then, to summarize the actual support for this policy in schools, Jónsson et al. (2021) pointed out that the Ministry did not initiate much implementation of the policy apart from short books published on each of the six education pillars.

## **Sustainability in the Icelandic Curriculum**

The present national curriculum guide is from 2011, and includes three different guides, one for preschools (2–5 years), one for compulsory schools (6–16 years), and one for upper secondary schools (16–19 years).

Although very different, these three have one general section in common which has not been revised since its publication in 2011. In this section, six general education pillars are introduced: (1) democracy and human rights, (2) sustainability, (3) equality, (4) creativity, (5) literacy, and (6) health and well-being (Ministry of Education, Science and Culture, 2011). These education pillars refer to social, cultural, environmental and ecological literacy so that children and youth may develop mentally and physically, thrive in society, and cooperate with others. The education pillars also refer to a vision of the future, and the ability and will to influence and be active in maintaining society, changing it and developing. Thus, the education pillars are socially oriented as they aim to promote increased equality and democracy and to ensure well-educated and healthy citizens, both for participating in and for changing and improving society, and also for contemporary employment (Ministry of Education, Science and Culture, 2011).

As explained in the general part of the curriculum, each of the fundamental pillars derives from Icelandic laws on preschool, compulsory school, and upper secondary school. Reference is also made to other laws including legal provisions for education and teaching in the school system, such as in the act on Equal Status and Equal Rights of Women and Men, no. 10/2008. In addi-

tion, government policy in various issues is considered, for example, welfare for the future regarding important policy issues on sustainability. Iceland also considers international conventions, for example, the United Nations Convention on the Rights of the Child and the Policy of International Institutions, of which Iceland is a member. Here the UNESCO policy on general education and sustainable development is an apt example, as is also the Council of Europe policy on democracy and human rights. In formulating the policy that appears in the definition of the fundamental pillars, the idea of teacher professionalism is also considered, as well as the developmental work that has been carried out in Icelandic preschools, compulsory schools and upper secondary schools (Ministry of Education, Science and Culture, 2011).

In addition to the six education pillars, the general section for all school levels introduces and explains a competence criterion defined at the completion of Grades 4, 7 and 10 of the compulsory school level. They are divided into five categories, namely expression and communication, creative and critical thinking, independence and cooperation, using media and information, and responsibility for and evaluation of one's own education (Ministry of Education, Science and Culture, 2011).

In SDG 4.7, six different elements are mentioned as belonging to the general aim of acquiring knowledge and skills needed for sustainable development. These are human rights, gender equality, sustainable lifestyles, appreciation of cultural diversity, promotion of a culture of peace and non-violence, and appreciation of culture's contribution to sustainable development. The content of these elements is visible in the six Icelandic education pillars (Ministry of Education, Science and Culture, 2011).

In the general section of the national curriculum, it is also explained that the education pillars are not to be a particular subject taught in schools as well-defined units within and framed by the school timetable. That would be against the core idea of ESD as defined by the United Nations. The principal

aim of the education pillars is to be an intrinsic part of school activities and to appear as a whole institution approach. The conception is that the pillars are to be reflected in the working methods, communication and atmosphere of schools, and should be evident in all educational activities. It is clearly stated in the curriculum that in evaluating school activities, such as in school self-evaluation, the influence of the education pillars on teaching, play, and studies has to be taken into consideration, and to what extent the education pillars are an intrinsic part of school activities. This means that the pillars are to be interwoven into the content of school subjects and fields of study, both regarding the knowledge and the skills that children and youth are to acquire (Ministry of Education, Science and Culture, 2011).

In this way, the education pillars in the Icelandic curriculum, of which sustainability is one, should be an intrinsic part of all school practice at all school levels (Ministry of Education, Science and Culture, 2011). Further, it is stated in the curriculum that the education pillars should: 1) Guide the choice of material and content of study, teaching and play to reflect the education pillars; 2) Influence the working methods and techniques that children and youth learn; 3) Be the base of procedures teachers and other school personnel design and act on, thus encouraging independence, initiative and development of school activities; and finally, 4) Be what school activities are evaluated by, that is, it should be observed whether and how the education pillars are reflected in study, teaching and play. This can necessitate unconventional teaching methods and unusual approaches to school activities (Ministry of Education, Science and Culture, 2011, pp. 14-15).

This means that the organization of each day, week, month and school year is to reflect the comprehensive overview formulated in the education pillars. Therefore, in school activities it is important to approach tasks in an integral manner, applying professional broadmindedness and, when appropriate, interdisciplinary methods (Ministry of Education, Science and Culture, 2011).

In line with Nordic curriculum emphasis, the Icelandic education pillars are based on the idea that active democracy is unobtainable without literacy of the diverse symbolism and communication systems of society. They are also based on the idea that active democracy can only flourish if simultaneously every form of equality between individuals and groups in society is supported. Human rights will not be ensured, except by supporting individual health and welfare and by fighting discrimination and every form of violence, including bullying (Ministry of Education, Science and Culture, 2011).

The general section of the national curriculum guide from 2011 had few stipulations about sustainability and Education for Sustainable Development (ESD) than the above explained education pillar (Jóhannesson, 2017). When analyzing the specific school-level sections, little evidence or indications of the concepts of sustainable development and sustainability were found, except in the subject area section for the curriculum for compulsory schools. Ideas on sustainability tended to appear in various ways, depending on the school level, but differed also according to subject area of the compulsory schools. As Jóhannesson (2017) explained, the application of the terms appeared as incidental and fragmented in the different sections, compared to what was said in the general section on the education pillars. The natural sciences subject area seemed an exception, including, for example, groups of competence criteria entitled *Action competence* and *A healthy environment*. Ideas relating to consumer education in the spirit of the education pillars are to be found in a few of the compulsory school subject areas (Jóhannesson, 2017).

Although there are a variety of priorities evident in ESD internationally, it is important to note that sustainability, as an education pillar of the 2011 Icelandic curriculum, including emphasis on ESD, prioritizes the development of student *action competence* (í. geta til aðgerða), with reference to the present and future role of being responsible citizens (Ministry of Education, Science and Culture, 2011).

The concept of *action competence* originates from Danish scholars, focusing on building an individual's capabilities to deal with unforeseen complex situations, such as wicked problems. The aim is creating a society of collective responsibility where individuals develop as active citizens, conscious of their own values, attitudes and feelings for global impact and equality of all the inhabitants of the earth (Pálsdóttir, 2014). Interwoven is the idea that critical engagement around every task must be evaluated on the basis of its educational value, regardless of whether the world will be improved with the help of the student contribution. For example, a school does not become “green” simply by conserving energy, collecting used batteries or sorting out waste. The crucial factor must be what the students learn by participating in such activities, especially in terms of thinking critically about the most appropriate outcomes and processes needed to achieve these outcomes. Thus, the focus on the development of action competence requires a significant shift in both teaching and learning – a learning shift from providing students with knowledge, to a focus on enabling them to build competences to make decisions responsibly for the benefit of all (Pálsdóttir, 2014). This emphasis on action competence is clearly in line with UNESCO's eight *key competences* necessary for achieving all SDGs (UNESCO, 2017, p. 10) which are:

- **Systems thinking competence:** the abilities to recognize and understand relationships; to analyze complex systems; to think of how systems are embedded within different domains and different scales; and to deal with uncertainty.
- **Anticipatory competence:** the abilities to understand and evaluate multiple futures – possible, probable and desirable; to create one's own visions for the future; to apply the precautionary principle; to assess the consequences of actions; and to deal with risks and changes.
- **Normative competence:** the abilities to understand and reflect on the norms and values that underlie one's actions; and to negotiate sustainability values, principles, goals, and targets, in a context of conflicts of

interests and trade-offs, uncertain knowledge and contradictions.

- **Strategic competence:** the abilities to collectively develop and implement innovative actions that further sustainability at the local level and further afield.
- **Collaboration competence:** the abilities to learn from others; to understand and respect the needs, perspectives and actions of others (empathy); to understand, relate to and be sensitive to others (empathic leadership); to deal with conflicts in a group; and to facilitate collaborative and participatory problem solving.
- **Critical thinking competence:** the ability to question norms, practices and opinions; to reflect on own one's values, perceptions and actions; and to take a position in the sustainability discourse.
- **Self-awareness competence:** the ability to reflect on one's own role in the local community and (global) society; to continually evaluate and further motivate one's actions; and to deal with one's feelings and desires.
- **Integrated problem-solving competence:** the overarching ability to apply different problem-solving frameworks to complex sustainability problems and develop viable, inclusive and equitable solution options that promote sustainable development, integrating the above-mentioned competences.

(UNESCO, 2017, p. 10)

These key competences are seen as crucial to advancing sustainable development and representing cross-cutting competences that are necessary for all learners of all ages worldwide (developed at different age-appropriate levels). Key competences can be understood as transversal, multifunctional and context independent. They do not replace the specific competences necessary for successful action in certain situations and contexts, but rather encompass them and are more broadly focused (UNESCO, 2017). If these eight key competences are compared to competence criteria defined at the completion of

Grades 4, 7 and 10 in the Icelandic curriculum, clear consonance can be seen. There is clear emphasis on critical thinking, collaboration and ability to reflect on the present situation and possible future scenarios.

In the school-level section specifically for pre-schools, from 2011, the concept of sustainability and ESD is addressed as one of the guiding lights of pre-school practice. The concept is discussed in the learning area “Sustainability and science,” where it is connected to all sustainability pillars. The concept is not mentioned in other chapters on literacy and communication, creativity, democracy, equality, culture, nor on health and well-being. In an analysis of 16 pre-school curriculum plans, Norðdahl (2020) found that while preschool curriculum plans include ESD, their interpretations of sustainability were typically not broad enough to match the recommendations of the national curriculum guide. Rather, they focused on environmental and economic issues with scarce attention to the socio-cultural aspects of sustainability and children’s participation (Norðdahl et al., 2024).

In a revised section on subjects for compulsory schools, published in 2024 (Government of Iceland, 2024a), the concept of sustainability appears 30 times in parts about languages, sciences, social science, arts, home economics and life skills. However, the SDGs [í. *heimsmarkmið*] are not mentioned at all in this revised section.

As one of the third type of policy papers, in addition to laws and curricula, the Minister of Education published a White Paper on Educational Reform in 2014 after one year in office. Jónsson et al. (2021) explained their analysis of this paper, and stated that it presents a sharp turn away from the social and environmental emphasis of the 2011 curricula towards a more individualistic and narrower concept of education. The concept of sustainability appears once in the document in the introduction, describing international discourse about important individualistic competences. In recent sources of information about government policy or priorities in education, this white paper is rarely cited or

used as an example of what path to walk.

## **Sustainability in Icelandic – Recent Education Policy**

Although not mentioning the SDGs in the national curricula nor the law on education, the Icelandic government has vaguely sharpened its education policy to further the SDGs. In an Icelandic governmental document, Education Policy 2030 (EP2030) (OECD, 2021), the concept of sustainability and ESD appears three times. First, referring to sustainable development, second in the meaning of maintaining or sustaining the policy, and third in the context of competitiveness and preservation of the Icelandic education system (OECD, 2021). The text emphasizes five main educational focus areas, namely Equal opportunities for all, Superior teaching, Skills for the future, Putting well-being first, and Quality at the forefront. Indications of what schools must do is provided; for example, consider the needs, abilities and aptitudes of each student, and provide appropriate help and support before problems become significant. Also, the role and responsibility of parents are emphasized. However, the purpose of ESD, and how to advance the SDGs and support teachers in doing so seems quite vague in the policy. The positive aspect of the policy is that it is in line with the UNESCO emphasis on the SDGs and the eight key competences needed to advance and achieve these competences (UNESCO, 2017). The policy is introduced with action plans in three steps, 2021–2024, 2024–2027, and 2027–2030. The first one is available. No indications of sustainability or ESD is visible in the first action plan, which introduces nine actions to be achieved in 2024.

Reviewing the first action plan for the recent Icelandic Education Policy 2030, Gunnþórsdóttir and Jóhannesson (2023) argued how this first action plan is a compilation of actions and work components with little or no prioritization, nor is it placed in the context of other current policy documents. There are many stakeholders introduced but no explanation of the document being intended for all those parties listed, or if it is mainly conceived to be a working

paper for the Ministry of Education and Children. Teachers are not directly addressed as parties to implement these actions in the two main actions (nr 6 and 8) which have direct bearing on school activities. In their analysis, Gunnþórsdóttir and Jóhannesson (2023) point out some contradictions, for example Action 6, which name is Critical thinking, creativity and comprehension. The name of the action does not correspond with the content, which is about teaching to read, minimum teacher competence in Icelandic, revision of competence criteria in the national curriculum guidelines for Icelandic, libraries, etc. They also point out the complete silence about sustainability and ESD, adding that it could be put into focus in two later actions plans. In sum, Gunnþórsdóttir and Jóhannesson (2023) state that the proposed legislation (EP2030) represents reasonably clear objectives. “The action plan, however, is first and foremost a collection of activities which are regarded as disjointed, and it is probably a matter of coincidence what was left out and what was included” (p. 9). This indicates clear disappointment in the first action plan for the Icelandic Education Policy 2030 (EP2030).

The role of educational authorities and their responsibilities in fulfilling the EP2030 policy seem unclear except in one place where external reviews of schools are stated to be the responsibility of the ministry. The main criticism by the OECD of the EP2030 is the lack of actionable implementation strategy, that is, who is to be responsible for what, when and how (OECD, 2021). This counts especially for the emerging curricular area of sustainability and ESD, which is not a subject in the Icelandic curriculum, and thus does not get allocated time in each school timetable. In sum, the main criticism of this policy paper is that the actual role and responsibility of the Icelandic educational authorities, both the ministry and the municipalities, seems to lack clear indications of who should do what and how, and how these are to be funded. As Eurydice (2023) explains, the Icelandic educational authorities, at the state and municipal levels, have adopted the policy of encouraging teachers themselves to bring about innovations and initiate developmental and in-service training

projects. It is not difficult to argue how this is a weakness in advancing sustainability and ESD in Icelandic schools.

The mean age of teachers in Iceland is high, indicating an aging workforce and low recruitment of teachers at all school levels (Government of Iceland, 2019b). Many Icelandic teachers have limited access to professional development opportunities. This is put in focus in Eurydice's (2023) analysis that states there is no single comprehensive legislation that applies to the professional development of teachers and their further education. Provisions concerning in-service training for pre-primary, compulsory and upper secondary teachers are in their wage-contracts, in laws and regulations for individual teacher education institutions, and in central legislations on individual school levels. Keeping in mind the smallness of Icelandic society and the size of the country, it also raises questions concerning how municipalities are to fulfil their role and responsibility of own school self-evaluation and school activities. This is particularly pressing since neither compulsory schools nor municipalities have standardized data on how well their children, schools or municipalities are doing in terms of the learning outcomes of the national curriculum. Icelandic national exams for compulsory schools were abolished in 2022 and the development of new assessment criteria [i. matsferill] is aimed at being ready for use in the 2025–2026 school year (Ministry of Education and Children, 2024). The new assessment criteria are planned to be a collection of short electronic exams or assignments, and each school can choose which ones to use though some obligatory exams in Icelandic and math (Ministry of Education and Culture, 2020).

## The Status of ESD

In Iceland, teachers have considerable freedom of how they work towards the learning outcomes of the curriculum. This means the professionals in schools have full trust to implement and realize the curriculum according to their student needs. There are no mandatory teaching approaches or obligatory teaching material to be used. However, the selection of teaching material is very limited in Iceland, particularly in emerging curriculum areas such as sustainability.

No comprehensive research or evaluations exist of the situation regarding what and how sustainability is implemented in Icelandic schools or what approach Icelandic teachers have chosen in ESD. There are some examples to be found, but these only give insights into what teachers and municipalities are willing to present. As previously explained, there is no culture of inspection in Icelandic schools, and ESD and the SDGs have not been prioritized for school self-evaluation.

All schools are to implement the national curriculum, of which sustainability is not a subject but an education pillar to be interwoven into all school aspects. In the school-level-specific sections of the national curriculum, only the section for compulsory school subjects has been updated since the publication of the SDGs in 2014. In the newly revised subject section, there is no mention of the SDGs, either in subject fields like social sciences or the natural sciences (Government of Iceland, 2024a).

Sustainability is not a subject within the national curriculum and thus is not allocated special time within each school timetable. However, some secondary schools provide an obligatory one-term course on environmental science with a focus on enhancing students' environmental literacy (Jóhannesdóttir, 2020). For pre- and compulsory schools, it is up to the teachers and school administrators to decide how they implement the education pillar of sustainability in

their schools.

However, the signs of the SDGs and emphasis on ESD is clearly written in the education pillars of the Icelandic curriculum. The law on compulsory education from 2008 has very limited direct mentions of sustainability, but elements related to sustainability, such as democracy and equality, are mentioned without further elaboration. Jónsson et al. (2021) argued that although sustainability education has a clear application in the fields of social and political life and economic activities in all of the Nordic countries, it is still the case that when ESD is discussed, an environmental perspective is most often taken. This may be due to the fact that ESD originated as a concern in schools within environmental education and it still has some of the character traits as a subject area within the environmental sciences.

## **Actions Taken and Performance Achieved for ESD**

### ***Priority Action Area 1: Advancing Policy on Sustainability and ESD***

The SDGs are not visible in education policy in Iceland, either in laws or in curricula for any of the three school levels. The newly revised compulsory school curriculum (in 2024) still has sustainability as one of six fundamental pillars of education. This is emphasized by the educational authorities in Iceland which explicitly declare how important this pillar of education is for the whole country while also keeping it as a mandatory educational pillar that all schools in all municipalities in the country have to implement.

However, advancement of the aims of the UN SDGs' systematic emphasis on transformative learning is needed in Iceland. That will require material support and participatory continuous learning opportunities for teachers, together with policy with realistic and funded action plans by the government.

## ***Priority Action Area 2: Education and Training Settings***

An ESD whole-institution approach is mandatory for all schools since sustainability is one of six fundamental pillars of education in the national curriculum. This emphasis requires all educators to organize their work with pressing issues of sustainability. These include pupils getting opportunities to know, understand and respect nature, both because of its intrinsic value and because of the service it renders mankind. Environmental protection, climate change and biodiversity are examples of tasks to be tackled. From a social perspective, this ideology concerns equality, both intragenerational and transgenerational. In order to obtain equality, democratic methods have to be employed, the diversity of mankind respected, and multiculturalism ensured.

To transform the knowledge of their own school's situation, several Icelandic compulsory schools have used a validated evaluation tool, the Sustainability Education Implementation Questionnaire (SEIQ), made to understand the constraints and contributors to the implementation of sustainability as an education pillar at the compulsory school level in Iceland. Findings provide educators collectively with information on the current situation and course of improvement for working with sustainability education in each school (Pálsdóttir, 2014). This collective self-evaluation is optional and it is in the hands of each school to decide if they do it.

The role of teaching material in schools is crucial for quality practice in schools, whether only used by teachers when preparing teaching or as part of in-class work with students. All teaching material for Icelandic compulsory schools is free of charge.

The production of teaching material for compulsory schools in Iceland such as textbooks (and e-books), workbooks, and interactive websites are in the hands of the Directorate of Education and School Services (2025). Due to the smallness of the population and its language, teachers for each grade have very

limited selection of books, either textbooks or workbooks, and it is very common that for each grade in each subject there is only one title available. Consequently, it is common practice for compulsory and upper secondary school-teachers in Iceland to create their own material for their teaching, including worksheets, assignments and exams.

The SDGs and sustainable development have been addressed in the Icelandic language in two main teaching sources. First, the Directorate of Education and School Services has legal responsibility for producing teaching material for Icelandic compulsory schools. The Directorate has produced titles about the SDGs and sustainable development. Some examples are a series called *Hello World*, books (and e-books) with teaching guidelines for grades 1–4. For the older grades, the titles address individual issues ranging from environmental and science problems, food waste, the Convention on the Rights of the Child, and social justice issues (Directorate of Education and School Services, 2025).

Second, the United Nations Association Iceland [í. *Félag Sameinuðu þjóðanna*] has actively provided translations of teaching material for the Icelandic context, particularly material from the other Nordic countries. The teaching material provided is organized by each SDG (see <https://un.is/kennsluefni/>) and by each of the three school levels. This Nordic collaboration provides Iceland with diverse types of teaching material that has been translated into Icelandic, the language of 400,000 people living on an island in the North-Atlantic Ocean.

The third source is a website, not widely used in Iceland yet, but which offers a growing collection of material that is gaining further attention from educators. The website is “Nordic Schools” (Norden i skolen, n.d.) and it provides free teaching ideas and teaching plans for compulsory and upper secondary schools in languages, history, social sciences, natural sciences, music and visual arts (Norden i skolen, n.d.). Its aim is to strengthen the Nordic relations and cultural literacy through free teaching material and ideas to further collab-

orate between schools across the Nordic countries. Many SDG-related topics are addressed and have been translated into Icelandic. Most of them are parts of themes in social sciences or natural sciences.

Teaching material for upper secondary schools is not free of charge and must be paid for by individuals. The publication of textbooks is mainly in the hands of private book publishers that specialize in books for upper secondary level. However, it is not uncommon that each secondary school (or individual teachers within these schools) make their own textbooks that students need to buy.

### ***Priority Action Area 3: Building Capacities of Educators***

A focus on empowering educators with the knowledge, skills, values and attitudes needed for the transition to sustainability school projects is common in the Nordic countries. These projects include teacher collaboration within schools, between schools and through university-school partnerships. Several projects, both funded and non-funded, have been administered in Icelandic schools, pre-schools, compulsory schools and upper secondary schools. Two research-based ESD projects including several schools in different locations in Iceland are worth mentioning.

The first is the ActionESD project which took place in 2007–2009 before much emphasis on education policy for ESD became evident in many countries' policies. In the ActionESD project, it was found that the university-school partnership provided an “interactional space” for discussion, and the use of ESD tools increased the capacity of teachers to deal with ESD in many and varied ways. In-school collaboration was important as well. There was also provision for advisers from the research team to work with schools, not in a directive manner, but as resource persons and co-learners (Pálsdóttir, 2014). One of the most valuable contributions of the advisers was to introduce to schools a tool: a curriculum analysis key (Jóhannesson et al., 2011). This key served as an artefact with which the existing activities could be analyzed, ex-

tending the understanding which teachers had of ESD (Pálsdóttir & Macdonald, 2010).

The second research-based ESD project is the ENSI project, which was also a university-school partnership. The aim was to support teachers in developing ESD in their practice in schools using a Quality Criteria (QC) framework for evaluation focus. The key elements included “Looking back, around and then forward” (Macdonald et al., 2018). The framework for reflections, with teachers, between teachers in schools and between schools is presented in Figure 2.

**Figure 2** Framework for reflections based on the Quality Criteria for ESD

<b>Sites of action for ESD within QC In and interaction between QC</b>		<b>Questions about ESD</b>		
<b>Quality Criteria (See Table 2)</b>		<b><i>What were we doing before we joined this project?</i></b>	<b><i>What did we do at our school this year?</i></b>	<b><i>What will we do next year?</i></b>
<b>1</b>	<i>Learning and teaching (classroom)</i>			
<b>2</b>	<i>School (as an organisation)</i>			
<b>3</b>	<i>Community/local society</i>			
<b>1, 2</b>	<i>Learning/teaching in interaction with the school organizations</i>			
<b>2, 3</b>	<i>The school interacting with local society</i>			
<b>1, 3</b>	<i>Learning and teaching linked to the community/ society</i>			
	<b>Our future vision</b>	<b>What was it?</b>	<b>What is it?</b>	<b>What could it be?</b>

Both of the abovementioned research-based ESD projects, the ActionESD (Pálsdóttir, 2014) and the Quality Criteria (Macdonald et al., 2018), have served as a support in collaboration with and between teachers in how sustainability can be incorporated into each school curriculum and practice. They provide support for the implementation of an ESD curriculum, provide examples of sustainability, and expose opportunities that lie in the nooks and crannies of the curriculum, the classroom, the school or the community (Macdonald et al., 2018).

The third, worth mentioning, are the aforementioned two supportive tools, the curriculum analysis key (Jóhannesson et al., 2011) and the Sustainability Education Implementation Questionnaire (SEIQ), which is a validated evaluation tool for whole-school analysis of the constraints and contributors to the implementation of sustainability at the compulsory school level. The SEIQ, which is optional, provides educators collectively with information on the current situation and course of improvement for working with sustainability education in each school (Pálsdóttir, 2014).

#### ***Priority Action Area 4: Empowering and Mobilizing Youth***

The focus of the fundamental pillars in the Icelandic curriculum refer to social, cultural, environmental and ecological literacy so that children and youth may develop mentally and physically, thrive in society and cooperate with others. This view of the individual refers to a vision of the future, the ability and will to influence and be active in maintaining society, changing it and developing. This view recognizes young people as key actors in addressing sustainability challenges and the associated decision-making processes (Ministry of Education, Science and Culture, 2011).

Education is an essential means of nurturing young people's ability to recognize and understand complex social and environmental problems and of motivating them to act (Guðjohnsen et al., 2024). In much recent research in Ice-

land, the aim has been to understand young people's (aged 14–18) civic and global concerns, their educational and social participation opportunities, and factors influencing their civic and sustainable behaviors. Findings have shown that school participation predicted students' emphasis on good citizenship, as did their societal discussions with others, and habits of staying informed and following news. Students' environmental engagement and parental granting of autonomy also predicted young people's pro-environmental behavior and sustainable lifestyles. What is probably most important in these findings is that students' sense of social justice turned out to be a key predictor of their good citizenship and pro-environmental behaviors, suggesting that social justice is a key element motivating young people to take interest in common and global welfare, develop sustainable mindsets, and become agents of change (Guðjohnsen et al., 2024). That gives strong indications of how to empower and mobilize youth; that is, for ESD and for promoting the SDGs, the educational focus should be on social justice, what it includes, and how it can be implemented and sustained.

Guðjohnsen et al. (2024) explain how a theory of justice can serve as the basis of practical reasoning with students about what might count as instances of injustice and how they might be reduced. This invites educators to engage their students in reflecting critically on their local surroundings with a global perspective. Such a reflection could bring together concerns of sustainability, citizenship, and character, and abilities to engage in critical discussion and to reflect on one's own relationships with both the human and more-than-human. Competences gained through such participation would be strongly in line with UN Key competences for ESD (UNESCO, 2017). A comparative conception of social justice might help to systematize a holistic approach and give it motivational force that helps young people to take interest in common, global well-being, develop sustainable mindsets, and become the agents of change that the world so desperately needs (Guðjohnsen et al., 2024).

### ***Priority Action Area 5: Accelerating Local Level Actions***

In Iceland, all compulsory schools have the national curriculum to use as their foundation but have ample space to elaborate on their own school curricula, for example, considering their own local environment, culture, history and human resources.

In the Icelandic curriculum, the international ESD emphasis on “thinking global – acting local” is a fundamental approach. At the end of compulsory school, students should have acquired diverse knowledge, skills and competences. Some examples are the following. First, students are to acquire *knowledge* of social values, morality, human rights and equality, as well as knowledge concerning being an active citizen in a democratic society, and knowledge concerning the Icelandic environment in a global context (e.g., culture, society, nature, sustainability). Second, students are to acquire *skills* to express themselves clearly, responsibly and creatively, use different techniques for acquiring and communicating knowledge in a responsible and critical manner, be able to use various study methods, and treat their environment with sustainability in mind. Third, at the end of compulsory schooling, students are to have the *competence* to respect the values of life, human rights and equality, to show respect for the environment in a global context, and to have a responsible attitude towards their own welfare, both physical and mental. They are also to have acquired the competence to be an active and responsible citizen in a democratic local community and in society as a whole, and to have acquired competence to link their knowledge and skills with everyday life, technology and science (Ministry of Education, Science and Culture, 2011).

One example of many Icelandic school practices where students study the local environment and put their findings in a global context is by the compulsory school in Hvolsvöllur in the south of Iceland (Hvolsskóli, 2024). For over a decade, groups of students in grades seven and eight, with their teacher and with support from the local rescue team, conducted glacier on-site measure-

ments, mapping the distance the glacier Sólheimajökull retreated each year (Atlantbib, 2024). The learning acquired provided the students with diverse multidisciplinary knowledge, skills and competences. They analyzed their own local environment and put their findings into a global context, here in the context of climate change. Such local-level actions provided transformative learning opportunities and clearly emphasized the importance of actions in the community.

## **Key Themes in ESD**

### ***Indicator of National ESD***

The concept of sustainability is not explicitly mentioned in the current laws (from 2008) for Icelandic preschools, compulsory schools or upper secondary schools, but sustainability is one of the six educational pillars of the curriculum, making it an intrinsic part of all school activities. Sustainability is not to be a subject with allocated space in the timetable, but to be reflected holistically in the working methods, communication and atmosphere of schools. Sustainability concerns the interplay of the environment, economy, society and welfare, and includes respect for the environment, a sense of responsibility, health, democratic working methods and justice, not only at the present time but also for future generations. Therefore, it is unthinkable to support human rights without simultaneously espousing sustainability and balanced social development.

There is a strong curricular emphasis on student *action competence*, indicating the role of schools to develop active and responsible students along with their capability to make decisions. The focus should be on building individuals' capabilities to deal with unforeseen complex situations, such as wicked problems, enhancing collective responsibility of individuals being conscious of their own values, attitudes and feelings for global impact and equality of all the inhabitants of the earth.

The key predictor of young people's good citizenship and pro-environmental behaviors is students' sense of social justice. This suggests that social justice is a key element motivating young people to take interest in common and global welfare, develop sustainable mindsets, and become agents of change. This could be an underestimated factor for advancing ESD in the Nordic context.

About 200 schools in Iceland, at all three school levels and universities, have participated in a formal education opportunity provided through the Eco School movement (Landvernd, 2025). In Iceland this program is administered by Landvernd, an NGO focused on nature protection and conservation. This program provides a seven-step framework to address 10 issues. On the Icelandic website, these are consumption and circular economy, energy, local environment and landscape, public health, climate change and transport, global justice, nature protection, water, biodiversity, and ecosystem retrieval (Landvernd, 2025). The participating schools plan and connect their activities to three or more of these Eco-Schools Topics, and if proceeding sufficiently they are rewarded the green flag (Ecoschools, n.d.).

### *Competence*

The Icelandic curriculum prioritizes the development of student *action competence*, with reference to the present and future role of being responsible citizens in a democratic society. This is clearly stated in the section about sustainability as an education pillar, and is also closely linked to the pillar on democracy and critical thinking. This is also emphasized in the Icelandic national curriculum in the section about the competences. The competences are expression and communication, creative and critical thinking, independence and cooperation, using media and information, and responsibility for and evaluation of one's own education, and are in clear consonance with the emphasis on *action competence* and the UN's eight key competences.

When comparing the curricular concept of *action competence*, which has a

clear focus on building an individual's capabilities to deal with unforeseen complex situations such as wicked problems, critical engagement around every task is imperative. The message is that every task given to students must be evaluated on the basis of its educational value, focusing on what the students learn by participating in selected activities. This emphasis is very much in line with the UN key competences for achieving the SDGs. For example, when students reflect on what they have learned through participating in measuring glacial retreat, they strengthen their *systems thinking competence* through recognizing relationships and analyzing complex weather systems. They also strengthen their *anticipatory competence* when collectively trying to understand and evaluate multiple futures, and when doing so they also enhance their *normative competence* when reflecting on norms and values that underlie people's actions. Through such reflection, search for explanations and creating meaning, they enhance their *self-awareness competence* through pondering on their own role in society, and their *integrated problem-solving competence* grows when applying different problem-solving frameworks to complex situations such as glacier retreat. Overall, the project on measuring glacial retreat strengthens their *critical thinking competence* since they get time and space to question norms, practices and opinions, and their own values.

## ***Curriculum***

Sustainability and ESD is one of six fundamental pillars of education that are part of obligatory formal education for the three school levels: pre-schools, compulsory schools, and upper secondary schools. The section on sustainability within the general section of the national curriculum is one and a half pages. Further interpretation is in the hands of teachers who are viewed as professionals and are trusted as such. However, an open curriculum has its limitations. Teachers call for support both in terms of more diverse teaching material and professional learning opportunities to further implement such an

emerging curriculum area.

### ***Formal Education***

Sustainability and ESD is one of six education pillars of the national curriculum for preschool, compulsory schools, and upper secondary schools. Formal education, particularly compulsory schools, is obliged to integrate sustainability holistically into all their schoolwork and school ethos. In pre-compulsory schools and upper secondary schools, a more environmental emphasis seems to be the common practice. However, no comprehensive research on or inspection of ESD at all school levels has taken place in Iceland so far.

### ***Teacher Training***

The teacher profession is a regulated profession in Iceland. To get a license to teach at any of the three school levels, one needs to have a formal university master's degree in education and have both general competence (such as competence to create a motivating learning environment and evaluate the progress of students) and specific competence which consists of having completed at least 90 ECTS in a specific school subject. The total credits are 300 ECTS (180 for bachelor and 120 for masters). No obligatory courses are in all teacher training study lines, although teacher trainees must learn about the education pillars, of which sustainability is one of six. However, the University of Iceland, that educates by far the most teachers for preschools, compulsory schools and upper secondary schools in the country, has taken two important steps in ESD teacher training. First, an obligatory course for all teachers aiming to work in compulsory schools is a 5 ECTS course on pedagogy of ESD (called Education for sustainability – skills in a changing world). The purpose of the course is to work with conceptual issues in sustainability and global initiative, such as climate change, decrease in number of species, soil erosion and pollution. Special emphasis is on working with controversial issues and how to teach children to analyze problems, evaluate information and put forward

possible solutions. Second, is a newly formed 2-year master's teacher education program (120 ECTS) with a key focus on ESD. The program is called Sustainability Education (M.Ed.), and graduates are eligible for a teacher license in Iceland. In both the obligatory course and the master's program, the overall approach is to support teacher trainees to implement ESD as a holistic school approach but not as a separate subject that ends up on the shoulders of a few teachers.

For in-service teachers, the Icelandic educational authorities, at the state and municipal levels, have adopted the policy of encouraging teachers themselves to bring about innovations and initiate developmental and in-service training projects. It is not difficult to argue how this is a serious weakness in advancing sustainability and ESD in Icelandic schools.

### ***Non-Formal Education***

Although no comprehensive research or evaluation of non-formal education exists in Iceland, recent research by Becher (2024) gives some indications. She explored the extent to which environmental non-governmental organizations (NGOs) in Iceland were engaging in sustainability education (ESD). Non-formal educational contexts have received limited directive by international sustainable development agendas, but have been recognized as a promising context for ESD. Becher points out that environmental NGOs can play a crucial role in promoting sustainability awareness and action, leveraging their unique position to engage diverse stakeholders and foster collective learning and action. The findings revealed a focus on the environmental protection realm of sustainability and a diverse range of perspectives and educational practices among the environmental NGOs. While some organizations demonstrate a strong commitment to ESD, others exhibit limited awareness and engagement. Such findings speak to the importance of various contextual factors, such as priorities, operational constraints, and institutional frameworks in shaping the knowledge and implementation of ESD initiatives. Also, Becher

(2024) pointed out that non-formal educational contexts have received limited directive and guidance for ESD, and this could be a contributing factor for limited engagement by environmental NGOs in Iceland.

These findings support the statement that Environmental Education has a long tradition in Iceland, particularly related to nature conservation in NGOs like Land protection (í. Landvernd), see <https://landvernd.is/>, Bird protection (í. Fuglavernd), see <https://fuglavernd.is/> and institutions like Land and Forest Iceland (í. Land og skógur), see <https://island.is/s/land-og-skogur>. However, all of these NGOs are based on individual initiatives, although some tasks have been moved to institutions.

### ***Social Partnership***

Even though Iceland is a member of the United Nations and has agreed to advance the SDGs, it is up to municipalities and private companies to define and implement their own sustainability policies. Many companies have developed corporate social responsibility policies, and public institutions are obliged to define and implement equality policies (Directorate of Equality, n.d.), and their own sustainability policies, for example on energy use, sustainable land use, and waste management. No one overview exists of these policies, but some examples can be found within banks, tourist companies, energy companies, and transportation companies.

The Confederation of Icelandic Enterprise (SA) is an umbrella service organization for Icelandic businesses with a focus on negotiations of collective agreements with unions on wages and working conditions, the advocacy of an internationally competitive legal and regulatory environment, and the interpretation and communication of decisions by governmental authorities that directly affect the business environment (SA Confederation of Icelandic Enterprise, n.d.). This federation has promoted sustainability approaches to be included in all Icelandic business policies, covering four main issues: Simpli-

fication of rules, Deployment of economic incentives, Limitations of inflexible decisions, and an Environment that allows for innovation, particularly in areas of environmental and climate change issues. These emphases are followed up by conferences, an annual “Enterprises sustainability day,” and providing regulatory knowledge and guidance for the economic sector in how and to what extent they can strengthen their work towards a sustainable economic life.

## **Features of ESD in Iceland**

### ***Sustainability – An education pillar in the national curriculum***

In Iceland, ESD is not a subject with allocated time in school timetables like in many countries. Sustainability is one of six education pillars that refer to social, cultural, environmental and ecological literacy so that children and youth may develop mentally and physically, thrive in society and cooperate with others. Also, these pillars refer to a vision of the future, ability and will to influence and be active in maintaining society, change it and develop. The sustainability pillar includes a curricular concept of *action competence* to build an individual’s capabilities to deal with unforeseen complex situations, such as wicked problems, requiring critical engagement around every task. This education pillar, like the other five in the Icelandic curriculum, is to be interwoven into the content of school subjects and fields of study, both regarding the knowledge and the skills that children and youth are to acquire. To include such an educational view, a clear focus shall be on the critical examination of issues rather than on teaching specific knowledge.

### ***Environmental education is emphasized***

International and national research has revealed that ESD originated as a concern in schools within environmental education and still has some of the character traits as a subject area within the environmental sciences. Examples from Icelandic preschools and upper secondary programs show this emphasis, both

in teacher understanding of what ESD includes, and in environmental science programs for ESD in some upper secondary schools. This is a limited view of content and processes of ESD that needs further attention in schools and support for teachers.

### ***Social emphasis of ESD including democratic views***

The education pillars in the Icelandic curriculum are socially oriented as they are to promote increased equality and democracy and to ensure well-educated and healthy citizens, both for participating in and for changing and improving society, and also for contemporary employment.

In line with Nordic curriculum emphasis, sustainability is related to other education pillars and is based on the idea that active democracy is unobtainable without literacy of the diverse symbolism and communication systems of society. Nordic education pillars are based on the idea that active democracy can only flourish if simultaneously every form of equality between individuals and groups in society is supported. Thus, human rights will not be ensured, except by supporting individual health and welfare and by fighting discrimination and every form of violence.

### ***Social justice – A needed priority***

A strong indication of how to empower and mobilize youth, for example for ESD and for promoting the SDGs, the educational focus should be on social justice, what it includes, and how it can be implemented and sustained. Such a focus will help students in understanding what might count as instances of injustice and how they might be reduced. Such a focus invites educators to engage their students in reflecting critically on their local surroundings with a global perspective, and brings together concerns of sustainability, citizenship, and character, and abilities to engage in critical discussion and to reflect on one's own relationships with both the human and more-than-human. Compe-

tences gained through such participation would be strongly in line with UN Key competences for ESD.

### ***Evaluation of ESD practices is needed***

To better understand the constraints and contributors to the implementation of sustainability as an education pillar, systematic information is needed. Such a tool exists in Iceland (but its use is optional) and would give information that provides educators collectively with transformative knowledge of their own school situation and course of improvement for working with sustainability education in each school.

## **Trends and Issues in ESD in Iceland**

### **Trends**

#### ***Open curriculum guides***

The Icelandic curriculum guide is quite open and gives teachers freedom to organize their teaching in many respects. The curriculum is competence-based using learning outcomes, with no defined syllabus or obligatory instruction methods or use of teaching material. For example, the curriculum guide for compulsory schools, including the general section and subject section, is less than 250 pages. This type of curriculum has been debated, and some teachers want more support in terms of what to prioritize in the curriculum in relation to ESD, and continuous professional development regarding how to implement ESD in different curriculum areas and the whole school approach. There are no known plans to change the type of the present national curriculum to address teacher requests for more detailed support and information of what and how to work. Also, there are no centralized plans for supporting teachers

in the continuous professional development on implementing ESD in Iceland.

### ***Emphasis on key competences and action competences***

Clear emphasis is in the Icelandic curriculum for all three school levels on competences that are in line with the UN key competences. No plans are known to further address the UN key competences in the Icelandic national curriculum, in addition to what is already addressed.

### ***Teacher education in constant development***

Teacher education has included growing emphasis on the Icelandic education pillars, both in selection of courses, and providing a master's program for the teacher education license on sustainability education at the University of Iceland. The content of teacher education is constantly being reassessed in the universities that provide that education, and according to the legal and regulation frame provided by the ministry.

### ***No centralized obligatory assessment***

There is little centralized assessment in Iceland, and national exams for grades 4, 7 and 9 in both the Icelandic language and mathematics were abolished in 2022. Therefore, there is no centralized data collection obligatory or foreseen on how well Icelandic compulsory school students are doing according to curricular requirements. Thus, in the year 2025, the only standardized information available in Iceland about student performance in key academic subjects is the PISA results.

### ***Monitoring of Icelandic schools is limited***

As explained, no centralized monitoring system of school practices exists in Iceland, neither national exams of student progress nor inspection of school's practices. In the other Nordic countries, more centralized information collec-

tion takes place, and ministries, or their representatives, provide systematic support for teachers and schools to implement the national curriculum. Being a small country, most municipalities put their trust in the Directorate of Education and School Services, the complicated tasks of which do not include any school evaluation other than requiring schools to do self-evaluation.

## **Issues**

### ***SDG teaching material and teacher support needs attention***

To advance the aims of the UN SDGs, systematic emphasis on transformative learning is needed in Iceland. That will require support material and participatory continuous professional learning opportunities for teachers, together with policy with a well-defined, realistic and funded action plan by the government. This is to be in the hands of the ministry and municipalities, preferably in collaboration with universities providing teacher education and continuous professional learning for teachers in schools.

### ***A clearer focus on pressing sustainability issues is needed***

An ESD whole-institution approach is mandatory for all schools since sustainability is one of six fundamental pillars of education in the national curriculum. This emphasis requires all educators to organize their work with pressing issues of sustainability defined both in the SDGs and priority areas of the UN. Teachers should get support on what to focus on and how to work with that focus in schools. No holistic plans exist in the country to address such support for teachers.

### ***Access to school self-evaluation tools for ESD needs priority***

Teachers and schools should have access to and be guided to use school self-evaluation tools with a focus on sustainability education when evaluating their own school situation according to the curricular fundamental pillars. The

Directorate of Education and School Services does not provide such tools for school self-evaluation in Iceland and seems not to plan to do so.

### ***Centralized national information is lacking***

Centralized information (assessment) on how well municipalities, schools or individual students are doing according to the curriculum requirement is not available in Iceland. Development of new assessment criteria [í. *matsferill*] is being developed and will be based on short electronic exams or assignments, and each school chooses which ones to use though some obligatory exams in Icelandic and math. No centralized national exams are foreseen.

### ***Student literacy status needs relevant resources***

Decreasing literacy of Icelandic 15-year-old students, according to PISA, is of serious concern. This will require education authorities to help schools to collect reliable data on their students' progress, and linked measures and resources to implement when acceptable learning progress is not in place. Data collection on student literacy is planned to be part of new assessment criteria [í. *matsferill*] by The Directorate of Education and School Services.

## **Conclusion**

The concept of sustainability is not explicitly mentioned in the current laws (from 2008) for Icelandic preschools, compulsory schools or upper secondary schools, but sustainability is one of six educational pillars of the curriculum, making it an intrinsic part of all school activities. In line with the Nordic emphasis, the Icelandic curriculum prioritizes the development of student *action competence*, with reference to the present and future role of being responsible citizens in a democratic society.

No centralized collection of information about student progress according to the national curricula is in place in Iceland. Teachers are trusted as professionals to follow the open curriculum, which is based on learning outcomes for grades 4, 7 and 9. On the other hand, teachers need support for professional development in ESD and teaching material in the Icelandic language focused on main issues and challenges of sustainable development.

The key predictor of young people's good citizenship and pro-environmental behaviors is students' sense of social justice. This suggests that social justice is a key element motivating young people to take interest in common and global welfare, develop sustainable mindsets, and become agents of change. This is difficult to assess via standardized tests but could be an underestimated factor for advancing ESD in the Nordic context and in Iceland.

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# **Status, Trends and Issues of Education for Sustainable Development (ESD) in Norway**

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## Abstract

This chapter examines the status, trends, and challenges of Education for Sustainable Development (ESD) in Norway, emphasizing its integration into the national curriculum, policy frameworks, and educational practices. Sustainability is embedded as a cross-disciplinary theme in Norway's education system, reflecting the country's commitment to the Sustainable Development Goals (SDGs). The 2020 curriculum reform reinforced ESD by incorporating sustainability alongside democracy, citizenship, and public health as key interdisciplinary themes. However, despite strong policy commitments, the implementation of ESD varies across schools due to Norway's decentralized educational governance and the flexibility afforded to teachers in curriculum enactment. Key trends include a high level of environmental awareness among Norwegian youth, increasing engagement with climate activism, and a growing emphasis on interdisciplinary teaching approaches. Non-formal education, particularly within sports and cultural institutions, also plays a vital role in advancing sustainability awareness. Nevertheless, persistent challenges remain, such as inconsistencies in teacher training, uneven integration of sustainability across subjects, and tensions between Norway's economic interests—especially its petroleum sector—and its sustainability ambitions. Additionally, research highlights a gap between environmental awareness and actionable behavior among students, underscoring the need for pedagogical strategies that foster agency and critical engagement. This chapter critically assesses these developments and discusses potential strategies for strengthening ESD in Norway, including enhanced teacher education, clearer pedagogical guidelines, and improved mechanisms for assessing the impact of sustainability education. By addressing these challenges, Norway can ensure that its internationally recognized sustainability commitments translate into more coherent and impactful educational practices.

**Keywords:** Norwegian education system, education for sustainable development, core curriculum, policy implementation

## Introduction

The Norwegian education system is structured to provide a coherent pathway from early childhood to higher education, ensuring equal opportunities for all students (NOKUT, 2025). The system builds upon three main stages: primary and lower secondary education, upper secondary education, and tertiary education, which includes both higher education and tertiary vocational education. This inclusive and comprehensive approach is guided by principles of equal access and adaptability to individual needs (The Norwegian Directorate for Education and Training, 2025a). Responsibility for delivering education in Norway is divided between municipalities and county authorities. Municipalities are tasked with managing primary and lower secondary education (grades 1–10). They are responsible for establishing and running schools, ensuring equal access to education, and adapting the curriculum to local needs within the national framework (Ministry of Local Government and Regional Development, 2023b). Municipalities also provide support services, such as special education and before- and after-school care. County authorities oversee upper secondary education (grades 11–13), including both general and vocational programs (Ministry of Education and Research, 2021). They are responsible for planning and financing schools with a regional perspective, ensuring adequate resources, and providing apprenticeship opportunities in collaboration with local businesses. At both municipal and county municipal levels, local and regional authorities work systematically to ensure high-quality education by monitoring performance, supporting teacher development, and adapting resources to meet the needs of their communities.

This decentralized structure empowers local and regional authorities to adapt education to the specific challenges and opportunities within their areas, while still adhering to a national curriculum framework. The standardization of education has provided the nation with individual freedom and mobility. However, the spending per pupil in Norway is at a significantly higher cost than the OECD average, with a spending of 55% more per primary level pupil, and 34% more per secondary level pupil (The Norwegian Directorate for Education and Training, 2022). By integrating national guidelines with locally driven initiatives, Norway aims to strike a balance between consistency in educational standards and flexibility to address regional diversity (Ministry of Education and Research, 2023a). This is especially significant given the high degree of heterogeneity across Norway's regions, which differ in terms of geography, demographics, and economic conditions (Ministry of Local Government and Regional Development, 2023a).

## **The Norwegian Education System**

Figure 1 below presents a visual representation of the Norwegian education system, illustrating the relationships and progression between its various levels. A particularly noteworthy feature of this system is the broad common foundation provided to all students through compulsory education, which lasts until the age of 15 or 16, at the conclusion of lower secondary education (10th grade). This shared educational base ensures that all students acquire fundamental skills and knowledge before choosing their next steps. The high proportion of students in the public system ensures high impact of the core curriculum, which has a clear focus on education for sustainable development (ESD).

When students transition to upper secondary education (VG1), they can select between general academic studies or vocational education and training. Both types of tracks are designed to accommodate students' diverse interests, abilities, and career aspirations while maintaining flexibility for future educational

opportunities. Hence, a distinctive feature of the Norwegian system is the absence of "dead ends." This means that students can transition between pathways and, regardless of their initial choice, have opportunities to pursue higher education or even restart a vocational training program (Ministry of Education and Research, 2021). For students in vocational education, this flexibility is particularly significant. They typically complete 2 years of school-based learning followed by 2 years of apprenticeship, earning a trade or journeyman's certificate. If they later wish to pursue higher education, they can for example supplement their qualifications by completing an additional Supplementary Year (VG4) to earn the Higher Education Entrance Qualification. This structure ensures equitable access to tertiary education for both vocational and general studies students, reinforcing Norway's commitment to inclusivity and lifelong learning.

**Figure 1** Visualization of Norway's Educational System

Age	Grade	Tertiary Education	Phd (3 years)		Higher vocational education	
			Master's			
			Bachelor's			
19+	14					
		Upper secondary education	(Multiple pathways into higher education)	(Direct route into higher education)	Folk high schools	
			Apprenticeship training		Citizens have a right to complete upper secondary education	
			Apprenticeship training	VG3		VG3 General Subjects supplement
			VG2			
16	11		VG1			
		Primary and lower secondary education	Lower secondary education		Compulsory education	
13	8		Primary education			
6	1					
0-5		Kindergarten				

## Sustainable Development in Norway

Norway is dedicated to achieving the Sustainable Development Goals (SDGs) as defined by the United Nations (UN) in 2015 (Norwegian Government, 2021a, 2021b). The commitment can be understood in line with how the SDGs have their roots in the former Norwegian prime minister, Gro Harlem Brundtland and her Commission's report (World Commission on Environment and Development, 1987), where the concept of sustainable development was first introduced. This report laid the foundation for the first conference on the topic, held in Rio de Janeiro. Norway played a key role in advocating for the adoption of the 2030 Agenda in 2015 and for ensuring that the goals were as ambitious as they are. As a country with a long history of environmental and social advocacy, Norway sees the SDGs as a natural extension of its commitment to global development and sustainability. The Norwegian government has decided that the 2030 Agenda with the SDGs will serve as the main political framework for addressing the greatest challenges of our time. This means that the SDGs provide an overarching structure for the government's policies, both nationally and internationally.

Education as part of an overall welfare policy in Norway is free and built on the principles of equity and differentiated instruction to meet the needs of all pupils (Ministry of Education and Research, 2023b). As shown in Figure 1, compulsory education spans 10 years, consisting of 7 years of primary school and 3 years of lower secondary school. Children begin their schooling in the calendar year they turn 6 (Eurydice, n.d.). The Norwegian education system strives to be among the world's best in terms of academic achievement, broad participation, and high completion rates. The quality of education and training is essential in shaping the competencies and values that define Norwegian society (The Norwegian Directorate for Education and Training, 2025b). More students than ever are now completing upper secondary education, with 81% of those who started in 2016 graduating, an increase of 9 percentage points

since 2006 (Norwegian Government, 2025). Additionally, 37% of the Norwegian population has attained a university or college-level education. However, Norway faces challenges as well. The 2022 PISA survey showed that Norwegian 15-year-olds performed lower in mathematics, reading, and science compared to 2018 (Jensen et al., 2023). There has also been a decline in students' reading skills and motivation, and furthermore their understanding of democracy (Storstad et al., 2023). While many students report having a positive learning environment with high levels of satisfaction, academic challenges, and a sense of achievement, studies also show that overall satisfaction has declined in recent years (Norwegian Government, 2025). Moreover, students are less motivated regarding schoolwork than before. From 2021 to 2024, there was a significant rise in bullying rates (Wendelborg, 2023). The government is working on a broad range of initiatives to support schools to improve motivation, learning, and development. Among these, a white paper on Grades 5-10 was presented in 2024, with the primary goal of enhancing students' learning, development, motivation, and skills, including through more hands-on and practical learning in schools (Norwegian Government, 2024).

Despite sustainable development being an established political objective both nationally and internationally for many years, and a general consensus on the global challenges within Norwegian society, the meaning and use of the concept have been a subject of debate, with research highlighting differing interpretations. There is also no agreement on what measures are necessary or how they should be implemented. However, a common understanding is that sustainable development must emphasize three key dimensions: the economic dimension (prosperity and economic growth), the social dimension (equality, opportunities for all, and reduced social disparities), and the environmental dimension (challenges related to climate and the environment) (Sinnes, 2015). In Norway, it is also emphasized that sustainable development is not solely about addressing climate challenges but must be viewed within a broader perspective (Aaslid et al., 2019). Sinnes and Straume (2017) highlighted the

complex and multifaceted nature of the concept of sustainable development, noting that it encompasses a variety of worldviews that often conflict with one another. They differentiate between a techno-optimistic perspective, which assumes that sustainability challenges can largely be addressed through the development of more "sustainable" technologies, and an ecocentric perspective, which views humans as an integral part of nature and calls for more profound personal and societal changes. These contrasting positions inevitably influence how ESD is prioritized and implemented.

### **Norway's Action Plan to Achieve Sustainability Goals by 2030**

In the spring of 2021, a white Paper titled *Goals with Meaning — Norway's Action Plan to Achieve the Sustainable Development Goals by 2030* was presented (Norwegian Government, 2021b). The white paper reviews the 17 Sustainable Development Goals and their 169 targets, outlines the challenges for Norway, and proposes policies to address these areas. The report highlights Norway's strong foundation for achieving the SDGs. It emphasizes that Norway benefits from democratic institutions, a well-functioning judicial system, a high-income level, excellent public services, and relatively low levels of inequality between people and regions. Additionally, the population's trust in institutions is high compared to many other countries. However, the report also underscores that Norway faces significant challenges in the coming years, particularly in the areas of social, climate, environmental, and economic sustainability. Among the most pressing issues described are those related to greenhouse gas emissions, biodiversity, resource use, and consumption patterns. It describes how the Department of Education and Research has responsibilities to achieve specific SDGs in education in Norway (Ministry of Digitalization and Public Governance, 2025).

The outlined sub-goals of SDG 4 focus on ensuring inclusive, equitable, and quality education for all, while addressing systemic barriers and promoting lifelong learning. These goals are structured to tackle various dimensions of

educational equity, access, and quality, as well as to enhance global efforts toward sustainable development through education. Below is a summarization:

### 1. Universal Access to Quality Education

By 2030, all children, regardless of gender, should have access to free, equitable, and high-quality primary and secondary education that results in meaningful learning outcomes (SDG 4.1). Early childhood care and pre-primary education are highlighted as essential foundations for preparing children for school (SDG 4.2).

### 2. Equitable Access to Higher and Technical Education

Aiming to eliminate gender disparities and ensure affordable access to higher, technical, and vocational education for women, men, and marginalized groups (SDG 4.3, and 4.5). This includes a significant focus on skills development for employability, decent work, and entrepreneurship (SDG 4.4).

### 3. Promoting Literacy and Lifelong Learning

The goal calls for substantial increases in literacy and numeracy among youth and adults, ensuring foundational skills for both men and women (SDG 4.6).

### 4. Competence for Sustainable Development

Education must empower learners with the knowledge and skills necessary to promote sustainable development, encompassing human rights, gender equality, global citizenship, and cultural appreciation (SGD 4.7).

### 5. Inclusive Learning Environments

Schools and educational facilities must be safe, inclusive, and gender-sensitive, ensuring accessibility for individuals with disabilities while fostering non-violent and effective learning settings (SDG 4.a).

## 6. Global Collaboration for Educational Opportunities

Strengthening international collaboration is considered critical, particularly for increasing scholarships for students from developing countries to access education in advanced and technical fields, thus enabling global skill enhancement (SDG 4.b).

## 7. Capacity Building for Teachers

The sub-goals also emphasize boosting the number of qualified educators, particularly in developing nations, through international cooperation and targeted teacher training initiatives (SGD 4.c).

These sub-goals illustrate the nation's approach to tackling global education challenges while addressing specific barriers to inclusion and equity. The integration of sustainability, digital skills, and global citizenship into educational systems ensures alignment with broader objectives of the 2030 Agenda for Sustainable Development.

# The Status of ESD

## Actions Taken and Performance Achievements for ESD

Norway consistently ranks among the top countries globally in measures of welfare and development, as reflected in international indexes such as the Human Development Index (HDI). In the 2021 SDG Index, Norway was ranked sixth overall, largely due to its strong economy, well-established welfare state, stable legal and democratic institutions, and high levels of public trust in government (Norwegian Government, 2021a). Norway has reportedly performed particularly well on SDG 1 (No Poverty), SDG 3 (Good Health and Well-be-

ing), SDG 5 (Gender Equality), SDG 7 (Affordable and Clean Energy), SDG 10 (Reduced Inequalities), and SDG 17 (Partnerships for the Goals). However, several areas require improvement, particularly in relation to sustainable consumption and production (SDG 12) and climate action (SDG 13). Norway also failed to meet the Aichi Biodiversity Targets for 2020, highlighting challenges in biodiversity conservation and environmental sustainability.

ESD in Norway has evolved significantly since the 1970s when Environmental Education was first introduced into school curricula (Jónsson et al, 2021). However, a broader approach to sustainability education emerged following the 1992 UN Conference on Environment and Development. This shift aligned with global trends and Norway's increasing emphasis on sustainable development in policy and practice. Norway has approached ESD as an interdisciplinary theme, embedding it across educational policies, curricula, and teacher education frameworks. Notably, sustainability is addressed as a guiding principle in key policy documents, such as the *National Strategy for Sustainable Development* (Royal Ministry of Foreign Affairs, 2007), the *Skills Reform report* (Ministry of Education and Research, 2020), and the so-called *Curriculum Renewal* introduced in 2020 (The Norwegian Directorate for Education and Training, 2021). The 2020 curriculum reform marked a key moment, integrating sustainability as one of three cross-cutting themes alongside democracy, citizenship, and public health. This reflects a broader Nordic commitment to equality, democracy, and environmental awareness in education, as highlighted in the *Mapping Education for Sustainability in the Nordic Countries* (Jónsson et al., 2021) study. The Nordic approach to sustainability education underscores shared values, such as promoting democracy, human rights, and equality, while integrating environmental, social, and economic perspectives. However, as the Jónsson et al. (2021) report notes, discussions on sustainability education often prioritize environmental issues, overlooking its broader social and political dimensions. The report describes how in Norway, ESD is most explicitly addressed in subjects like Natural Science, Social Studies, and

Food and Health, where issues such as climate change, resource management, and life skills are emphasized. The *Mapping Education for Sustainability in the Nordic Countries* report also reveals challenges in harmonizing policy ambitions with practical implementation; While sustainability is prominently featured in Norwegian policies, its practical integration into classroom teaching often depends on teacher training and school-level initiatives. Projects like the *Sustainable Backpack* illustrate Norway’s proactive measures to support schools in adopting ESD through teacher professional development, networking, and funding for school projects (Scheie & Stromholt, 2019).

Table 1 provides an overview of how the curriculum aligns with these priority action areas (UNESCO, 2020) and the relevant SDGs and performance achieved on five action areas.

**Table 1** Priority Action Areas and Performance Achievements in Norway

Priority Action Areas	Relevant SDGs	Key Aspects from the Curriculum	Performance
1. Advancing Policy	SDG 4 (Quality Education), SDG 17 (Partnerships for the Goals)	Focus on overarching policies promoting inclusion, equity, and sustainable development.	High degree of implementation through institutionalized policy and legislation.
2. Transforming Learning Environments	SDG 4 (Quality Education), SDG 12 (Responsible Consumption and Production), SDG 13 (Climate Action)	Emphasis on creating inclusive and sustainable learning environments addressing health, well-being, and environmental challenges.	Addressed through a national focus on adapted teaching, in-depth learning and student participation.

Priority Action Areas	Relevant SDGs	Key Aspects from the Curriculum	Performance
3. Building Capacities of Educators	SDG 4 (Quality Education), SDG 8 (Decent Work and Economic Growth)	Support for teachers' professional development, reflective practices, and evidence-based approaches.	High quality teaching secured through investments in teachers' formal competences.
4. Empowering and Mobilizing Youth	SDG 10 (Reduced Inequalities), SDG 16 (Peace, Justice and Strong Institutions)	Encouraging student participation, critical thinking, and active citizenship to promote equality and social responsibility.	Strong performance achieved through a widespread focus on youth participation and fostering citizenship.
5. Accelerating Local Level Actions	SDG 11 (Sustainable Cities and Communities), SDG 15 (Life on Land)	Local adaptations to address regional challenges, including environmental sustainability and community engagement.	Vast regional variation. Municipalities responsible for implementing the national curriculum. High degree of participation in youth and environmental organizations.

The overview illustrates the Norwegian national education system's systematic incorporation of these global priorities into its framework, in an attempt to serve as a tool for sustainable development. This integration is evident not only in the curriculum's goals and values, but also in its emphasis on interdisciplinary collaboration, local adaptation, and teacher autonomy. These elements demonstrate Norway's commitment to preparing students for active participation in a complex and interconnected world.

### Key Themes in ESD

The three interdisciplinary themes: A) health and life skills, B) democracy and citizenship, and C) sustainable development (The Norwegian Director-

ate for Education and Training, 2025d) are integrated across subjects and grade levels, aiming to provide students with knowledge, skills, and attitudes. Each theme is designed to contribute to the overarching purpose of education, which is to prepare students for participation in a democratic society, promote well-being, and foster responsible global citizenship. The health and life skills theme focuses on equipping students with tools for physical and mental well-being, encouraging informed and responsible life choices. Democracy and citizenship aim to cultivate students' understanding of democratic values, human rights, and active participation in societal processes. Meanwhile, sustainable development emphasizes the importance of environmental stewardship, ethical decision-making, and an understanding of the interplay between social, economic, and environmental factors.

### ***Norwegian Formal K-12 Education***

Table 2 provides an overview of the International Standard Classification of Education (ISCED) operationalization in Norway, showcasing how the education system is structured. The ISCED framework, developed by UNESCO, serves as a global standard for classifying education levels and ensures consistency in comparing educational systems internationally. In Norway, the educational system is designed to ensure progression through compulsory and intermediate education (The Norwegian Ministry of Education and Research, 2025b). Each level is designed to cater to the developmental needs of students, focusing on foundational skills, critical thinking, and career or academic readiness. Furthermore, the curriculum at every stage integrates interdisciplinary themes such as sustainability, democracy, and life skills, which are central to Norway's educational vision.

**Table 2** ISCED Operationalization in Norway

Three-Level Division	ISCED Level	Level Name	Grade Level	Age of students	Curriculum Focus
	0	No education and preschool education	Below school age	0-6	Play-based learning, social-emotional development, preparation for formal education.
Compulsory Education	1	Primary school education	Grades 1-7	6-13	Foundational skills: literacy, numeracy, cultural awareness, and introduction to interdisciplinary themes.
	2	Lower secondary school education	Grades 8-10	13-16	Subject specialization, critical thinking, interdisciplinary themes such as democracy and sustainability.
Intermediate Education	3	Upper secondary education, basic level	Grades 11-12	16-19	Academic (general studies) or vocational pathways; focus on career readiness, advanced subjects, and life skills.

Source: NOKUT, 2025; Statistics Norway, 2016.

## Level 0 - Early Childhood Education – Kindergarten

Kindergarten in Norway is a voluntary educational service for children under the age of 6. All children are entitled to a place in kindergarten from the age of 1, ensuring equal access across municipalities. The purpose of kindergarten is twofold: supporting children’s social and educational development and enabling parents to work or study. Municipalities fund and manage over half of all kindergartens, while private kindergartens also receive municipal grants. Kindergartens operate under the *Framework Plan for the Content and Tasks of*

*Kindergartens* (The Norwegian Directorate for Education and Training, 2017), which is designed to ensure quality across the country. At the age of 1 year, 81.8% of children attend kindergarten, while 97.5% are attending kindergarten at the age of 5 (The Norwegian Directorate for Education and Training, 2023). The *Framework Plan for the Content and Tasks of Kindergartens* explicitly incorporates sustainability as one of its guiding principles, emphasizing that children should learn to take care of themselves, each other, and the natural environment. The framework highlights the interconnected nature of sustainability by addressing environmental, social, and economic dimensions, fostering an early understanding of how daily actions impact the future.

## **Level 1 and 2 - Primary and Lower Secondary Education**

Education is compulsory and free for all children from ages 6 to 16, comprising primary school (grades 1–7) and lower secondary school (grades 8–10). Municipalities are responsible for managing schools, ensuring that they provide equal opportunities for learning within an inclusive and adaptive framework. The curriculum emphasizes fundamental skills, cultural knowledge, and personal development. In primary school, no grades are given, but in lower secondary school, students receive grades in mandatory subjects, which are documented in a final certificate upon graduation. After completing lower secondary education, students have the right to enroll in upper secondary education. In Norway, 95.4% of all pupils attend the public school system (The Norwegian Directorate for Education and Training, 2022). In primary and lower secondary education, sustainability is incorporated into subjects such as Natural Science, Social Science, and Food and Health, where students learn about topics like climate change, biodiversity, and resource management. Specific learning objectives related to sustainability are outlined in the core curriculum (Ministry of Education and Research, 2017b). The Norwegian curriculum emphasizes competency-based learning, meaning that students are expected to develop skills such as critical thinking, problem solving, and ethical decision-making in relation to sustainability issues.

### **Level 3 - Upper Secondary Education**

Upper secondary education in Norway represents the stage following compulsory schooling, where students can specialize and prepare for either higher education or direct entry into the labor market. This level spans 3 to 4 years and offers multiple pathways to ensure inclusivity and flexibility in meeting diverse learner needs. According to the Education Act, the goal of upper secondary education is to lead to one of three outcomes: general study competence, vocational competence, or a basic (documented) competence. Of each youth cohort, 98% start upper secondary education following the compulsory education (The Norwegian Directorate for Education and Training, 2022). Around half of the students start at a vocational program. In general academic programs, sustainability themes are most prominent in subjects like Natural Sciences, Geography, and Social Studies. In vocational education and training (VET) programs, sustainability is also linked to industry-specific competencies. For example, in Building and Construction, students learn about sustainable materials, while Restaurant and Food Processing programs emphasize food waste reduction and sustainable sourcing. Students who complete vocational programs but wish to qualify for higher education can take a supplementary year to earn general study competence. Norway's upper secondary education system also includes several alternative pathways designed to ensure flexibility (Schmees et al., 2024).

#### ***Curriculum***

Norwegian education is governed by the national curriculum framework, which serves as the guiding document for all levels of primary and secondary education. The Norwegian curriculum framework consists of three main components: the Core curriculum, subject and time allocation, and subject-specific curricula. These are regulations under the Education Act (Ministry of Education and Research, 2023b) and are designed to govern the content and structure of education in Norway. The framework ensures consistency and quality

in education while providing a clear guideline for what pupils are expected to learn at each level. The Norwegian Core curriculum provides a unified framework that outlines the overarching values, principles, and objectives of education, ensuring consistency across schools while allowing for flexibility in local implementation (The Norwegian Directorate for Education and Training, 2025d). Together, these components aim to promote holistic development, critical thinking, and lifelong learning among students, in line with the SDGs. The three interdisciplinary themes of health and life skills, democracy and citizenship, and sustainable development (The Norwegian Directorate for Education and Training, 2025d) are integrated across subjects and grade levels, aiming to provide students with knowledge, skills, and attitudes.

### ***Teacher Training in Norway***

Teacher education in Norway has undergone significant reforms over the last decade, driven by efforts to improve educational quality, align with global standards, and respond to national challenges (Smepllass et al., 2023). These reforms include extending the duration of teacher education to a 5-year master's program, fostering stronger connections between pedagogical theory and practical application, and consolidating institutions to create stronger academic environments and research capacity (Jónsson et al, 2021; Smepllass & Leiulfstrud, 2022). The catalyst for many of these changes was the so-called "PISA shock" in the early 2000s, when Norway's students were found to perform below the OECD average in international assessments. This spurred policymakers and educators to address the quality of teaching, boost recruitment into teacher education, and enhance the professional standing of teachers. A series of policy discussions and commissions led to increased investment in teacher education and research.

The Ministry of Education and Research (2009) issued the white paper, *The Teacher, the Role, and the Education*, which marked a turning point in Norwegian teacher education. It was followed by the establishment of a National

Curriculum Committee tasked with developing regulations for differentiated teacher education programs for primary and lower secondary education (Grades 1–10) (Jónsson et al, 2021). By 2010, the *National Guidelines for Differentiated Primary and Lower Secondary Teacher Education* were published, ensuring a consistent national framework while allowing institutions autonomy to develop their program descriptions (Ministry of Education and Research, 2011). A key outcome of these guidelines was the differentiation of teacher education into two specific levels: primary (Grades 1–7) and lower secondary (Grades 5–10). Building on this, the government introduced the strategy *The teacher promise. Working together for the knowledge school* in 2014 (Ministry of Education and Research, 2014). This strategy laid the groundwork for transitioning to a 5-year master’s degree as the minimum qualification for teachers, increasing subject-specific specialization, and emphasizing continuing professional development and school-based initiatives. New framework plans for teacher education were introduced in 2016, requiring all institutions to adopt the 5-year Master’s model by 2017.

While the reforms were welcomed by many, they also presented significant challenges. Transitioning from a 4-year bachelor’s degree plus an optional 2-year master’s program to an integrated 5-year program required institutions to condense content and restructure curricula. Additionally, teacher education institutions needed to provide stand-alone master’s programs for teachers trained under the previous system and address the professional development of in-service teachers to meet new standards. These demands placed considerable pressure on staffing and institutional capacity (Smeplass & Schmees, 2024). To address these challenges, the 2017 strategy *Teacher Education 2025: National Strategy for Quality and Cooperation in Teacher Education* (Ministry of Education and Research, 2018) provided guidance for enhancing teacher education. Its goals included creating academically rigorous programs, fostering collaboration between schools and teacher education providers, and adopting research-based approaches to teaching. The strategy also set standards for academic staff qualifications, requiring at least 10% of instructors to hold pro-

fessorships and 40% to qualify as associate professors or senior lecturers.

Despite the emphasis on enhancing teacher education, the integration of sustainability remains limited. Sustainable development is only briefly mentioned in the framework plans for primary and lower secondary teacher education, primarily as a general competence goal. While earlier frameworks also referenced sustainability, it was often framed as part of global issues or interdisciplinary skills. In the updated national guidelines, sustainability is mentioned more frequently, particularly in subjects such as Natural Science, Social Studies, and Food and Health. These guidelines aim to equip future teachers with the knowledge and skills to teach students about climate change, environmental issues, and sustainable development. However, the alignment between teacher education curricula and the national curriculum for basic education has been inconsistent. With the renewal of Norway's national curriculum in 2020, many teacher education institutions have incorporated interdisciplinary themes into their programs, including sustainability. The recent reforms have established a strong foundation for teacher education in Norway. The transition to a 5-year master's degree as the standard for teacher qualifications has ensured a higher level of professional preparation and professional autonomy based on research. However, challenges such as integrating sustainability across all aspects of teacher education, addressing teacher shortages, and supporting in-service teachers remain ongoing priorities. According to the Norwegian national guidelines for teacher education (UHR, 2024), sustainability education must be integrated as an interdisciplinary theme, equipping future teachers with the knowledge and skills to support students' learning and actions for sustainable development. The *Teacher Education 2025* strategy underscores the importance of aligning teacher education with societal needs and global priorities, including sustainability. As institutions continue to adapt to these reforms, their success will depend on maintaining high academic standards, fostering collaboration between schools and teacher education providers, and preparing future teachers to address the complex challenges of the 21st century.

## *Statistics on Climate and Biodiversity Awareness*

Studies of Norwegian youth's concerns reveal that a significant portion of the population is deeply worried about climate change and biodiversity loss (The Confederation of Norwegian Enterprises, 2025). A 2024 survey conducted by Opinion AS, Norway's largest agency for social and market analysis, gathered responses from a representative sample of 1,334 individuals aged 15–29. The findings highlighted that 59% of respondents were concerned about the destruction of nature and the environment, while 54% expressed worries about climate change. Additionally, 40% reported concerns over growing social inequalities in Norway, whereas only 22% were worried about their ability to express their opinions freely. These findings suggest that environmental concerns are not only widespread but also deeply embedded in young people's worldviews. The high level of concern about biodiversity loss and climate change indicates that sustainability education has had a measurable impact on raising awareness. However, the relatively lower prioritization of social inequalities suggests that sustainability is still primarily framed through an environmental lens, aligning with previous research on the dominance of ecological perspectives in Norwegian education (Mellingén & Tollefsen, 2023).

A survey conducted on behalf of Save the Children Norway and Miljøagentene (The Environmental Agents) highlights a high level of environmental awareness among Norwegian children and youth (Save the Children & Miljøagentene, 2022). Based on responses from 1,039 participants aged 8 to 19, the findings indicate that a significant majority of young people consider environmental issues to be of great importance. Among the key concerns, 87% of respondents emphasized the need to stop pollution and littering in nature, while 81% expressed concern about the extinction of animal and plant species. Additionally, 68% identified stopping climate change as a crucial issue. These results suggest that Norwegian children and teenagers are highly engaged with environmental topics, particularly those with immediate and tangible conse-

quences such as pollution and biodiversity loss.

The survey also revealed interesting demographic patterns (Save the Children & Miljøagene, 2022). Across all three environmental issues, girls reported higher levels of concern than boys, suggesting potential gendered differences in environmental engagement. Age differences also emerged, with younger children (8–11 years) showing the highest levels of concern, particularly regarding biodiversity loss (93%) and pollution (90%). While engagement remained strong among adolescents aged 12–15 years, there was a slight decline, with 85% prioritizing biodiversity conservation and 81% emphasizing pollution prevention. Older teenagers (16–19 years) demonstrated slightly lower concern levels, with 82% emphasizing biodiversity loss and 77% prioritizing pollution prevention. This pattern suggests that environmental concern is deeply rooted in childhood but may slightly decline in adolescence as other social and personal priorities emerge. However, the consistently high levels of engagement across all age groups indicate that sustainability education and advocacy efforts have effectively embedded environmental awareness within the youth population.

### ***Competence Goals related to ESD***

Sustainability education is embedded in multiple subjects across different grade levels in the Norwegian curriculum. The competence goals outlined in the Core curriculum ensure a progressive approach, allowing students to develop sustainability-related knowledge and skills throughout their education. These goals emphasize key aspects of sustainable development, such as environmental responsibility, climate change, biodiversity, and ethical resource management, while also fostering critical thinking and problem-solving skills. Table 4 provides an overview of selected competence goals in social science and natural science education, illustrating how sustainability themes are integrated from early primary education through upper secondary school.

**Table 4** Competence Goals Related to Sustainability in Norwegian Social Science and Science Education

Grade Level	Social Science sustainability goals of education	Natural science sustainability goals of education
<b>Grade 2</b>	<ul style="list-style-type: none"> <li>- Explore and describe cultural heritage sites and the cultural and natural landscape in the local environment.</li> <li>- Explore and present how people lived one to two generations ago.</li> <li>- Explore and provide examples of how humans impact the climate and environment and document how these impacts are visible in the local area.</li> <li>- Explore and provide examples of how people in different parts of the world influence each other's lives.</li> </ul>	<ul style="list-style-type: none"> <li>- Discuss how we can make environmentally conscious choices and implement local environmental initiatives.</li> <li>- Explore a natural area in the local environment and describe how some organisms are adapted to the area and to each other.</li> <li>- Experience nature in different seasons, reflect on how nature changes over time, and discuss why the year is divided in different ways in Norwegian and Sami traditions.</li> </ul>
<b>Grade 4</b>	<ul style="list-style-type: none"> <li>- Describe cultural and natural landscapes in Norway and discuss how historical and geographical sources, including maps, can provide information about landscapes.</li> <li>- Explore and provide examples of some aspects of sustainable development.</li> </ul>	<ul style="list-style-type: none"> <li>- Discuss what energy is and explore different energy chains.</li> <li>- Explore a natural area and discuss its sustainable use.</li> <li>- Explore and compare adaptations of different animal and plant species to their environments and discuss why some species become extinct.</li> <li>- Participate in harvesting and using natural resources and discuss sustainable resource management.</li> <li>- Explore and describe the water cycle and explain why water is essential for life on Earth.</li> </ul>
<b>Grade 7</b>	<ul style="list-style-type: none"> <li>- Explore how people in the past sustained themselves and discuss how key changes in livelihoods and technology have influenced and continue to influence demographics, living conditions, and settlement patterns.</li> <li>- Describe key geographical features of different parts of the world and reflect on how these features affect the people who live there.</li> <li>- Explore and present a global challenge related to sustainable development, discuss its consequences, develop proposals on how to address the challenge, and examine how international cooperation can contribute.</li> </ul>	<ul style="list-style-type: none"> <li>- Reflect on how technology can solve challenges, create opportunities, and lead to new dilemmas.</li> <li>- Explore electrical and magnetic forces through experiments and discuss how electrical energy is used in everyday life.</li> <li>- Explain the importance of biodiversity and implement measures to preserve biodiversity in the local environment.</li> <li>- Suggest measures to preserve biodiversity in the northern regions and provide examples of the importance of traditional knowledge in environmental management.</li> <li>- Explore and describe different food webs and use them to discuss interactions in nature.</li> <li>- Explain Earth's conditions for life and compare them with other celestial bodies in the universe.</li> <li>- Explain how the geological cycle, plate tectonics, and external forces shape and change landscapes.</li> </ul>

Grade Level	Social Science sustainability goals of education	Natural science sustainability goals of education
Grade 10	<ul style="list-style-type: none"> <li>- Explore how technology has been and continues to be a driver of change, and discuss its impact on individuals, society, and nature.</li> <li>- Reflect on how people have fought for and continue to fight for societal change while also being influenced by geographical conditions and historical contexts.</li> <li>- Compare how political, geographical, and historical conditions affect living conditions, settlement patterns, and demographics in different parts of the world today.</li> <li>- Explain the causes and consequences of key historical and contemporary conflicts and reflect on whether changes in certain conditions could have prevented these conflicts.</li> <li>- Explore and describe how human and Indigenous rights, as well as other international agreements and collaborations, influence national policies, people's lives, and equality.</li> <li>- Describe different dimensions of sustainable development and how they influence each other, and present measures for creating more sustainable societies.</li> <li>- Evaluate how work, income, and consumption impact personal finances, living standards, and quality of life.</li> </ul>	<ul style="list-style-type: none"> <li>- Describe the greenhouse effect and explain factors that contribute to global climate change.</li> <li>- Explain energy conservation and energy quality, and explore different ways to convert, transport, and store energy.</li> <li>- Discuss how energy production and energy use can affect the environment locally and globally.</li> <li>- Explain how scientists developed the theory of evolution and use it to describe the development of biodiversity.</li> <li>- Explore relationships between abiotic and biotic factors in an ecosystem, and discuss how energy and matter are cycled.</li> <li>- Provide examples of and discuss current dilemmas related to the exploitation of natural resources and biodiversity loss.</li> <li>- Give examples of Sami traditional knowledge about nature and discuss how this knowledge can contribute to sustainable environmental management.</li> <li>- Explain how photosynthesis and cellular respiration provide energy for all living things through the carbon cycle.</li> </ul>

Grade Level	Social Science sustainability goals of education	Natural science sustainability goals of education
Upper Secondary (VG1)	<ul style="list-style-type: none"> <li>- Explore and present current topics or debates using social science methods, sources, and digital resources, and argue for their own and others' opinions and values.</li> <li>- Discuss how personal finances, commercial influence, and consumption affect individuals, groups, and society.</li> <li>- Explore and describe how the organization of society and working life in Norway has changed, and discuss how the Nordic social model addresses challenges faced by individuals and society.</li> <li>- Explore and discuss how economic foundations, innovation, and technology shape and influence working life and local communities in Norway.</li> <li>- Investigate a challenge or conflict at the local, national, or global level and discuss how the challenge or conflict impacts different groups.</li> <li>- Discuss the relationship between economic growth, living standards, and quality of life from a global and sustainable perspective.</li> </ul>	<ul style="list-style-type: none"> <li>- Assess risks in their own experiments and handle waste responsibly.</li> <li>- Explore the properties and reactions of some organic and inorganic carbon compounds, provide examples of their applications, and explain the importance of carbon for life on Earth.</li> <li>- Explain how some environmental toxins can accumulate in food chains and evaluate measures to protect health and the environment.</li> <li>- Explain the functions of certain nutrients and discuss why a varied diet is important from a health and sustainability perspective.</li> <li>- Explain how climate change affects evolution, species distribution, and biodiversity.</li> <li>- Provide examples of biotechnology applications and discuss ethical issues related to biotechnology.</li> </ul>

## *Non-Formal ESD Education*

Non-formal education providers in Norway, including sports organizations and cultural institutions, play a significant role in integrating ESD into their activities (Tjønndal et al., 2022). These organizations actively incorporate the principles of the SDGs through various initiatives, fostering awareness of sustainability issues among children, youth, and adults. Sports organizations are among the most influential actors in non-formal education, as participation in organized sports is widespread in Norway. Approximately 74% of young people between the ages of 13 and 18 are involved in a sports club at some point during their adolescence (Ministry of Culture and Equality, 2024). The Norwegian Sports Confederation (Norges idrettsforbund) promotes sustainability by integrating environmental, social, and economic sustainability into its vision of "sports for all." This includes efforts to make sports more inclusive, ensuring accessibility for all social groups, promoting health and well-being, and implementing environmentally responsible practices in sports facilities and events. By focusing on these three dimensions—social sustainability, economic sustainability, and environmental sustainability—the Norwegian sports sector actively contributes to the broader sustainability agenda.

Cultural institutions, particularly museums, also play a vital role in sustainability education. Norway has around 200 public museums and numerous private ones, many of which actively work toward implementing the SDGs through exhibitions, educational programs, and sustainable operational practices. Museums can apply for Miljøfyrtårn ("Environmental Lighthouse") certification, a national environmental certification scheme that provides institutions with structured measures to enhance their environmental performance. This initiative encourages museums to adopt sustainable resource management, reduce their ecological footprint, and educate the public about sustainability challenges.

The Norwegian Music Council (Norsk musikkråd) represents a wide range of

cultural organizations, including 1,700 marching bands, 2,200 choirs, 220 orchestras, 115 big bands, and over 500 concert organizers across various musical genres. The council has increasingly emphasized sustainability by guiding local music councils and their affiliated groups in incorporating sustainability principles into their activities. This includes reducing the environmental impact of concerts and events, promoting sustainable transportation for touring artists, and advocating for responsible resource use in stage productions. By integrating SDG principles into cultural life, the Norwegian music sector contributes to raising awareness of sustainability challenges while reducing its overall ecological footprint. The broad engagement with sustainability across Norway's non-formal education sector demonstrates how organizations across sports, culture, and recreation actively contribute to ESD.

## **Features of ESD in Norway**

### ***National commitment to SDG policy***

Norway consistently ranks among the top countries globally in sustainability, education, and welfare development, as reflected in indices such as the Human Development Index (HDI) and the SDG Index (Norwegian Government, 2021a). Sustainability has been a long-standing political priority, integrated into national policies and educational strategies.

However, despite Norway's strong policy framework, challenges remain in implementation. While SDG 4 (Quality Education) and SDG 17 (Partnerships for the Goals) show strong national performance, Norway faces difficulties in achieving SDG 12 (Responsible Consumption and Production) and SDG 13 (Climate Action) (Norwegian Government, 2021b).

The 2020 curriculum reform has solidified this commitment by embedding sustainable development as one of three cross-curricular themes, alongside democracy, citizenship, and public health (The Norwegian Directorate for

Education and Training, 2021). This reform ensures that sustainability is systematically integrated across all education levels, reinforcing it as a guiding principle rather than an isolated subject.

More broadly, Norway's sustained commitment to sustainability at the policy level is a defining feature of ESD in the country. Sustainability is not merely an educational goal but a fundamental pillar of national governance, influencing policies in energy, industry, and social welfare. By aligning educational priorities with national sustainability strategies, Norway illustrates how ESD can be embedded as a comprehensive societal effort rather than a school-based initiative alone.

### ***Holistic approach to sustainability***

Norwegian ESD takes a holistic approach, ensuring that sustainability education goes beyond climate issues to encompass economic, social, and ethical dimensions. The curriculum defines sustainable development as:

*“Protecting life on Earth while safeguarding the needs of present generations without compromising the ability of future generations to meet their own needs”* (The Norwegian Directorate for Education and Training, 2025d).

The curriculum further states that *“students shall develop competence to make responsible choices and act ethically and environmentally aware”*. To achieve this, sustainable development is not limited to specific subjects but is integrated across all areas of learning. This means that students are encouraged to engage with sustainability from multiple perspectives (Sinnes & Straume, 2017):

- Scientific perspective: Understanding climate change, biodiversity loss, and ecological systems.
- Social perspective: Exploring global inequalities, migration, and human rights.

- Economic perspective: Examining sustainable consumption, circular economy models, and green industries.

To strengthen interdisciplinary learning, sustainability is explicitly integrated into multiple subjects (Jónsson et al., 2021). This cross-disciplinary approach fosters critical thinking, ethical reflection, and problem-solving skills, preparing students to navigate sustainability challenges in various societal roles (Sinnes, 2015).

### ***Pedagogical variation through adapted teaching***

A defining principle of Norwegian education is adapted teaching, which ensures that all students receive instruction tailored to their individual needs, abilities, and learning styles. This principle is enshrined in the Education Act and serves as a foundation for fostering equity and inclusion in learning (Ministry of Education and Research, 2023b). In the context of ESD, pedagogical adaptation ensures that sustainability education is not a uniform approach but rather part of somewhat individualized learning that considers students' diverse interests, competencies, and local contexts. Teachers are expected to differentiate instruction to engage all students meaningfully, whether through theoretical discussions, hands-on projects, or inquiry-based learning. This flexibility is particularly important to understand the implementation of sustainability education in Norway, as the integration of ESD into various subjects allows schools to approach the theme in ways that resonate with different student groups. The interdisciplinary nature of ESD also encourages some collaboration across subjects, creating opportunities for students to approach sustainability from multiple perspectives and apply their knowledge in real-world contexts.

The Norwegian education model values student-centered learning, and ESD is often taught through project-based methods, outdoor education, digital simulations, or collaborative problem-solving activities. This approach encourages

students to take an active role in shaping their learning encounters, fostering engagement with sustainability issues in ways that feel relevant and meaningful to them. Moreover, adapted teaching ensures that students with different learning needs, including those requiring additional academic support or accommodations, can access sustainability education in ways that align with their abilities and interests.

## Trends and Issues in ESD

### Trends

#### *The gradual strengthening of teacher education*

Norwegian teacher education has undergone major reforms over the last decade, including the transition to a 5-year master's degree (Smeplass et al., 2023). These reforms aimed to enhance subject specialization, pedagogical competence, and the research foundation of teacher education in general (Jónsson et al., 2021; Smeplass & Leiulfstrud, 2022). However, sustainability remains only a minor component in teacher training programs. The national framework for teacher education mentions sustainable development only briefly, primarily as a general competence goal (UHR, 2024), and its integration into subjects such as Social Science and Natural Science remains inconsistent. Given that teacher autonomy is a defining feature of the Norwegian education system, this leads to variations in how sustainability is implemented in schools. However, this variation is not considered problematic. Nevertheless, scholars emphasize the need for stronger integration of sustainability in education to better equip future educators with the necessary knowledge and skills to address global challenges and strengthen the ESD achievements of the Norwegian system (Sinnes & Straume, 2017; Stoll et al., 2022).

### *A gap between awareness and action*

Although Norwegian youth express strong concerns about climate change and environmental issues, their engagement in concrete actions such as sustainable consumption or political advocacy remains inconsistent. While 59% of young people rank environmental degradation as a top concern (The Confederation of Norwegian Enterprises, 2025), studies indicate that translating this awareness into behavioral change is more challenging (Fløttum et al., 2016). This suggests that sustainability education needs to place greater emphasis on equipping students with tools for active engagement, including critical thinking, decision-making, and participation in sustainability initiatives.

### *Challenge of integrating sustainability across disciplines*

Sustainability is embedded as an interdisciplinary theme in the national curriculum, yet its implementation varies across subjects. The 2020 curriculum reform emphasized sustainability alongside democracy, citizenship, and public health (The Norwegian Directorate for Education and Training, 2021). However, due to the flexible nature of Norway's education system, where teachers have significant autonomy in curriculum implementation, sustainability may not receive equal emphasis in all schools and classrooms. Recent research highlights the potential of transformative learning approaches to enhance sustainability education in Norway. Transformative learning encourages students to critically examine their values and assumptions, fostering deeper engagement with sustainability challenges (Sterling, 2011). Pilskog and Heggen (2023) advocated for the integration of problem-based learning and experiential education, allowing students to apply sustainability knowledge in real-world contexts.

### **The influence of global climate movements on Norwegian youth**

The rise of global climate activism, particularly the influence of inspirations like Greta Thunberg and the Fridays for Future movement, has played a cen-

tral role in shaping Norwegian youth's engagement with sustainability. Haugs-eth and Smepllass (2022) identified three dimensions of climate reflexivity among young Norwegians: (1) prioritizing climate change as a key issue, (2) recognizing environmental issues as personally and socially relevant, and (3) integrating sustainability concerns into broader value systems. The findings indicate that global climate movements have contributed to increased youth engagement with sustainability topics, reinforcing the role of social movements in education.

### ***Uneven teacher competence in sustainability education***

While teacher education reforms have strengthened professional qualifications, sustainability remains an underdeveloped area in teacher training. Pilskog and Heggen (2023) discussed challenges in defining and operationalizing sustainability in education, which may affect how teachers approach sustainability-related teaching. As a result, implementation depends heavily on individual teachers' expertise and motivation. The lack of specific training in the area and professional development programs in ESD exacerbates these inconsistencies, highlighting the potential of targeted investments in teacher competence.

### ***Institutional pressure on teacher education programs***

The shift to a mandatory 5-year master's program for teacher qualifications has placed additional demands on Norwegian teacher education institutions. The transition required substantial restructuring of curricula, increased research expectations for faculty, and new qualification standards for teaching staff. The 2017 strategy, *Teacher Education 2025*, set ambitious goals, including requiring at least 10% of academic staff to hold professorships and 40% to qualify as associate professors or senior lecturers (Ministry of Education and Research, 2018). While these changes might have improved some academic rigor, they have also led to tensions (Smepllass & Schmees, 2024), possibly challenging how sustainability education is prioritized within teacher training

programs.

### ***The shift towards active citizenship in sustainability education***

There is increasing recognition that sustainability education should go beyond knowledge acquisition and actively foster civic engagement. Research on eco-citizenship (Heggen et al., 2019) underscores the importance of participatory and experiential learning approaches that encourage students to take action on sustainability issues. Pilskog and Heggen (2023) argued that students should be empowered to engage with sustainability beyond the classroom, whether through local environmental projects, policy advocacy, or social entrepreneurship. This shift further aligns with broader international trends in sustainability education that emphasize active engagement and responsibility.

## **Issues**

### ***Increasing pessimism and sense of powerlessness among Norwegian youth***

Studies indicate that Norwegian youth are deeply engaged with climate change and sustainability issues, yet many feel increasingly pessimistic about the future. A 2024 survey by Opinion AS, based on a representative sample of 1,334 individuals aged 15–29, found that 59% of respondents ranked environmental destruction as a top concern, while 54% were worried about climate change (The Confederation of Norwegian Enterprises, 2025). Similarly, a study by Save the Children and Miljøagentene (2022) revealed that 87% of young respondents emphasized the need to stop pollution, and 81% were concerned about biodiversity loss. These findings indicate that sustainability education may have successfully raised awareness among Norwegian youth.

However, despite this engagement, there is a growing sense of pessimism and powerlessness. The Save the Children and Miljøagentene (2022) study found that only one in four young people believe the world will successfully solve

climate and environmental challenges, and pessimism increases with age. Among those 16 years and older, 40% express doubt that these problems can be solved. Additionally, half of the surveyed youth believe that politicians are not doing enough, and only one in five feel they have the ability to influence decision-makers on sustainability issues.

These trends suggest a disconnect between awareness and perceived agency, where Norwegian youth are highly informed about sustainability issues but lack confidence in institutional responses. This could pose challenges for future civic engagement and sustainability efforts if young people increasingly view their role in climate action as limited.

### ***Uneven implementation due to decentralized educational governance***

One of the major challenges in monitoring ESD in Norway is the decentralized nature of the education system. While the national core curriculum establishes overarching goals, the responsibility for integrating ESD into teaching practices is delegated to municipalities and individual schools (Ministry of Education and Research, 2023b). This results in regional and local differences in how sustainability education is practiced, as municipalities vary in their financial and human resources and schools have different agendas. Schools in some areas, for example, may struggle to implement ESD due to fewer resources, whereas schools in areas of high socioeconomic status have greater access to resources, expertise, or collaboration opportunities.

This variation affects the quality of sustainability education students receive, potentially undermining the national effort to ensure comprehensive ESD. To address these disparities, national education authorities could provide clearer implementation guidelines and targeted funding to schools with fewer resources.

### *Insufficient teacher training in sustainability education*

Despite the emphasis on sustainability in Norway's national curriculum, many teachers lack specific training in how to incorporate ESD into their teaching practices. Teacher education programs in Norway primarily focus on subject-specific training, leaving sustainability to be addressed as a general competence rather than an integrated teaching approach. Multiple reforms over the past decade have created high pressure for teacher training institutions (Smeplass & Schmees, 2024). As a result, Norwegian teachers can struggle to translate abstract sustainability goals into concrete classroom activities, especially in times of cuts and budget constraints.

While sustainability is mentioned in the framework plans for primary and lower secondary teacher education (UHR, 2024), its inclusion in practice remains unclear, with very limited studies on the topic. Some school subjects, such as natural sciences and social studies, provide explicit sustainability connections through the core curriculum, while others, such as mathematics and language studies, offer more limited guidance on integrating ESD. The Core curriculum is therefore mostly implemented through teachers' pedagogical training. Teacher autonomy is an important part of the Norwegian system, as educators have considerable freedom in how they choose to implement sustainability themes in the different subjects. While this autonomy allows for flexibility, it can also lead to inconsistency in how sustainability education is conducted, depending on individual teachers' expertise and motivation (Ministry of Education and Research, 2015, 2024).

Munkebye (2016) examined how sustainability is taught in Norwegian primary schools through the Sustainable Backpack initiative, a program designed to enhance teachers' and students' engagement with sustainability topics. Her study highlights that while interdisciplinary and experiential learning approaches are commonly employed, the actual implementation varies significantly between schools. Some teaching programs successfully integrate sus-

tainability through outdoor learning, hands-on activities, and connections to local ecosystems, while others struggle to move beyond surface-level engagement. A key finding is that teacher competence in ESD remains inconsistent, as many educators lack specialized training in how to integrate sustainability principles across subjects. This raises concerns about the extent to which sustainability is embedded in classroom practices rather than merely existing as an abstract policy goal.

Strengthening sustainability education in teacher training programs and providing in-service teachers with specialized ESD courses and/or resources could improve the quality and consistency of sustainability education across Norwegian schools.

### ***Tensions between ecological priorities and economic interests***

Norwegian sustainability policies frequently emphasize technological solutions as the primary means of addressing environmental challenges. This techno-optimistic perspective is evident in key policy documents such as *Meld. St. 28 (2015–2016)* (Ministry of Education and Research, 2016) and the *Core Curriculum – Values and Principles for Primary and Secondary Education* (Ministry of Education and Research, 2017b), which highlight technological development as central to sustainability education. While this approach aligns with Norway’s strong emphasis on innovation, it risks overlooking the need for broader societal and cultural shifts. Sinnes and Straume (2017) argued that Norwegian sustainability policies largely reflect an anthropocentric, growth-oriented framework that prioritizes economic sustainability over ecological concerns. This perspective creates tensions in sustainability education, as students are taught about sustainability in a way that aligns with Norway’s economic interests rather than fostering critical discussions on systemic change.

A key example of this tension is Norway’s reliance on the oil industry, which remains a major driver of economic growth while simultaneously contribut-

ing to global carbon emissions (Straume, 2016). Schools often avoid critical discussions about Norway's dependence on fossil fuels, instead emphasizing technological solutions such as renewable energy and carbon capture. This framing can limit students' understanding of sustainability by presenting it as a technical challenge rather than as a broader social and ethical issue (O'Brien & Selboe, 2015; Sterling, 2009). Expanding sustainability education to include deeper discussions on economic and societal transitions could help students develop a more comprehensive understanding of sustainability challenges.

### ***Fragmented integration across subjects***

While sustainability is designated as an interdisciplinary theme in the Norwegian curriculum, its implementation across subjects remains inconsistent. Research by Mellingen and Tollefsen (2023) indicates that most empirical studies on sustainability education in Norway focus on natural and social sciences, while subjects such as mathematics, language studies, and arts and crafts receive less attention. This results in an uneven emphasis on different dimensions of sustainability, often prioritizing environmental issues while underrepresenting social and economic sustainability. Pilskog and Heggen (2023) highlighted that different disciplines approach sustainability in varied ways. For instance, business and economics courses often emphasize financial sustainability, while natural sciences focus on environmental conservation. These disciplinary differences can lead to fragmented learning, where students gain a deep understanding of certain sustainability aspects while missing broader interdisciplinary connections. Additionally, while Norway's national curriculum encourages interdisciplinary collaboration, structural barriers within the education system make it difficult to operationalize this in practice. Traditional subject divisions persist, making cross-disciplinary collaboration challenging for teachers. Interviews with educators suggest that many struggle to incorporate sustainability meaningfully into their subjects due to a lack of concrete guidance and resources (Grindheim et al., 2019). Addressing this is-

sue involves clearer curricular integration, cross-disciplinary collaboration initiatives, and stronger institutional support for interdisciplinary teaching.

### ***Student engagement and action-oriented learning to bridge the gap between awareness and action***

Norwegian youth express strong environmental concerns, with 59% ranking environmental degradation as a top concern (The Confederation of Norwegian Enterprises, 2025). Surveys indicate that a majority of children and teenagers are highly aware of issues such as pollution, biodiversity loss, and climate change (Save the Children & Miljagentene, 2022). However, this awareness does not always translate into concrete action, such as sustainable consumption or civic engagement (Mohamed, 2022). Research suggests that while environmental awareness is deeply rooted in childhood, engagement tends to decline slightly in adolescence as other priorities emerge. Additionally, sustainability education in Norway largely focuses on knowledge acquisition rather than active citizenship, potentially limiting students' ability to translate their concerns into meaningful action. Strengthening experiential learning, student-led initiatives, and local partnerships could help bridge this gap and foster greater real-world engagement with sustainability issues.

## **Conclusion**

Norway's approach to ESD is shaped by strong policy frameworks, cross-sectoral collaboration, and high levels of public awareness. SDGs are viewed as a shared responsibility across sectors, engaging employers, businesses, and both public and private stakeholders (Lund et al., 2023). Despite Norway's ambitious sustainability goals, there is limited concrete data on how effectively these goals are being met in education. The country benefits from an in-

tegrated welfare state that supports climate awareness and long-term political investment in sustainability initiatives, and has taken part in the development of the UN agenda. Furthermore, high levels of trust in government institutions contribute to widespread public knowledge about issues such as overconsumption, global warming, and pollution. However, young people in Norway increasingly experience a disconnect between the sustainability values promoted in public discourse and the country's high consumption levels, which rank among the highest in Europe (Mohamed, 2022). Scholars highlight a paradox in Norway's economic development: while early economic growth contributed to reducing the nation's ecological footprint, surpassing a certain GDP threshold has intensified environmental pressures (Georgescu et al., 2024). This raises important questions about whether sustainability education adequately addresses the tensions between economic expansion and environmental responsibility as coming generations need to address the issues of overconsumption and sustainable life.

A major challenge in assessing the effectiveness of ESD in Norway is a lack of concrete indicators and standardized evaluation tools. While sustainability is a central theme in the national curriculum, there are few mechanisms in place to measure students' environmental awareness or the long-term impact of sustainability education. Unlike other subjects, where national assessments and standardized testing provide more clear benchmarks for success, ESD remains difficult to quantify in the Norwegian context.

Norway's ESD framework benefits from strong policies, multi-sectoral collaboration, and widespread public engagement. However, challenges persist, particularly regarding assessment, regional and local disparities, and economic contradictions. The country's reliance on oil revenues creates tensions between sustainability goals and national economic structures, leading to youth disillusionment and inconsistencies in ESD implementation. To translate sustainability education into meaningful action, it is crucial to critically examine

the economic and policy contradictions shaping its impact. Addressing these challenges will be essential to aligning Norway's strong international reputation in sustainability with domestic educational realities.

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# **Status, Trends and Issues of Education for Sustainable Development (ESD) in Singapore**

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## Abstract

Education for Sustainable Development (ESD) aims to develop students' knowledge, skills, attitudes, and behaviors to address global challenges such as climate change. The Singapore Eco-Stewardship Program integrates sustainability education into various aspects of the curriculum, campus, culture, and community, and the authors argue that these contribute to the notion of human flourishing by fostering eco-consciousness and holistic well-being, taking care of both the person as well as the environment. As ESD emphasizes an integrated approach to education that goes beyond just knowledge acquisition to include critical thinking skills and active engagement, the chapter will include examples from the Singapore context, framing the discussion around the concepts of learning to know, learning to do, and learning to be. The Singapore examples show that learning to do and to be often happen at the same time, while grounded firmly in learning to know. In other words, ESD should go beyond knowledge acquisition to encompass, at the same time, critical thinking, empathy, and a sense of community responsibility. The chapter also describes the importance of teacher quality and hence teacher professional development in the successful delivery of ESD through the Eco-Stewardship Programme. Indeed, the Singapore Eco-Stewardship Programme encourages environmental stewardship, promoting sustainable practices, and develops a culture of sustainability in schools to foster informed and active citizens for our common sustainable future.

**Keywords:** human flourishing, education for sustainable development, climate change education

## Introduction

Whiting (2002) argued that human flourishing can be used to describe the highest type of human well-being, but the term "human flourishing" has only started to gain popularity in recent decades, especially in fields such as education. This is in line with greater aspirations to improve individual and societal well-being and indeed, Ellyatt (2022) argued that “[f]lourishing is when our inner needs are in a state of cohesive balance with the demands of the external world, enabling us to become aware of and focus on what most interests us and brings us pleasure, to hone, express and share our unique skills and capacities and to functionally optimise our lives—physically, psychologically, socially and spiritually” (p. 58). Such an ideal is situated within the contemporary challenges of global environmental change and sustainable development, which raises the question of how education can respond to these challenges while helping our children achieve the ideals of human flourishing.

Dewey (1938) argued that “[e]ducation is not preparation for life; education is life itself” and the purpose of education “has always been to everyone, in essence, the same—to give the young the things they need in order to develop in an orderly, sequential way into members of society” (p. 18). In fact, we as educators aspire to develop in children the capabilities that give them substantive freedom they can enjoy so as to lead the kind of life they have reason to value (Sen, 1999). Human flourishing adds a dimension of the “demands of the external world” to an otherwise person-centric notion (Ellyatt, 2022, p. 59). In referring to Ellyatt’s (2022) notion of the demands of the external world, one cannot ignore the fact that they are closely related to issues of sustainability. In this case, ESD seeks to develop children’s ability to respond to global challenges such as climate change through associated cognitive, socio-emotional, and behavioral learning outcomes. This will in turn contribute to achieving the United Nations’ 17 Sustainable Development Goals (SDGs).

Some may argue that ESD is not something new, as there were references to education for environmental protection and conservation even before the Rio Earth Summit of 1992. The 1987 United Nations Brundtland Commission defined sustainability as “meeting current needs without compromising future generations’ ability to do the same.” This definition emphasizes actions that yield short-term gains while projecting long-term benefits and continuity. The 1975 Belgrade Charter on Environmental Education was focused on knowledge, attitudes, and skills that children need in order to exhibit responsible environmental behavior. Environmental knowledge equips children with scientific understanding of environmental issues, the human impact on the environment, and the possible ways to manage environmental issues. Skills include critical thinking, problem-solving, and being able to take on multiple perspectives in analysis. These skills empower individuals to transition from understanding to taking action or adopting behavioral change for the sake of the environment. Attitudes include fostering respect for nature, developing empathy for the environment and a mindset that prioritizes sustainability. These knowledge, skills, and attitudes also ensure that learners not only understand environmental challenges but are inspired and equipped to undertake effective and significant environmental action.

Similarly, Delors (1998, p. 97) proposed an integrated approach to education, based on four foundational pillars of learning. These pillars include: learning to know, which involves gaining a broad general understanding along with specialized knowledge in specific areas; learning to do, which emphasizes not only developing vocational skills but also the ability to navigate various situations effectively; learning to be, which focuses on personal growth, fostering autonomy, sound judgment, and personal responsibility; and learning to live together, which promotes empathy, mutual respect, and recognition of the interdependence of individuals within society. More recently, there have been discourses around climate change education which are related to ESD. Chang (2023) also proposed three aspects of knowing, doing and being in his book

on climate change education. Such an approach allows us to consider the development of knowledge and skills, but also attitudinal and emotional development as key learning outcomes for ESD.

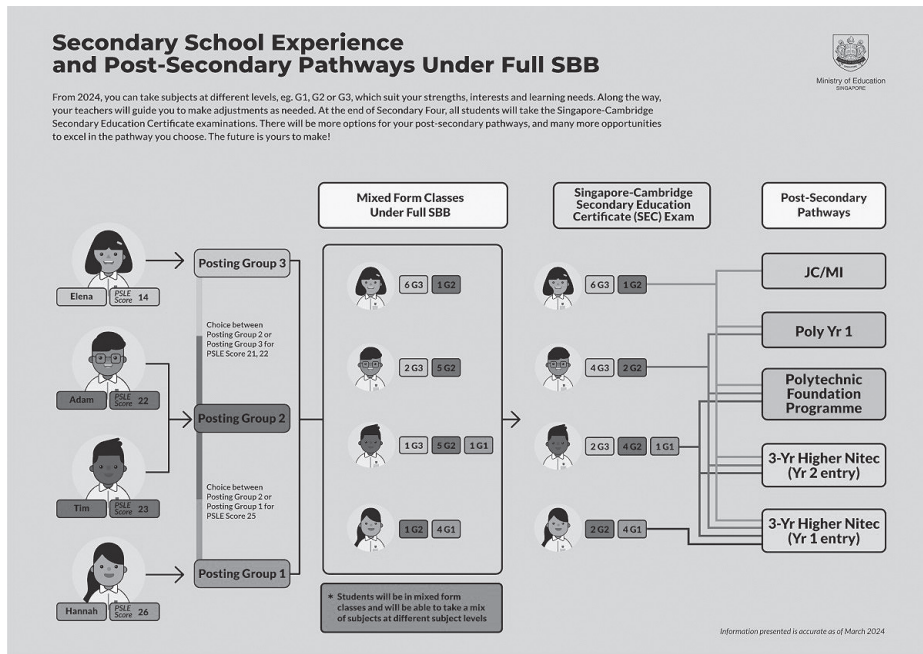
## **ESD and the Singapore Education System**

Singapore is a small tropical island and city-state in Southeast Asia, located about one and a half degrees north of the equator. The city had a total population of just above 6 million people in mid-2024, and it has a high population density of about 8,200 persons per square kilometer (Singapore Department of Statistics, 2024). Singapore has been placed among the top performers in some of the international assessments such as the Programme for International Student Assessment (PISA) and the Trends in International Mathematics and Science Study (TIMSS). It ranked at the top of all countries that participated in the 2022 PISA assessment, with scores in Mathematics, Reading and Science above the OECD averages for these domains (Organisation for Economic Co-operation and Development, 2022). In addition, Singapore also ranked at the top in mathematics and science for Primary 4 and Secondary 2 students in the 2019 TIMSS study (Ministry of Education, Singapore, 2020). While these achievements do not necessarily mean that the country has one of the best and most successful education systems in the world, given the complex economic and social-cultural factors that impact education and success in assessment, it might indicate that the country has sufficiently rigorous curricula and effective teaching strategies. This is corroborated by other scores such as the Teaching and Learning International Survey (TALIS) which showed that Singapore is committed to professional development and that teachers undergo rigorous training and benefit from continuous professional development programs, ensuring high-quality instruction (Ministry of Education, Singapore, 2020). This focus on teacher quality, together with high PISA and TIMSS scores, support

the understanding that Singapore invests heavily in education.

Children between the ages of 6 and 12 in Singapore have 6 years of compulsory primary school education. At this level, they experience a general education in languages (English and their Mother Tongue language), science and mathematics, the arts and humanities, and physical education. They have to take a national level Primary School Leaving Examination (PSLE) at the end of primary education before going on to 4 years of secondary education (ages 12-16). At the secondary level, students take classes based on their ability level for each subject under a Subject-Based Banding (SBB) system that categorizes the subjects that a student can take into the subject levels of G1, G2 and G3 (Ministry of Education, Singapore, 2023). These levels correspond to the Normal Technical level, the Normal Academic level, and the Express Stream level, respectively. When they enter secondary education, students are assigned to a posting group based on their PSLE score. Students who are in Posting Groups 1, 2 and 3 will likely take G1, G2 and G3 classes, respectively. Throughout their secondary education, students' subject levels for different subjects can change based on their interests and strengths. See Figure 1 for an illustration of these pathways.

**Figure 1** Singapore Secondary School Experience and Pathways Under Full SBB



Source: Ministry of Education Singapore, 2024.

For example, a student might study Mathematics at the G2 level and English at the G3 level. There are also mixed-form classes, where students from different academic levels learn together for common subjects. After students complete their secondary education, they will be able to consider post-secondary options, including entry into Junior Colleges, Polytechnics, and the Institute of Technical Education, that will prepare them for higher education or vocational training (Ministry of Education, Singapore, 2023). The education system caters to differentiated learning through this structure, and ESD is delivered through the school system within this context.

## *ESD in the Singapore Education System*

In 2006, Singapore became the 168th state to ratify the Kyoto Protocol (Ministry of Environment and Water Resources, Singapore, 2006). Singapore signed the Paris Agreement on April 22, 2016 and ratified it on September 21, 2016. Since then, Singapore has participated in various multinational initiatives that encourage comprehensive and holistic approaches to climate change mitigation. In accordance with its international commitments, Singapore developed the Green Plan 2030 (Singapore Green Plan 2030, 2024), which focuses on the following five areas:

- City in Nature,
- Energy Reset,
- Green Economy,
- Resilient Future, and
- Sustainable Living.

(Singapore Green Plan 2030, 2024)

ESD in Singapore is guided by the Eco-Stewardship Programme (ESP). The ESP was developed as the educational response to the Singapore Green Plan, under the areas of Resilient Future and Sustainable Living. The ESP is described as a way to “nurture generations of Singaporeans to be stewards of the environment” (Singapore Green Plan 2030, 2024). The ESP in Singapore is a whole-school approach that is organized around the four pillars of Curriculum, Campus, Culture, and Community (Ministry of Education, Singapore, 2021). Sustainability topics are found across subjects in the curriculum. The learning outcomes for the ESP across levels are as follows:

- Primary level – to develop an awareness of the human-environment relationship and the anthropogenic environmental issues.
- Secondary level – to understand and extend learning of these issues to the impact of human action on the environment and the need for man-

agement of environmental impact

- Pre-University level – to deepen the understanding of the human-environment interactions and interdependence, and take action for environmental issues to achieve sustainable development

(Ministry of Education, Singapore, 2021)

In particular, the Primary Social Studies subject emphasizes the importance of resource management, and the Secondary Science curriculum includes the topic of Sustainability. Further, the Upper Secondary and Pre-University Geography curriculum also incorporates the theme of sustainability, addressing environmental concerns in Singapore, sustainable urban development, and related innovations in environmental management in the region (Ministry of Education, Singapore, 2021).

While eco-friendly campus practices, such as the installation of solar panels and water-saving taps, help to reduce the schools' carbon emissions, ESD culture promotes everyday sustainable habits and community partnerships, including programs like the Go Green SG and Values in Action projects, which foster student involvement in local environmental efforts. The Ministry of Sustainability and the Environment leads Go Green SG, which is a nationwide initiative that brings together citizens, private and public organizations, and the community to create a more sustainable Singapore (Go Green SG, 2024). Values in Action, on the other hand, is a student development experience that focuses on values, knowledge, and skills for socially responsible children who will contribute to the community (Ministry of Education, Singapore, 2022c). While there are no explicit definitions of national ESD indicators for K-12 education, Singapore's ESD policies aim to cultivate eco-conscious individuals who are prepared for green economy roles, and this encourages their active community engagement in sustainability from a young age.

To elaborate using the five priority action areas as outlined in UNESCO (2020), the ESP advances policy by addressing issues of climate change and

the unsustainable use of resources through the use of SG’s Sustainability challenge theme: carbon emissions and a food sustainability theme in 2023, which supported schools through strengthening their curriculum focus and resources on sustainable food production and waste management, respectively. The ESP also sought to transform the learning environments through enhancing the schools’ infrastructure to reduce the carbon footprint of campuses in addressing climate change, planting trees into the school environment to minimize the loss of biodiversity, and utilizing energy-efficient technologies to reduce unsustainable use of resources. To build educators’ capacities, pre-service education for teachers features a uniquely integrative approach. All pre-service teachers are required to take a course on “Singapore kaleidoscope” which features a topic on sustainability. The coverage includes a key seminar on the theme and the students’ assignments which are based on the approach of appreciative inquiry and can also draw on the theme of sustainability (National Institute of Education, 2025). In addition, all pre-service teachers who go through the Double Major Undergraduate program in their Subject Discipline and Education are required to take an interdisciplinary collaborative core course titled “Sustainability: Society, Economy & Environment.” The key learning outcomes for the course have an interdisciplinary focus on social, economic, and environmental perspectives, as well as solutions for sustainability across individual, organizational, and global scales (Nanyang Technological University Singapore, 2025). For professional development, the resources and learning materials for teachers are available on the teacher professional learning platform—One Portal for All Learners (OPAL). Teachers have lesson packages and resources that address the challenges of climate change, loss of biodiversity, and unsustainable use of resources. These utilize the school’s environment and also work on raising awareness of children about their own carbon footprint reduction. In particular, the encouragement to reduce energy, food, and water waste also targets the action area of empowering and mobilizing youth. In terms of accelerating local-level actions, the expansion of environment-related volunteering and enrichment in the ESP also strengthens

students' awareness.

Beyond the formal education system, informal education through the community is also a feature of the Singapore Green Plan. In 2022, several government agencies in Singapore, such as the Ministries of Transport, Education, Trade and Industry, and Sustainability and the Environment have worked with the National Youth Council to organize a series of Green Plan Conversations (Singapore Green Plan, 2022). The discussions among industry representatives, youth, educators, government representatives and members of the public were around topics of how Singapore can meet the Singapore Green Plan 2030 goals. The discussion involved green transportation, sustainable living practices, the green economy, and developing climate resilience. Community involvement, and in particular youth advocacy, was also discussed (Singapore Green Plan, 2022). Based on the official documents about these conversations, participants appeared to reach a general consensus on the importance of collective action. This is in agreement with the study by Wi and Chang (2019) which found that Singaporeans are aware that everyone has a part to play in managing the environment.

The authors argue that ESD in Singapore, which is carried out through the ESP, contributes to the development of children for the goal of achieving human flourishing. It goes beyond the emphasis on cognitive goals to include important aspects of dispositional, and even social, outcomes of learning. In a way this considers the holistic individual and societal well-being together with the eco-systemic demands of the changing environmental conditions. The convergence in these approaches of looking across knowledge, skills, attitudes, and behavioral learning outcomes points to an integrated and holistic approach to sustainability education. In reviewing the example of the Eco-Stewardship Programme (ESP) in Singapore (Ministry of Education, Singapore, 2021), we shall be framing the discussion around the notions of knowing, doing, and being to illustrate how ESD is practiced in the city state of Singapore.

## Environmental Sustainability as an Example

Environmental sustainability is taught across different school subjects in Singapore. However, as the authors are geography educators by training, there is an affinity for the subject as well as the positionality of a geographer. It would be remiss of the authors not to present the perspective of climate change education through the lens of geographical education. The International Charter on Geographical Education published by the Commission of Geographical Education (CGE) (CGE, 2016) posits that “geographically educated individuals understand human relationships and their responsibilities to both the natural environment and to others.... geographical education helps people learn how to exist harmoniously with all living species” (CGE, 2016, p. 6). Sustainable development is explicitly stated as the overarching theme of the geography syllabuses at all levels (Ministry of Education, Singapore, 2022b, p. 3). The topics within the syllabuses are aligned to sustainable development issues, including sustainable resource use, consumption and management, sustainable development of cities, and sustainable economic development. The content is organized around geographical concepts, while the teaching of the content is framed around inquiry-based learning. The purpose of these approaches is to develop geographical thinking alongside the learning of content for the purposes of knowing, doing and being. Consequently, the discussion presented in this chapter uses examples from geography education, while examining how this is related to the curricula of other school subjects, in the context of the Singapore ESP.

The discussion also features the trends of ESD in the context of Singapore. First, the learning outcomes for ESD go beyond the knowledge domain. Second, there is a focus on learning by doing. Third, ESD in Singapore focuses heavily on the values and dispositional aspects that would result in actual action. Fourth, ESD engages multiple stakeholders, beyond just students and teachers to different members of society. Finally, there is also a focus on

teacher development. This ensures an understanding of the collective responsibilities that are needed in the context of the Singapore society.

## Features of Singapore's ESD

### *Beyond cognitive outcomes - Knowing*

For the ESP, teachers use real-world examples and case studies, including sustainable campus features, to engage students in learning about ESD. While the ESP seeks to foster awareness, develop understanding, and encourage action towards sustainable development, the knowledge aspect of the curriculum includes the objectives to have students be able to:

- Understand the relationship between people and the environment
- Recognize how humans rely on the environment for resources
- Understand and analyze the causes of issues arising from human action on the environment and its resultant impact
- Examine solutions that address sustainable management of the environment

(Ministry of Education, Singapore, 2021)

These learning outcomes help students to ask critical questions and engage with the pressing issues that impact their lives. This is what knowing is about. These objectives are achieved through various school subjects. Using climate change for example, the subject of science delves into essential concepts such as the greenhouse effect and climate models, while the subject of geography emphasizes the study of climate patterns, how climate affects people and how humans impact climate. In addition, the social studies subject can help students investigate critical policy responses and the principles of environmental justice (Chang, 2023). The issue with the readily accessible information

through search functions using the internet is that we are easily tricked into thinking that we are able to learn anything with just a click. However, the dilemma remains: How can we search for answers when we do not know what questions to ask in the first place? We do not know what we do not know.

In climate change learning, this problem is even more pronounced when we consider that the climate system is in a delicate balance among factors like solar radiation, greenhouse gases composition, feedback mechanisms and a whole range of natural and human forces. As we seek to understand the climate system, we are faced with the complexity where new knowledge builds upon, and is sometimes challenged by, what we previously thought we knew. In as far as human flourishing is concerned, having knowledge that supports climate change understanding is important as it allows students to ask critical questions, increase their intellectual capabilities, and interact with the current issues affecting their lives. However, knowledge alone is insufficient. The authors contend that it is necessary to have powerful knowledge. The notion of powerful knowledge, introduced by British education sociologist Michael Young (Young et al., 2021), pertains to knowledge that equips individuals with the ability to comprehend and interact with the complexities of the world in a meaningful manner. To elaborate, we do not just teach students about facts such as what the longest river on Earth is, where the highest mountain is, or which is the most populous nation in the world. These are easy facts to teach, but what students make of these facts or how we want them to be able to draw conclusions about these geographical phenomena is what we are describing as powerful knowledge.

For climate change, powerful knowledge enables learners to understand the intricate interrelations among different scientific, economic, and social factors that impact this global phenomenon, helping us to identify the areas in which our understanding may be lacking or erroneous. The following excerpt illustrates this argument for powerful knowledge:

*There is an argument about climate change that goes like this. The UK's contribution to global emissions of greenhouse gas is only a small percentage. There's not much point in taking responsibility for our own place when India and China are growing as they are. Now I might have found that a comforting argument but it seems it's a totally inadequate geography. What that small percentage counts is the greenhouse gas emissions from the United Kingdom directly. In that sense it treats the UK as an isolated entity - but it is not. That calculation it seems, misses out the effect of all the things we import from elsewhere, many of them indeed from China. We demand of those goods, that we do not count as our own, the pollution of producing them.*

(Massey, 2007)

Suppose that students were only provided with a graph of various countries' greenhouse emissions; geography teachers who have a sufficiently deep understanding of geographical concepts can take the students beyond their current understanding by asking questions that highlight spatial interconnections and flows. For instance, the teacher can ask questions such as “Which country are the sneakers that you are wearing made in?” and “Where should the carbon emissions from making the shoes be included in these graphs?”. This enables students to understand the complex spatial relationships that exist in the production, transport and consumption of goods and services, as well as developing a more critical understanding of carbon accounting and emissions in a globalized world.

The role of teachers in the development of powerful knowledge cannot be over-stated. In the Singapore context, geography teachers are encouraged to see themselves as curriculum makers (Ministry of Education, Singapore, 2022b), recognizing that a centralized national syllabus and suite of teach-

ing and learning resources do not lead to identical learning experiences in the classroom. For instance, Seow and Ho (2016) found that teachers using the same centralized curriculum and textbooks approached the teaching of climate change topics in markedly different ways, based on their own beliefs, values and content knowledge of the topics. Additionally, Seow et al. (2020) similarly found that teachers' professional and subject identities variously affected the ways in which they designed and conducted fieldwork on water quality using a common fieldwork site and suite of resources. How teachers interpret the standards or syllabus based on their own geographical training, select resources and classroom activities, and design assessments are crucial to helping children learn better and empowering them to do well in society. This has led to the prominence of curriculum making in teacher education and professional development in Singapore. In a chapter that focuses on how geography teachers' professional development in Singapore focuses on encouraging teacher agency, Seow (2024) suggested that teachers' curriculum making (as outlined by the Geographical Association<sup>1</sup>), together with inquiry-based learning, helps students to develop geographical thinking and contributes to powerful geographical knowledge. We argue that this is fundamental to allowing learners to go beyond that which they know.

It is also vital for children to develop the ability to discern skeptical views about climate change, as this empowers them to navigate complex and often polarized discourses critically. For example, studies have looked into how various stakeholders, such as huge corporations, employ framing techniques to undermine the scientific consensus on anthropogenic global warming (Busch & Judick, 2021). The literature suggests that students who took part in problem-solving-based climate change education programs were better at critical thinking, especially when it came to understanding complex environmental issues (Perdani et al., 2023; Young et al., 2021). Chang et al.'s (2018) study

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1 <https://geography.org.uk/curriculum-support/support-guidance-curriculum-planning/curriculum-making/>

also showed that students could clear up inaccurate, incomplete or incoherent understanding after using refutation texts that looked at false information, thereby helping them correct these misconceptions.

### ***Beyond cognitive outcomes - Doing***

Learning to do includes skill and competence, as well as life skills for work. The authors argue that these go beyond developing cognitive competence to behavioral changes. The ESP seeks to develop in learners' skills and ability to:

- Construct understanding through investigation
- Evaluate multiple sources and viewpoints to make well-informed, evidence-based decisions
- Communicate evidence-based findings and perspectives to various stakeholders
- Contribute solutions to complex and contemporary environmental issues

(Ministry of Education, Singapore, 2021)

Climate change doing in the context of being able to make informed decisions is essential for human flourishing, as it empowers autonomy, encourages informed decision-making, and enhances our understanding of the world. When students are able to make informed decisions about the actions they want to take, they would then be able to attain the ideals of meeting the external demands of the world while beginning to develop capabilities that empower them to lead the lives they desire, all within the ecosystemic needs of the planet. The notion of doing also requires learners to take action as an outcome of a good sustainability education. Numerous studies indicate a correlation between individuals' environmental actions and their level of environmental knowledge and comprehension (Chawla & Cushing, 2007; Kenis & Mathijs, 2012; Poortinga et al., 2003).

Wi and Chang (2019) argued that environmental actions or behaviors may evolve into habitual practices when taken on consistently. Instead of depending on conscious attitudes and reasoning for each action, such behaviors can be guided by automated cognitive processes—habits, short (Chang & Wi, 2018). In essence, the pursuit of environmental action can be informed by cognitive frameworks that individuals can acquire, retain, and access from memory when faced with specific circumstances (Steg & Vlek, 2009). In Wi and Chang’s study (2019), participants were asked to work on task-oriented problem solving, and they were also provided with a platform should they need to seek clarification from an expert. The objective was to improve the participants’ knowledge, skills, and values in the area of energy consumption management. The authors found a significant drop in the utility bills for the experimental group, showing that the program resulted in a change in energy consumption behavior (Wi & Chang, 2019). This is the type of climate action, or learning to do, that climate change education seeks to encourage.

In Singapore, the emphasis on learning to do in education can be clearly discerned through a number of programs that emphasize taking action within the formal curriculum. For example, in geography, the emphasis on geographical investigations as a signature pedagogy (Seow et al., 2019) involves all students participating in field-based learning to not just know, but to also then take action to do something about sustainability-related issues they have discerned. Another example is Commonwealth Secondary school’s eco-habitat enhancements on the campus to emulate natural habitats like the rainforest and wetlands. These eco-habitats provide students with authentic ecosystems to study and observe how organisms depend on each other for survival, which then translates into opportunities to take on roles like acting as guides for local and international visitors on biodiversity trails around their eco-habitats (Commonwealth Secondary School, 2024).

Learning to do is also reinforced through opportunities to participate in a range of school-based activities, such as Co-curricular Activities, Applied Learning

Programs, and Values in Action experiences focused on sustainability, in addition to the skills and competence learnt through the curriculum. These could include examples like having students set up their own school gardens, doing an audit on their own home energy consumption, or even taking part in local environmental initiatives so that they can develop a deeper connection with their community (Chang, 2023). An example from Singapore's ESP is that of Elias Park Primary School (EPPS). EPPS advocates zero food waste through a program where their 9-year-old students make compost from fruit peel and work with canteen vendors to recycle excess food using bio-digesters. The resulting fertilizer is used to nourish school plants (National Archives of Singapore, 2019).

Ho and Seow (2023) further suggested that non-formal learning outside of school settings has the potential to support environmental citizenship education. For instance, Tan et al.'s (2023) study of the impact of informal learning in science and geography education through an immersive non-residential camp program suggested that outdoor learning increased students' nature-connectedness. Moreover, by learning firsthand from community partners involved in marine conservation efforts, students reported feeling a sense of hope and motivation to act.

Indeed, the ESP in Singapore has great potential for active and engaged learning as it is set up to engage the students within and beyond the formal curriculum and to provide opportunities through various collaborative and community projects. This is in alignment with the concept of human flourishing, as the participants are equipped to take action for beneficial transformations in their surroundings. However, the doing aspect of learning does not take into account the attitudes and beliefs of these learners. Wi and Chang (2019) also conducted a survey on participants' attitudes and beliefs about taking environmental action, and this informs the discourse on the next segment of our chapter - being.

### *Beyond cognitive outcomes - Values and dispositions*

Developing individual growth and the capacity to make well-informed and accountable choices about sustainability contributes to the being aspect of ESD. This approach will enhance self-awareness and promote personal responsibility through reflective practices like journaling or engaging in group discussions focused on ethical dilemmas related to sustainability issues like climate change. To illustrate, the idea of being encourages individuals to internalize environmental responsibility as part of their identity. When people adopt sustainable practices as part of their lifestyle, they contribute to both personal fulfilment and the broader goal of sustaining human life on Earth, thereby supporting overall flourishing. This approach requires education to transcend our usual aspirations for knowledge, skills and action. This requires a shift in perspective, a fundamental transformation in disposition, “as it isn’t just about having attitudes or values about the individual and their relationship to the environment but also a consideration of the individual’s interaction with the environment in relation to the community” (Chang, 2024, p. 78). It certainly demands an examination of the individual’s engagement with the environment in the context of the broader community, including the global community.

One pillar of the ESP is the campus, whereby school campuses are progressively enhanced with sustainability features. These include planting more trees, installing energy-efficient technologies such as LED lights, as well as the deployment of solar panels to tap into alternative energy sources. In the example of Tampines Secondary School in Singapore, they have set up a green sanctuary. The teachers in the school transformed a school quadrangle into a sustainable sanctuary, featuring butterfly host plants, edible greens, and a restored swing. The garden fostered student learning about self-sufficiency, gardening techniques, and the importance of nature through having them care for the butterflies’ habitat (Lee, 2024). One of the students’ reflection was that “[p]rogress happens step by step; there are no shortcuts – just like how plants

sprout from tiny seeds and gradually blossom.” Another student with autism spectrum disorder said that chasing butterflies in the garden “was calming for her” (Lee, 2024). These two examples of student reflections go to illustrate the authors’ argument that human flourishing involves learning that contributes to both personal fulfilment and the broader goal of sustaining life on Earth.

In addition to the current state of wellbeing and flourishing of students, the ESP also strengthens students’ awareness of future “green jobs,” such as jobs in green urban design, renewable energy and sustainability technologies, water management, food sustainability, urban farming, and green financing. Some Institutes of Higher Learning (IHLs) have refreshed their course offerings and are introducing specialized courses and common modules to equip individuals with forward-looking skills to thrive in emerging green jobs or existing jobs that are being “greened.” Some of these IHLs use their campuses as “living labs” to support national research and talent development initiatives. The ITE-SembCorp Centre for Sustainable Solutions at the Institute of Technical Education (ITE) College East provides training in integrated sustainable solutions, with a focus on photovoltaic systems. The center seeks to train approximately 440 students and mid-career professionals each year in order to build the qualified workforce required for Singapore's solar panel industry (Ministry of Education, Singapore, 2022a). It is through this holistic approach of preparing children for their current well-being and their future potential that we begin to see how human flourishing can be achieved through a robust ESD.

### ***Developing collective responsibilities among stakeholders in context***

All of the above categories of Knowing, Doing and Being are necessary to ESD, and there is value in school-based and non-school-based programs that develop knowledge and skills, encourage them to take action, and consider sustainability as being core to their identities. After all, the actions of an individual are fundamentally influenced by their underlying values. Wi and Chang (2019) conducted an examination of participants’ values based on the Value-

Belief-Norm theory of environmentalism (Sarrasin et al., 2022; Steg et al., 2014), specifically within the framework of climate change education. The study observed that participating in their program led to a 21.8% increase in the number of participants who held the belief that individual household actions can significantly impact climate change. This suggests that the study facilitated not only the development of behavior, but also fostered a sense of identity among individuals. More importantly, the research indicated that certain participants perceived individual action as inadequate, emphasizing that all members of the community share a *collective responsibility*. This underscores the importance of collaborative efforts in fostering a harmonious coexistence, for human flourishing. In essence, it is imperative for an individual to contemplate engaging in climate action not solely due to personal ethical responsibilities, but also in recognition of their role within a broader community context.

Discourses on climate change often exhibit a deficiency in empathy towards genuine critical discourse. Discussions in environmental education prioritize rational and logical reasoning (Ohman & Ostman, 2019). This focus may unintentionally diminish the importance of empathy in our interactions with the varied viewpoints of stakeholders involved in the challenges of climate change adaptation and mitigation. The examination of empathy involves acknowledging the potential trade-offs that different stakeholders might encounter, depending on the particular context of climate change mitigation or adaptation strategies. Martusewicz et al. (2015) argued that a thorough comprehension of the intricate social, economic, and environmental trade-offs is crucial for the implementation of effective climate action. In the absence of a comprehensive grasp of the intricate trade-offs at play, discussions may inadvertently stray from the concrete human experiences and the repercussions that stem from climate policies.

Although the existing body of research on effective pedagogies for teaching

trade-offs is limited, Chang (2024) described the use of a card game known as “Getting to Zero” (GTZ) developed by the National Institute of Education (NIE) Sustainability Learning Lab (SLL)<sup>2</sup>. The game employs a range of climate change adaptation and mitigation strategies, which are articulated through various cards that display values related to carbon emissions and economic growth. The objective of the game is for the winning player to achieve the highest reduction in carbon emissions, represented through a straightforward comparison of values associated with carbon cuts and monetary worth. In the event of a tie among participants who have achieved the highest reductions in carbon emissions, the determining factor for victory is the player possessing the greatest remaining monetary value. This represents the ideal scenario that policymakers aspire to achieve, wherein the reduction of carbon emissions occurs without hindering economic growth.

However, the dynamics of the game are not entirely simplistic. Every card that possesses value is crafted to illustrate the possible trade-offs that exist in our world. For example, the card illustrating the utilization of the ASEAN Power Grid for alternative energy generation demonstrates a favorable carbon reduction value; however, it is important to note that this strategy may impose additional financial burdens on the economy. In the example of the GTZ as described by Chang (2024), students who play this card game are then provided with the opportunity to understand the trade-offs. Seow (2023) also emphasizes the potential of the game to engage students beyond economic and energy policies to consider the social impacts of climate action across different place contexts. For instance, while Singapore may benefit from the ASEAN power grid, there are social consequences to dam building for local populations and ecosystems.

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2 Learn more about GTZ, the rationale behind its development and associated resources here: <https://singteach.nie.edu.sg/2024/01/09/game-your-way-to-a-greener-tomorrow-sustainability-education/>

### *Embedding social and global awareness in ESD pedagogy*

Seow et al. (2024) further argue that developing a sense of responsibility for socially and distant “others” should be a fundamental part of ESD. The authors suggest three curriculum principles that teachers in Singapore and beyond can use which allow students to: 1) view environmental phenomena occurring in faraway places as connected to students’ own lives and experiences; 2) understand other people’s beliefs and values in their own lived contexts; 3) guide students on how to take effective and wise social action that meets the needs of others in their own social contexts.

In the examples provided above, not only do the students develop critical thinking skills as they have to make strategic decisions based on the options available, but they also have to consider varied societal values and outcomes essential for making informed and contextually appropriate decisions. Sustainable development is a messy problem. ESD curriculum and pedagogy need to be designed to convey these complexities and intricate nuances in order to be effective. This extends beyond knowing and doing to being, and emphasizes the imperative of recognizing our shared existence within a global community. The authors have demonstrated various practices and examples from the literature and in relation to the Singapore ESP. The framing of ESD using knowing, doing and being also addresses the central question of how it can bring about human flourishing. If we concede that human flourishing requires the development of our students so that their personal needs are in balance with the demands of the external world, the knowing, doing and being helps them become aware of what is happening so that they can focus their attention on what matters both to them and to the society and the environment.

## Trends in ESD

Singapore's ESD landscape is undergoing a dynamic evolution, driven by a desire to cultivate deeper, more authentic learning experiences that move beyond knowledge acquisition. While the nation has already established strong foundational features in ESD and acknowledged critical implementation challenges, new trends are emerging that reflect an adaptive and forward-looking education system. These trends are not simply reiterations of current practices or problems—they signal deliberate progressions that address gaps, capitalize on opportunities, and strengthen the relevance of sustainability education for the next generation of learners.

### *Expansion of experiential, action-oriented learning models*

There is a growing emphasis on deepening experiential learning approaches that immerse students in authentic sustainability challenges. Beyond existing school-based activities, schools are increasingly adopting project-based learning, service-learning, and student-led sustainability campaigns. These pedagogies enable students to co-create solutions, collaborate with peers and external stakeholders, and engage in real-time decision-making. This trend reflects a shift from simply "doing" tasks to designing meaningful action with impact, empowering students as changemakers and environmental advocates.

### *Interdisciplinary curriculum integration*

While educators have recognized the interdisciplinary nature of ESD as a challenge, a new trend is emerging that moves toward proactive curricular integration of sustainability across traditional subject boundaries. Rather than treating sustainability as a stand-alone theme, schools are rethinking curriculum design to embed sustainability within science, humanities, arts, and technology in meaningful and interconnected ways. This trend encourages systems

thinking, enabling students to grasp the multifaceted nature of global issues and equipping them with the ability to synthesize diverse perspectives when approaching complex environmental problems.

### ***Strengthening professional learning networks for teachers***

Beyond formal professional development, there is increasing attention on cultivating collaborative and sustained professional learning communities that support teacher growth in ESD. These communities of practice go beyond one-off training sessions by promoting peer mentoring, joint curriculum planning, interdisciplinary collaboration, and reflective dialogues on sustainability pedagogy. The goal is to create distributed expertise within schools, empowering educators to innovate and contextualize ESD meaningfully in their classrooms, while collectively building pedagogical resilience and leadership in the field.

### ***Fostering community-centric sustainability engagement***

ESD in Singapore is gradually moving beyond the school gates through a growing emphasis on community partnerships and place-based learning. Schools are positioning themselves as hubs of environmental engagement by working with local organizations, parent groups, civic bodies, and public agencies. This trend supports a whole-of-society approach to sustainability, where students are encouraged to apply their learning in community contexts and witness the social dimensions of sustainable action. Such engagement fosters a stronger sense of belonging, civic responsibility, and relevance in students' sustainability efforts.

### ***Cultivating sustainable identity through values-based education***

ESD in Singapore is in alignment with the country's move toward character and citizenship education (CCE) which features strongly values-based education, among its various goals. Singapore's CCE nurtures values and social-

emotional competencies in students. Schools conduct activities for holistic student development, including co-curricular activities, learning journeys, and Values in Action. This is where ESD and CCE are enacted, through the activities such as Values in Action.

## **Key Issues, Challenges and Opportunities for ESD**

### ***Addressing subject matter knowledge***

There is a pressing need for educators to have deeper content knowledge and understanding of sustainability issues as gaps in current understanding may limit the effective implementation of ESD, and as we argue, limit human flourishing potential. Chang and Ow (2023) argued that one of the primary challenges for any ESD implementation is the need for better teacher preparation. While the argument this far has been to consider the learning to know, do and be aspects holistically, one fundamental challenge to taking action or inculcating the values that support sustainability action seems to be inadequate subject matter knowledge. Whether it is to save electricity through households, or understanding the trade-offs in climate change strategies, for instance, deep and true understanding that leads to behavioral and attitudinal learning outcomes requires good subject matter knowledge. Chang and Ow (2023) suggested that many teachers need stronger pedagogical content knowledge (PCK) in sustainability topics. Many educators lack sufficient content knowledge about climate change. Misconceptions among teachers, such as the belief that ultraviolet rays cause global warming, highlight gaps in understanding (Chang & Pascua, 2017). These knowledge deficiencies often translate into low confidence and a reluctance to delve deeply into the topic, further perpetuating superficial coverage. Studies have highlighted gaps in both content knowledge (CK) and pedagogical knowledge (PK) among teachers, which are critical for designing

and delivering effective ESD curricula (Chang & Ow, 2023). Ho and Seow (2015) also found that teachers sometimes avoid engaging with critical discourses about climate change because of their own lack of clarity on climate science.

### ***Bridging disciplinary boundaries in ESD***

The complex and interdisciplinary nature of ESD further worsens these issues. ESD calls for an integrated approach that connects different subject areas and so teachers often need to go beyond the traditional disciplinary boundaries to facilitate meaningful discussions on complex issues. Sustainability education draws on the subject matter of multiple disciplines—including those of geography, economics, and other social sciences—and the ability to connect these perspectives. However, teachers often find it challenging to transcend traditional disciplinary boundaries, resulting in fragmented and superficial instruction. For instance, Ho and Seow (2017) found evidence that Singapore teachers' own ontological views about the nature of geography led to them teaching about climate science as objective fact, without a need to engage in further social controversy which falls outside the perceived boundaries of the subject. Moreover, there is evidence that teachers have concerns about their students' ability to engage in complex social and scientific issues (Seow & Ho, 2016) and would rather not raise them in their classrooms.

We argue therefore that more can be done in the Singapore context to help teachers address their knowledge gaps in content and pedagogy, and build synoptic capacities such as the ability to connect and integrate knowledge across disciplines. A study by Chang and Pascua (2017) examined how teachers perceive of their own readiness to teach about climate change, and found that a good proportion (65%) of the teachers surveyed expressed concerns regarding the absence of adequate support (65%) and professional development courses and platforms (75%) for discussing climate change related issues. Additionally, teachers often face difficulties weaving climate change discussions seam-

lessly across subjects due to time constraints and curriculum rigidity (Chang & Pascua, 2017).

### ***Developing communities of practice***

One of the better ways is to engage teacher professional development through communities of practice. “When teachers have opportunities to learn in the ways they are expected to teach—by studying, doing, and reflecting; by collaborating with other teachers; by looking closely at students and their work; and by sharing what they see—they can begin to develop a new image of what, how, and who they teach” (Darling-Hammond & McLaughlin, 1995, p. 597). For example, Colombia’s “Todos a Aprender” program emphasizes coaching, collaboration, and the development of instructional materials using a teacher-centered design (Reimers, 2017, p. 9). In Singapore, this is done through a system of Networked Learning Communities (NLCs) run by the Association of Singapore Teachers<sup>3</sup>. For instance, these NLCs cover a range of teacher-initiated topics including teaching conceptually, deepening learning through Geographical Investigations, among others—many of which support ESD directly or indirectly. However, the number of teachers participating in these NLCs is limited and should be expanded if possible, with a greater focus on helping teachers bridge knowing to doing and being for their students. Finally, teachers could be encouraged to reflect more on their stances on the role and purpose of the academic subjects they teach in empowering students to form their own value judgments, aligning their conclusions with ethical considerations and informed reasoning. In doing so, they can grow into reflective citizens capable of making meaningful contributions to global environmental challenges.

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3 Find out more about the Geography subject chapter NLCs here: <https://sites.google.com/moe.edu.sg/geogchapternlcs/introduction-to-nlcs?authuser=0>

### ***Addressing persistent misconceptions and apathy***

Students in Singapore are exposed to climate change discourse through formal education as well as other media sources. However, reliance on media often fosters misconceptions, such as the conflation of ozone depletion with global warming (Chang & Pascua, 2017). Teachers frequently encounter students who believe they already “know a lot” about climate change, which can lead to their disengagement from the issue, and worse yet, can result in apathy. These trends underscore the importance of critical media literacy as part of climate change education.

Engaging students in climate change education poses additional challenges. Singaporean youth, often detached from nature due to their urban lifestyle, struggle to relate to environmental issues (Chang & Pascua, 2017). Teachers also report difficulties connecting theoretical knowledge to practical actions, leaving students feeling pessimistic and powerless about addressing climate change. The disconnection between classroom learning and societal practices exacerbates the challenges of climate change education. Teachers observed that values promoted in schools, such as recycling, are often undermined by inconsistent behaviors at home and in society. Thus, the Singapore ESP focus on developing the campus is a good way to encourage a more integrated learning process between the curriculum, the campus and the community. Schools setting up eco-sanctuaries or eco-habitats in the school compound are an exemplification of this idea.

### ***Bridging knowledge and action in ESD pedagogy***

Pedagogy matters. Good pedagogy is essential for effective ESD as it bridges knowledge with action, ensuring that students not only understand the sustainability issues but can develop critical thinking and agency to respond to these issues. Chang and Pascua (2017) further suggested action-oriented pedagogy as a way to enhance student engagement by linking abstract concepts to prac-

tical solutions. The Singapore ESP's emphasis on community and culture is best brought about through action-oriented pedagogy. Teachers can design experiential learning opportunities, such as sustainability projects or field trips, that empower students to take tangible actions. These often require the use of a whole-school approach to ESD. This can help bridge the gaps between disciplines and align classroom practices with broader societal values. Schools should be encouraged to implement pro-environmental programs, such as "Green Days," that promote awareness and action across the entire school community. The projects from EPPS, TSS and CWSS are such examples. By fostering experimental and problem-based learning, students can connect abstract concepts to real world issues, empowering them to take on meaningful action.

Climate change education in Singapore illustrates the broader challenges and opportunities of ESD. While progress has been made in incorporating climate change into the curriculum, through a whole school approach, some challenges remain, including teacher preparedness and societal disconnects. By addressing these challenges through targeted teacher preparation, interdisciplinary collaboration, and action-oriented pedagogy, Singapore can strengthen its ESD efforts and contribute to a more sustainable future.

## **Conclusion - Knowing, Doing and Being**

The Singapore ESP equips students with the knowledge, skills, and values that will develop them as environmental stewards by holistically integrating sustainability in the curriculum, campus practices, culture, and community. The ESP program addresses climate change and resource sustainability through curriculum enhancements, infrastructure improvements, and educator support. These initiatives aim to reduce carbon footprints, promote biodiversity,

and empower youth to take action. This approach enables students to "learn to know, learn to do, and learn to be," as it enhances the teaching and learning of sustainability across various school subjects, including Science, Social Studies, and Geography. ESP also promotes hands-on learning and the development of practical skills. Through campus sustainability initiatives, as well as opportunities to learn and do in the formal and co-curriculum, this holistic approach to ESD not only equips students with the knowledge and skills needed for sustainable living, but also shapes the students' values and identity, and prepares them to be responsible eco-stewards. This whole curriculum approach to integrating sustainability into all aspects of school life empowers students to flourish as informed individuals and active participants in building a sustainable future, which is aligned with Singapore's Green Plan 2030.

However, as in every context, policy and institutional goals need time and space to be enacted successfully on the ground. Further research on the effectiveness of the various components of ESP will also be important to chart the future development and growth of Singapore's ESD efforts.

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**Appendix:** A Cross Table of Five Priority Action Areas and Four Interconnected Global Challenges

Five Priority Action Areas	Four Interconnected Global Challenges to be Addressed			
	A. Climate change	B. Loss of biodiversity	C. Unsustainable use of resources	D. Inequality,
1. Advancing policy	Developing school-based environmental policies and programmes to help schools reduce carbon footprint.  Use of SG's Sustainability challenge theme: carbon emissions	NA	2023: Adopted a food sustainability theme which supported schools through strengthening curriculum focus and resources on sustainable food production and waste management.  Included policies on energy, water conservation and waste management	NA
2. Transforming learning environments	Implementation of energy-efficient technologies  Enhancing infrastructure to reduce school's carbon footprint.	Planting trees into school environment	Implementation of energy-efficient technologies	NA
3. Building capacities of educators	Trialing lesson resources that feature sustainability initiatives	Trialing lesson resources that integrate with green infrastructure within school environment	Trialing lesson packages to raise students' awareness of carbon footprint and how to reduce them.	NA
	Refresh and enhance teaching and learning of sustainability within the Science and Humanities curriculum			
	Providing learning resources (OPAL)			
4. Empowering and mobilizing youth	NA	NA	Encouraged to practice sustainability by adopting daily habits (reducing energy/food waste/conserving water/recycling)	NA

Five Priority Action Areas	Four Interconnected Global Challenges to be Addressed			
	A. Climate change	B. Loss of biodiversity	C. Unsustainable use of resources	D. Inequality,
5. Accelerating local level actions	NA	NA	NA	NA
	Expansion of environment-related volunteering and enrichment (can be under pt. 4 too)			
	Strengthen students' awareness of future "green jobs"			

# **Status, Trends and Issues of Education for Sustainable Development (ESD) in Sweden**

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## Abstract

Sweden has established itself as a global leader in Education for Sustainable Development (ESD), integrating sustainability principles across all levels of education. The national curriculum for compulsory and higher education emphasizes key ESD competencies, including systems thinking, critical evaluation, future-oriented decision-making, collaboration, ethical awareness, and sustainable action. Sustainability is embedded across subjects and is reflected in the general approach of schools and society, with the three dimensions of sustainable development—environment, economy, and society—woven into educational practices. This is achieved through interdisciplinary curriculum integration, active student participation in sustainability projects, global and local perspectives, and continuous teacher professional development. Swedish schools have autonomy in implementing ESD, allowing educators to integrate sustainability in diverse ways. However, while initiatives such as the Whole School Approach and the Eco-School model have helped foster sustainability competencies, challenges remain. Reports indicate that ESD implementation is inconsistent, with many schools not fully utilizing the extensive support materials provided by the Swedish National Agency for Education and other stakeholders. Additionally, some ESD approaches may inadvertently reinforce gender disparities, with boys demonstrating lower engagement in sustainability topics. Despite Sweden's strong policy framework and student-led movements such as Fridays for Future, many young Swedes do not view sustainability as a viable career pathway. This disconnect highlights the need for stronger links between sustainability education and future professional opportunities, ensuring that sustainability is not only an academic priority but a long-term societal commitment.

**Keywords:** education for sustainable development, sustainability competencies, curriculum integration, sustainability policy, student engagement

# Introduction

## Overview of the Swedish Educational System

Sweden's education system is built on principles of inclusivity, equality, and free access for all, fostering lifelong learning and aligning with Sustainable Development Goal (SDG) 4 "Quality Education." Sustainable development is a key component of the Swedish national curriculum for compulsory schools, and is integrated across subjects to foster environmental, economic, and social responsibility. An overview of the Swedish education system is provided in Figure 1. Formal education is compulsory for children aged 6 to 16, beginning with Förskoleklass (preschool class) and continuing through Grundskola (compulsory school). Most children also attend Förskola (voluntary preschool) before compulsory education, with 86% of children aged 1–5 enrolled in 2021 (Skolverket, 2022a). The national preschool curriculum emphasizes an interdisciplinary, holistic approach to fostering creativity, curiosity, and sustainability-related competencies. It encourages democratic engagement, dialogue, and collaborative exploration to build foundational capabilities and social values from an early age.

The Swedish compulsory curriculum places a strong focus on sustainable development, integrating environmental awareness, social responsibility, and economic understanding into various subjects to prepare students for global challenges. Lessons and activities are designed to help students explore their own ideas while building on others' perspectives, fostering democratic approaches and stimulating dialogue. Students develop an understanding of nature's cycles, human impact, and the role of science and technology in sustainability (Skolverket, 2024).

Compulsory schooling includes 16 mandatory subjects plus one optional subject (modern languages), each with a national syllabus outlining learn-

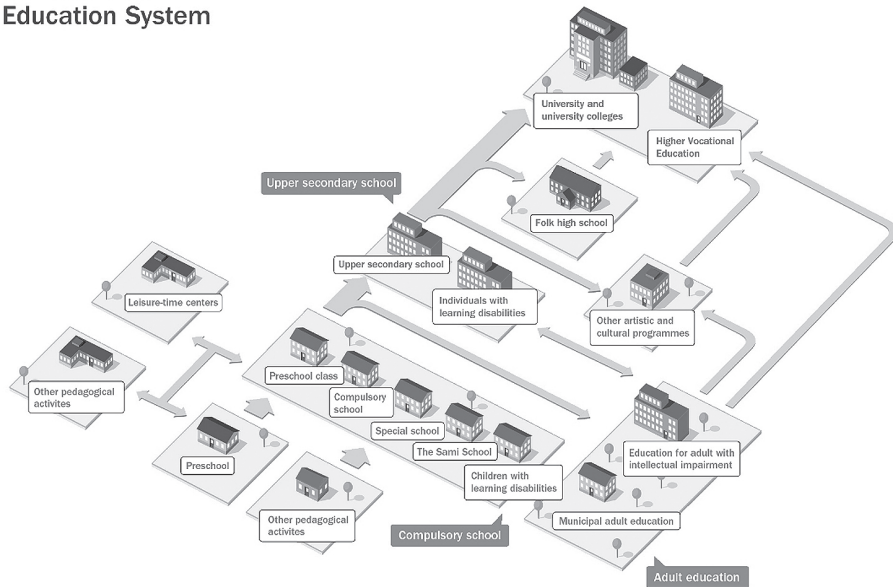
ing objectives, core content, and assessment criteria. Schools have autonomy in distributing instructional hours and structuring lessons, allowing teachers to adopt interdisciplinary or thematic approaches if they meet national curriculum requirements (Hartell & Buckley, 2022). Compulsory education is publicly funded with no fees allowed. Both public and private "independent" schools are publicly funded and must adhere to national education standards. Municipalities oversee school operations and funding, ensuring consistency with national guidelines. School lunches are free for all students in K-12 education and must be nutritious and sustainably sourced.

After compulsory schooling, all students are entitled to three years of Gymnasium (upper secondary education), offering 18 national programs—12 vocational and 8 university-preparatory—tailored to different career and academic pathways (Hartell & Buckley, 2022). While upper secondary education (ages 16–18) is voluntary, approximately 98% of students enroll, choosing between vocational and university-preparatory programs (Lind, 2017). Special schools for students with disabilities follow national curricula, with an emphasis on sustainability in subjects such as natural sciences, technology, and mathematics.

Like compulsory and secondary education, higher education in Sweden is tuition-free for Swedish, EU, and EEA (European Economic Area) citizens. Students can access financial aid to cover their living expenses. The system is internationally oriented, offering a variety of English-taught programs and emphasizing innovation, sustainability, and global perspectives.

**Figure 1** Schematic Illustration of the Swedish Educational System

**The Swedish  
Education System**



**Source:** Skolverket, 2022b.

Sweden has a national curriculum for K-12 education, but no national textbooks or similar to guide instruction on how to enact the intentions of documents governing education. It is up to each school and teacher to decide which textbook, or even any textbook, to use. Sweden has teacher-based assessment whereby teachers design their own assessment relative to knowledge requirements outlined in the curriculum (Skolverket, 2024). There are national examinations in some subjects and particular year groups, which are used for moderating and evaluating the status of education. However, at the system level, measurement is focused on international assessment such as Program for International Student Assessment (PISA). The PISA assessment includes measurement of how well countries are preparing their students with

an understanding of science and how science produces reliable knowledge, which is crucial for citizens who need to make informed personal decisions about science-related phenomena such as health and the environment, and to engage in action within their families, local communities, and wider societies. It is particularly important in the 21st century when humanity faces an uncertain future as it enters the Anthropocene, an era in which human impact is significantly changing Earth's systems, where knowledge of science matters at the individual, regional and global levels. The environmental science competencies to be measured in PISA 2025 relate to the environmental-related outcomes of students' science education, defined as "Agency in the Anthropocene."

Having said that, there is a great deal of support material regarding teaching activities provided for schools, especially in sustainable development. For example, Skolverket, the Swedish National Agency for Education, provides support materials for educating students in sustainable development, which like any other support material, are all optional for teachers to embrace (e.g., Skolverket, 2025c). The support material includes, for example, lesson plans, but more so models for professional development which schools can engage. There is also a national but optional network of teachers where schools develop their systematic quality work in learning for sustainable development by gaining knowledge and tools they can use and try out to develop their teaching from a long-term perspective. The Skolverket sustainable development program is aimed at teachers, preschool teachers and school leaders, and provides support material for collegial learning and not concrete lesson activities.

## **Overall ESD Policies and Practices in Sweden**

Sweden has long been at the forefront of Education for Sustainable Development (ESD), embedding sustainability principles across all levels of education. The national curriculum integrates environmental, economic, and social dimensions of sustainability into subjects from preschool through higher

education, ensuring that students develop the competencies needed to address global challenges. This approach aligns with Sweden's commitment to the UN's Sustainable Development Goals (SDGs) and broader international sustainability initiatives.

At the K-12 level, ESD is not a standalone subject, but is interwoven across disciplines, fostering critical thinking, problem-solving, and active participation in sustainability projects. Schools have autonomy in how they implement ESD, with interdisciplinary teaching encouraged. Initiatives such as the Whole School Approach and Eco-Schools program support a culture of sustainability, promoting student agency in environmental and social action.

In higher education, universities are mandated under the Swedish Higher Education Act (Ministry of Education and Research, 1992) to integrate sustainability into teaching, research, and operations. Institutions develop their own sustainability strategies, and some, such as KTH Royal Institute of Technology, have set long-term sustainability goals to ensure students and staff contribute to sustainable societal development.

Beyond formal education, adult learning and non-formal education reinforce sustainability principles. The Komvux system integrates ESD into vocational education, while NGOs, businesses, and municipalities collaborate on sustainability initiatives, engaging young people in environmental action and innovation.

Despite these strong policies, challenges remain. Reports indicate inconsistent implementation of ESD across schools, limited student engagement, particularly among boys, and a disconnect between sustainability education and career aspirations. The Swedish School Inspectorate (Skolinspektionen, 2023) has called for greater teacher support and clearer ESD implementation strategies to bridge these gaps.

The following sections of this chapter will explore these policies, initiatives, and challenges in greater detail, providing a comprehensive examination of Sweden's approach to ESD and its impact on students, educators, and society.

## **The Status of ESD**

### **Actions Taken and Performance Achieved for ESD**

ESD has evolved and grown from the field of environmental education, which until the 1960s focused on environmental problems and its effect on society. ESD has, however, examined sustainable development from a different perspective with the aim of teaching and learning with a particular focus on behavioral change through a participatory and active citizenship process (Berglund et al., 2014; Olsson et al., 2016). It is therefore not surprising that many countries including Sweden have made ESD a hallmark of their educational systems, with a focus on building on the strengths and ideas of individuals through the co-creation of ideas and solutions to the many societal challenges. In achieving the goals and objectives of ESD in Sweden, the integration of cognitive and affective domains in the school curriculum has been made explicit, which is consistent with the complex nature of knowledge. This perspective is reflected in the Swedish National Curriculum (Skolverket, 2024) which states that:

Knowledge is a complex concept that can be expressed in various forms – such as facts, understanding, skills and familiarity – all of which depend on and interact with each other. The work of the school must therefore focus on providing scope for expressing these different forms of knowledge, as well as creating a learning process in which these forms are balanced to form a meaningful

whole. (p. 9)

The above quotation calls for a more holistic approach to teaching and learning that will help students develop knowledge and understanding of their environment with the aim of training students who do not only have the cognitive knowledge but the affective knowledge that helps them to become sustainability conscious of their immediate environment for a sustainable future (Breiting, 2009; Olsson et al., 2016). Hence, the effect of implementing ESD in schools can lead to educating students who are critical thinkers and future citizens, and provide learning opportunities where students “reflect on their learning and lead to changes in values, attitudes, and behaviors” (Warburton, 2003, p. 50)

This action competence approach enshrined in the Swedish education system at all levels across the 290 municipalities and 21 regions is paving the way towards achieving the goals of the 2030 Agenda, especially within the Swedish context. Through the above policy initiative across the Swedish school curriculum, the learning environment in schools has over the years been changing with the integration of ESD in all parts of school subjects in the curriculum. This is instead of it being the responsibility of science education as seen in many other school curricula, and is conducted from four perspectives: historical, international, ethical and environmental (Fredriksson et al., 2020). The learning environment is characterized by communicative learning whereby students discuss and understand the meaning of others’ thinking and feeling about democracy, sustainability consciousness, justice, and freedom.

Building capacities of educators has been integrated into the Swedish ESD framework where government agencies, academia, civil society organizations, the national council of Swedish Youth organizations, and many others are at the forefront of organizing workshops and training initiatives for all citizens on issues of sustainable development through the common agenda of active participation in civic life and how people can adapt to ways of living that pro-

mote sustainable development. Through different networking and cooperation activities, the youth are mobilized to undertake different sustainable conscious projects both at school and within the community as a means of making society aware of how their ways of life can affect the environment.

An example of this structured approach is the Keep Sweden Tidy Foundation, which collaborates with organizations like the World Wide Fund for Nature (WWF) to promote environmental consciousness among students. Schools participating in this initiative must submit annual reports detailing their sustainability activities. Institutions that fail to comply risk losing their green flag certification, a status symbolizing commitment to sustainable education (Boeve-de Pauw et al., 2015). Research suggests that schools involved in this program have successfully embedded sustainability into their curricula, fostering environmentally responsible behavior among students.

Table 1 summarizes Sweden's ESD implementation by aligning five UNESCO (2020) priority action areas with four interconnected global challenges. The table also includes specific examples illustrating Sweden's strategies and initiatives, some of which are further discussed later in this chapter.

**Table 1** Examples of Swedish ESD Relating to the UNESCO Priority Action Areas and Four Interconnected Global Challenges

UNESCO Priority Action Areas	Interconnected global challenges to be addressed			
	Climate change	Loss of biodiversity	Unsustainable use of resources	Inequality
Advancing policy	Sweden's national curriculum mandates ESD across subjects and ensures students acquire knowledge about climate change impacts and mitigation strategies.	Swedish Higher Education Act (1992) requires universities to integrate sustainability, including biodiversity preservation, into education and research.	The National STEM Strategy aims to equip students with knowledge to address technological and resource challenges in sustainability.	Swedish Education Act (2010) ensures access to free education, embedding sustainability and social justice themes to reduce educational inequalities.
Transforming learning environments	The Eco-Schools Green Flag Program encourages schools to implement energy efficiency, climate adaptation, and student-led climate projects.	Outdoor and experiential learning approaches (e.g., school forests) allow students to explore biodiversity protection in real-world settings.	Waste sorting and food sustainability initiatives in schools ensure reduced resource consumption and promote circular economy thinking.	Schools incorporate gender equality and democratic participation into sustainability discussions, but reports indicate lower engagement from boys.

UNESCO Priority Action Areas	Interconnected global challenges to be addressed			
	Climate change	Loss of biodiversity	Unsustainable use of resources	Inequality
Building capacities of educators	The Swedish National Agency for Education (Skolverket) provides ESD teaching materials, helping educators integrate climate change topics.	Teacher education programs (e.g., at KTH Royal Institute of Technology) emphasize interdisciplinary teaching of biodiversity conservation.	Professional development programs focus on integrating sustainable consumption and production into teaching practices.	Efforts to promote inclusive pedagogy ensure all students can engage with sustainability issues, although engagement varies by gender.
Empowering and mobilizing youth	The Fridays for Future movement (founded by Greta Thunberg) has mobilized Swedish youth in global climate advocacy.	Youth-driven environmental projects, such as biodiversity restoration in urban areas, are supported by local schools and NGOs.	Student-led sustainability initiatives in secondary schools focus on reducing plastic waste and promoting sustainable consumption.	Many Swedish students do not see sustainability as a viable career path, highlighting a gap between education and future employment.
Accelerating local level actions	Komvux (adult education) programs include sustainability themes in vocational training, equipping adults with climate adaptation skills.	Sorunda Riding Club's environmental initiative works on sustainable manure management to protect local biodiversity.	Scania's partnership with higher education institutions promotes research on sustainable transport and resource-efficient mobility.	NGOs such as the Swedish Scouts (Scouterna) incorporate social sustainability by addressing inclusion, fair conditions, and mental well-being.

## Key Themes in ESD

A critical review of policy documents and other research reports showed that in Sweden, as in many other countries, the key themes of ESD focus on climate change, biodiversity, sustainable production and consumption, global justice, disaster risk reduction, and poverty reduction. The next sections discuss these themes across ESD indicators, national competence, the curriculum and formal education, teacher training, non-formal education, and social partnerships.

### *ESD Indicators*

National ESD indicators for K-12 education in Sweden have been integrated into the curriculum with the overarching aim of promoting sustainability across all school levels. As reflected in the national curriculum, these indicators ensure students at all levels acquire knowledge, skills, and attitudes that will help them contribute to and promote a sustainable society at the local, regional and national levels. For example, Swedish school-age educare (SAEC) became part of the national school curriculum to complement and create more creative learning methods that emphasize a social, educational purpose. The core educational concepts within SAEC include complement (providing other forms of teaching that support informal learning approaches), compensate (providing for varying living conditions and social contexts while also addressing individual needs and support), meaning-making (creating meaning from everyday life experiences), play (using the concept of play as a tool and method of learning), and life-affirming attitude and attention (helping children to develop love and relationships in their daily practice) (Manni, 2023).

The underlying dimensions of sustainable development, the environment, economy, and society are the three key indicators integrated into the Swedish school system to provide students with cognitive and affective knowledge of a sustainable society. The key elements include curriculum integration (where

sustainability is embedded across subjects with an emphasis on interdisciplinary learning), critical thinking and problem-solving (analysis of global challenges such as climate change, biodiversity, and social justice), participation and action (schools promoting active participation in sustainability projects), global and local perspectives (the use of local solutions as the starting point for solving global challenges) and teacher competence (organization of professional development programs for teachers of ESD).

### *Competence*

The role of Sweden and Swedish schools in championing ESD has been explored by Cars and West (2015) and Hillbur et al. (2016) who have shown that the influence of Sweden on sustainable development through ESD has been far above the international benchmark. One of the innovative ways that Sweden has done this is through the Whole School Approach (the involvement of a whole school community in efforts to promote sustainable development, in addition to the orientation of the teaching, learning, and curriculum toward its promotion). In addition, the eco-school approach in Sweden has also paved the way for more students and teachers from different schools to exhibit sustainable development competencies. To achieve ESD competencies, there is always the need to describe specific competencies that students and teachers must display. Within the Swedish context, these are stipulated in the national curriculum and other policy documents. For students, these include but are not limited to systems thinking (understanding the interconnectedness of environmental, social, and economic systems), critical thinking (the ability to evaluate), future thinking (the ability to have foresight for long-term decisions and consequences), collaboration and communication, values and ethics, and the ability to take actions which will have a sustainable effect at both local and global levels. For the teachers and educators at the K-12 school level, the key competencies identified as enshrined in both professional development programs and teacher education programs include the use of holistic and in-

terdisciplinary teaching strategies, facilitation skills that can promote student-centered learning, lifelong learning, cultural awareness and inclusion, and assessment of sustainability learning. These holistic competencies are necessary for providing overarching and cross-curricular perspectives to train students in the cognitive and affective knowledge needed to develop sustainability-conscious attitudes.

## ***Curriculum***

Since the UN declaration of a Decade of Education for Sustainable Development (DESD) in 2005, countries have restructured their school curricula to make room for the teaching and learning of sustainable development. The UNESCO document, Framework for the UN DESD International Implementation Scheme, outlines the three dimensions of how SD could be implemented through education, including sociocultural perspectives, natural resources and mitigation economic perspectives (UNESCO, 2006). To achieve this, the need for a holistic perspective on education where emphasis is placed on the relationships between the environment, the economy, and society has been advocated for. As highlighted above, in Sweden, ESD has been made compulsory in all school curricula, and this is evident.

## **Compulsory Curricula**

The national compulsory curricula all emphasize the development of students' knowledge, skills, and values to address global challenges such as climate change, resource management, and equality. Teachers are encouraged to adopt interdisciplinary approaches, enabling students to analyze and reflect on sustainability issues in both local and global contexts. The curriculum also promotes critical thinking, problem-solving, and collaboration to equip students with the tools needed to contribute to a sustainable future (Skolverket, 2024). Schools are responsible for ensuring that, after completing compulsory education, every pupil “has acquired knowledge of the conditions for a good

environment and sustainable development” (p. 14). Additional societal objects relating to the SDGs include that each pupil “has acquired knowledge of society’s laws and norms, human rights and democratic values in school and in society” and “has acquired knowledge in the area of sexuality, consent, and relationships and about honor-based abuse and oppression” (pp. 13–14).

In the Swedish national curriculum for secondary school, ESD is integrated as a cross-curricular perspective rather than as a standalone subject. It emphasizes the importance of equipping students with the knowledge, skills, and values necessary to contribute to a sustainable society.

Key aspects include:

- **A holistic perspective:** Encouraging interdisciplinary learning that links ecological, economic, and social dimensions of sustainability.
- **Critical thinking and problem-solving:** Promoting analytical skills and the ability to evaluate and address complex sustainability challenges.
- **Student agency:** Emphasizing active participation and engagement in sustainability issues, both locally and globally.
- **Core subjects:** Topics such as climate change, biodiversity, and resource management are often addressed within subjects like Science, Social Studies, and Geography.

### **Komvux (Adult education primary, secondary and/or vocational education for adults)**

The approach to ESD in Komvux (Swedish adult education) aligns with the principles of the national curriculum for secondary schools, but is adapted to the specific goals and framework of adult education. In Komvux, ESD is embedded across subjects and focuses on equipping adult learners with the

knowledge, skills, and values necessary for sustainable development in their personal, professional, and civic lives. Komvux school courses all include ESD, but the schools may also design courses with a particular focus on, for example, sustainable development. Komvux often has a more vocational and practical focus, tailoring ESD to real-world applications relevant to adult learners' lives and work. The curriculum in Komvux is more flexible than the compulsory curriculum, allowing for customized learning pathways that integrate ESD in ways that suit individual learners' goals and previous experiences. ESD in Komvux emphasizes the importance of sustainability as a part of continuous learning and adapting to societal changes.

## Higher Education

In Sweden, ESD in higher education is guided by The Swedish Higher Education Act 1992 (Ministry of Education and Research, 1992) and the Higher Education Ordinance (Ministry of Education and Research, 1993) rather than by a specific national curriculum. These regulations emphasize sustainability as a fundamental goal of higher education, requiring universities and colleges to promote sustainable development through education, research, and collaboration.

Key elements include:

- **Legal Mandate:** The Higher Education Act explicitly states that universities and colleges must contribute to sustainable development to ensure current and future generations have a good environment, economic and social welfare, and justice.
- **Integration across disciplines:** ESD is integrated into various academic programs and courses, encouraging a multidisciplinary approach that combines environmental, economic, and social dimensions.
- **Critical thinking and research:** Higher education institutions are tasked with fostering critical thinking, innovation, and research that ad-

dress sustainability challenges and advance knowledge in the field.

- **Autonomy of institutions:** Universities and colleges have significant autonomy in how they implement ESD, resulting in diverse approaches that reflect the specific strengths and focus areas of each institution.
- **Global and local perspective:** ESD in higher education encourages students to consider sustainability at both local and global levels, emphasizing the interconnectedness of sustainability challenges.

These principles ensure that sustainability is a core focus of higher education in Sweden, preparing students to contribute to sustainable solutions in their professional and societal roles.

In addition to the above-mentioned Higher Education Act, higher education institutions such as universities stipulate their own action plans. For example, the KTH Royal University of Technology has embraced university-wide sustainability goals and climate goals, including action plans for the period 2021-2045. These plans include increasing all employees' and students' knowledge of and commitment to sustainable development issues. Sustainable development shall be integrated into all education programs at all levels so that students can contribute to sustainable social development after graduation. In addition, some bespoke ESD courses have been developed. All policy for recruitment and promotion includes sustainable developmental goals as well as travelling and building for an overall sustainable approach for the university.

### ***Formal Education***

Swedish educational policy documents, such as the national curriculum (Skolverket, 2024), emphasize that students should learn about and adopt sustainable development practices in their daily lives. To translate these policies into action, schools integrate environmentally conscious measures into their operations. Examples include waste sorting programs, energy efficiency initiatives, and carbon footprint reduction efforts across primary, secondary, and

tertiary education. School lunches—provided free for all K-12 students—are not only legally required to be nutritious but are also designed with sustainability in mind, focusing on local and seasonal ingredients while minimizing food waste. Students are actively involved in these initiatives, fostering agency beyond educational institutions.

Sustainability is embedded throughout the curriculum. Each syllabus includes:

- Aims of the subject, defining essential skills and knowledge students should develop.
- Core content, structured by grade levels (years 1–3, 4–6, and 7–9).
- Knowledge requirements, detailing assessment criteria for grades E, C, and A.

ESD is particularly emphasized in STEM subjects, Geography, Crafts, Home Economics, and Technology. The term “sustainable development” appears more than 34 times in the national curriculum, indicating its significance. In Technology education, sustainability is explicitly integrated into the overarching subject aims, which state that:

“Students should be provided opportunities to develop an understanding of the importance and impact of technology on people, society, and the environment, thus developing technological awareness and the ability to relate technological solutions and their use of technology to sustainable development issues” (Skolverket, 2024, p. 267)

Teaching in technology is designed to ensure that students develop an interest in and knowledge of technology’s role in society. They are encouraged to explore how technological advancements impact the environment and contribute to sustainable development. The curriculum fosters historical reflection, enabling students to understand contemporary technological phenomena and

the reciprocal relationship between technology and societal development. This approach helps students analyze how technology can be used responsibly to address sustainability challenges.

Moreover, the curriculum emphasizes experiential learning, allowing students to develop knowledge of how human choices contribute to sustainable development. Schools facilitate outdoor education, community involvement, and participation in clubs and cultural activities, providing students with real-world applications of sustainability principles. Through these comprehensive policies and curriculum structures, Sweden ensures that ESD is not only an academic requirement but a core component of students' learning experiences and everyday lives.

When discussing the school's role in sustainability and instilling hope for the future in students, it is essential to consider the United Nations' Agenda 2030 and the SDGs. The Swedish national curriculum for compulsory education emphasizes that students should gain knowledge of the conditions necessary for a sustainable environment and development, as well as how individual lifestyles impact health, the environment, and society. However, explicit references to the UN's Sustainable Development Goals are noticeably absent throughout the formal education system, from preschool to higher education.

To enhance this work, formal schools are expected to integrate Agenda 2030 and its goals into their teaching practices. By linking these goals to concrete projects and subjects, students can develop both knowledge and the capacity to act. This approach fosters hope by demonstrating that meaningful contributions to societal and global challenges are possible. At the same time, it is crucial to strike a balance between raising awareness of sustainability challenges and highlighting solutions and progress, to prevent students from feeling overwhelmed or disheartened. This is something that both formal education and the surrounding society must contribute to. Formal education elevates what children “get” from their family and upbringing. Informal education such as

museums or even sports clubs such as football or similar (which in Sweden is organized outside of school) play an important role in the development of young people's lives. The integration of ESD in the Swedish educational system could not have been achieved without proper supervision of the schools and other activities.

The Swedish Schools Inspectorate's 2023 review of education on sustainable development revealed that while many schools incorporate aspects of sustainability into their teaching, the work is often fragmented and lacks a comprehensive perspective (Skolinspektionen, 2023). The review highlighted that education frequently emphasizes environmental sustainability, while the social and economic dimensions receive less attention. Additionally, there is often no clear connection to the UN's Sustainable Development Goals (SDGs) and Agenda 2030 in many schools. The Inspectorate emphasizes the importance of integrating education on sustainable development across subjects, and enabling students to reflect on the complexity of sustainability issues. According to the Swedish Educational Act (Sveriges Riksdag, 2010), schools can decide their organization for instruction, and hence can work interdisciplinarily if they like to, if they meet the curricula criteria. To improve this work, schools are encouraged to develop a more systematic approach where sustainable development permeates the entire curriculum and is explicitly linked to the SDGs. Furthermore, the review underscores the need to equip students with concrete tools and a sense of hope to address the challenges posed by sustainability issues.

### ***Teacher Training***

In Sweden, ESD in teacher training at the university level is regulated by the Higher Education Ordinance and the national framework for teacher education programs. It emphasizes equipping future teachers with the knowledge, skills, and values to integrate sustainability into their teaching practices and to foster sustainable development in schools.

Key elements include:

- **National guidelines:** The Higher Education Ordinance requires teacher education programs to prepare students to teach and promote sustainable development, ensuring they can integrate ecological, economic, and social sustainability into their future teaching.
- **Interdisciplinary approach:** ESD is embedded across subjects and courses in teacher training, emphasizing the ability to teach sustainability within and across disciplines.
- **Didactic competence:** Teacher education focuses on providing future teachers with the pedagogical tools to engage students in critical thinking, problem-solving, and active participation in sustainability-related issues.
- **Values-based education:** Future teachers are trained to promote democratic values, equity, and responsibility for current and future generations in their teaching practices.
- **Reflection and action:** Teacher training encourages reflection on sustainability challenges and action-oriented learning, preparing teachers to handle complex, real-world issues in their classrooms.

These principles aim to ensure that newly trained teachers can effectively integrate ESD into the Swedish school curriculum, fostering a generation of learners equipped to address sustainability challenges. The Swedish National Agency for Education (Skolverket, 2025d) provides detailed information on these programs, outlining the necessary competencies and knowledge areas for prospective teachers. This includes a focus on subject-specific knowledge, pedagogical skills, and practical training components as requested by documents governing Swedish education.

At KTH Royal Institute of Technology, one of the technical universities in Sweden, ESD is a fundamental component of all educational programs, including teacher education. KTH's vision emphasizes producing graduates who

are driving forces in technological and societal development, with a clear focus on sustainability (KTH, 2023).

In the teacher education programs at KTH, ESD is integrated through:

- **Curriculum design:** Courses incorporate sustainability topics, ensuring that future educators can teach and promote sustainable development effectively.
- **Interdisciplinary approach:** The programs encourage a holistic understanding of sustainability, covering environmental, economic, and social dimensions.
- **Pedagogical training:** Teacher candidates are equipped with the skills to engage students in critical thinking and problem-solving related to sustainability challenges.

This holistic approach ensures that graduates are equipped to integrate sustainable development principles into their teaching, fostering a culture of sustainability in education.

### *Non-Formal Education*

In addition to schools, the surrounding society—including families, sports clubs, and other leisure-time activities—plays a crucial role in preparing students for the future through non-formal education. These environments provide complementary opportunities for young people to practice sustainable behaviors, develop collaborative skills, and see real-world applications of sustainability principles. By fostering a unified approach among schools, families, and extracurricular activities, society can create a supportive ecosystem that empowers students to become active participants in building a sustainable future.

Sweden has a wide range of initiatives related to ESD within non-formal education. While some are explicitly dedicated to sustainable development,

others, such as football, basketball and horseback riding schools, incorporate sustainability practices into their daily operations. These initiatives aim to raise awareness among participants while enhancing their efforts toward a more sustainable future. Due to space constraints, only two examples will be mentioned here.

One illustrative example of sports clubs and their work on sustainable development is the non-profit member-owned riding club, Sorunda Ridklubb. In 2021, they initiated an environmental project to prevent the eutrophication of the lake nearby. The project involved implementing measures to manage horse manure and runoff, thereby reducing nutrient leakage into the waterway. This initiative benefited both the horses and the environment by promoting sustainable practices within the equestrian community (Skoglund, 2021). Another illustrative example is the Scouterna—The Guides and Scouts of Sweden (Scouterna, 2025). They, like their international fellow organizations, emphasize sustainability in everything they do, embracing not only enjoying but protecting nature, reducing climate impact and saving water, including sustainable consumption, fair conditions and gender equality. Social sustainability is about mental and physical health, education, safety, and inclusion in their activities, locally and globally. To encourage local scout organizations to work toward sustainable development, they can apply for special sustainability accreditation.

### ***Social Partnership***

In Sweden, ESD is strengthened through partnerships with foundations, associations, and companies. These collaborations bridge the gap between theoretical knowledge and real-world applications, enhancing sustainability education through funding, expertise, and community engagement.

## **Collaborations Between Businesses, NGOs, and Schools**

Swedish companies and NGOs play an active role in supporting sustainability education. Public-private partnerships allow businesses to provide resources, expertise, and practical learning experiences. For instance, H&M Group collaborates with universities on sustainable fashion and circular production, while Scania works with higher education institutions on sustainable mobility research.

NGOs and associations also contribute significantly to ESD efforts. Natur-skyddsföreningen (Swedish Society for Nature Conservation) supports schools in biodiversity conservation and sustainable consumption projects, while the Keep Sweden Tidy Foundation organizes waste reduction campaigns to engage students in environmental responsibility. Many local and regional initiatives, often led by grassroots organizations and foundations, provide additional sustainability education opportunities.

## **Funding and Educational Support for Sustainability**

Social partners contribute financial support for sustainability initiatives through funding, grants, and educational programs. Organizations such as Mistra (Swedish Foundation for Strategic Environmental Research) fund interdisciplinary sustainability research and education projects, while the Swedish Postcode Foundation provides grants for innovative sustainability education initiatives.

Additionally, NGOs and museums develop teaching materials, digital tools, and exhibitions to support sustainability learning. WWF Sweden creates educational resources for schools, while Tekniska Museet (The Swedish National Museum of Science and Technology) develops exhibitions on sustainable technology and innovation

## **Engaging Students through Awareness Campaigns and Competitions**

Associations and companies collaborate on awareness campaigns and innovation programs to engage students in sustainability initiatives. Fossilfritt Sverige (Fossil Free Sweden) encourages students and businesses to act in reducing fossil fuel dependency, while Fairtrade Sweden partners with schools to promote ethical consumption and fair-trade practices.

Competitions and innovation labs encourage students to develop creative sustainability solutions. IKEA's Global Innovation Lab hosts workshops and contests for sustainable product design, while KTH Innovation and Chalmers Ventures organize hackathons on sustainability issues in energy, transportation, and urban development. These initiatives foster entrepreneurial thinking and problem-solving in sustainability.

## **Sweden's Role in the European Green Transition**

As a member of the European Union, Sweden aligns its sustainability education policies with broader EU initiatives. In June 2022, the Council of the European Union adopted recommendations for integrating sustainability education across all levels of formal and non-formal education. The key priorities include:

- Embedding sustainability in national education policies.
- Ensuring all students learn about climate change and sustainability.
- Investing in sustainable infrastructure through national and EU funding.
- Providing teacher training in sustainability education.
- Fostering interdisciplinary and experiential learning approaches.

To support these goals, the European Commission introduced "GreenComp," a European Competence Framework for Sustainability. GreenComp outlines key competencies for learners of all ages, including:

- Embodying sustainability values, promoting environmental responsibility and justice.
- Understanding sustainability as a complex system, fostering critical thinking and problem-solving.
- Taking action for sustainability, encouraging political agency and collective action.
- Envisioning a sustainable future, developing adaptability and future-focused thinking.

In 2023, the European Commission launched a community of practice to bring together schools, researchers, policymakers, and organizations for applying GreenComp principles. Ongoing research also explores teacher training in sustainability, green education strategies, and the development of sustainable learning environments.

Through these national and EU-level collaborations, Sweden ensures that social partnerships and sustainability-focused education policies equip students with the skills needed to contribute to a more sustainable future.

### ***Key Statistics and Practical Examples***

Sweden has a long-standing commitment to ESD across all levels of education, as noted in the preceding sections. The country was an early mover in integrating sustainability into curricula (with environmental education included since the 1994 curriculum) and has built a comprehensive framework of policies, initiatives, and programs to promote sustainable development learning (The Nordic Council of Ministers, 2021). Below, we summarize some of what has been discussed so far, and outline key policies and strategies, practical initiatives, case studies, and quantitative indicators of ESD implementation and impact in Sweden.

## **National Strategy and Committees**

In the early 2000s, Sweden strengthened its ESD policy framework. A government committee on ESD (Kommittén för utbildning för hållbar utveckling) was established in 2003 to review how sustainability could be better included in education. Its influential report, “Att lära för hållbar utveckling- learning for sustainable development,” argued for ESD as essential to preparing youth for future challenges (Kommittén för utbildning för hållbar utveckling, 2004). This laid the groundwork for subsequent reforms. In 2006, the government also founded the Swedish International Centre of Education for Sustainable Development (SWEDESD) as a national research and capacity-building center to support the UN Decade of ESD and beyond.

## **Teacher Education and Ordinances**

ESD is also embedded in teacher training requirements. The Higher Education Ordinance (Ministry of Education and Research, 1993) specifies that prospective teachers must be able to make assessments in their pedagogical work based on, *inter alia*, “the needs of sustainable development,” ensuring that new teachers are equipped to teach sustainability. In practice, this means teacher education programs include sustainability content and pedagogy, preparing educators to integrate ESD across subjects. This is further supported by the Global School program, which is a national teacher-education program run by the Swedish National Agency for Education (Skolverket) and the Swedish Council for Higher Education that offers professional development on global issues and ESD. This program helps teachers incorporate sustainable development and global perspectives into their teaching practice. Through workshops and courses, thousands of Swedish teachers have received training on sustainability topics.

## National ESD Programs

There are several ESD programs and initiatives in Sweden. One example is the Eco-Schools “Green Flag” Program. This is an international certification program for sustainability in schools, coordinated in Sweden by the Keep Sweden Tidy Foundation. It is a widespread voluntary program that guides schools through a cycle of planning and action on sustainability themes (like waste, energy, water, biodiversity), with a strong emphasis on student participation via “Green Flag councils” (Pedagogsajten, 2019). The program is extremely popular in Sweden. As of recent years, about 2,500 schools and preschools (from kindergartens to secondary schools) are part of the Swedish Green Flag network (European Commission, 2024). This represents a significant portion of schools actively engaged in organized sustainability work. Many schools use Green Flag as a structured way to implement ESD, and each year outstanding Green Flag schools are recognized (for example, an annual award for “Sweden’s most sustainable school” is given by Keep Sweden Tidy).

### School Project Work to Support Sustainable Development

An illustrative example of a project in Swedish schools is provided as an exemplar of the integration of ESD. In a Swedish case study, 10- to 12-year-old students in a multilingual school engaged in an ATS STEM project (ATS STEM, 2025). ATS STEM is an Erasmus+ funded project focusing on the assessment of transversal skills in STEM implemented in eight EU countries including Sweden, and involving a network of 12 educational institutions between 2018–2022. The project aimed to equip teachers and students with effective digital assessment approaches to foster the development of transversal skills in STEM education (Costello & Hartell, 2023). The school project integrated subjects such as STEM, Swedish, Swedish as a second language, and English. In response to students’ needs, the project targeted communication, problem-solving, content knowledge, and meta-cognition through digital

formative assessments, all centered around the real-world sustainability issue of a messy local recycling station—a concern that resonated strongly with the students. Focusing on Agenda 2030 SDG 12 (Responsible Consumption and Production), the project was structured into two learning cycles. In the first cycle, students built conceptual understanding and academic vocabulary through activities such as sorting recycling items, building degradation timelines, and discussing the environmental impact of waste. The second cycle adopted an inquiry-based approach, where students observed and documented the recycling station, then proposed solutions through posters and local newspaper submissions. This case study illustrated how real-life issues combined with digital tools can effectively engage students and foster critical skills and democratic participation.

## **Quality and Gaps in School Implementation**

A review by the Swedish Schools Inspectorate examined how well schools are implementing ESD in practice (Skolinspektionen, 2023). The review of 30 schools (grades 7–9) found that 27 of 30 schools needed to develop their sustainability education further. Key observations included: teachers generally had good content knowledge of sustainable development and Agenda 2030, which is a positive foundation, but many teachers had a narrow understanding of ESD pedagogy (often seeing their role as changing students’ behavior, rather than empowering critical thinking and action competence). Moreover, in many schools, principals had not established a clear, school-wide approach to ESD, and were often unaware of the extent of their teachers’ ESD efforts. The Inspectorate concluded that few schools consciously combined the content and form of education for sustainability in a cohesive way—many had isolated ESD activities but lacked a coordinated strategy. Strengthening teacher education in ESD methods and school leadership support were recommended to improve student involvement and learning outcomes. This evaluation highlights that while policy and interest in ESD are high, the depth of implementation varies, and there is room to scale up best practices across more schools.

## ESD in Higher Education

In 2017, the Swedish Higher Education Authority conducted a comprehensive evaluation of how well sustainable development had been integrated into all 47 higher education institutions (Finnveden et al., 2020). While most institutions could give examples of courses with sustainable development integration, less than half had overarching goals for sustainable development integration or systematic follow-up goals. Additional statistics include that 38% of institutions had systematic competence development for teachers regarding sustainable development, 53% had systematic collaboration with students regarding sustainable development, 48% had systematic collaboration with the labor market regarding sustainable development, and 58% had interdisciplinary collaboration regarding sustainable development. Overall, only 12 of 47 institutions were deemed to have “well-developed processes” for ESD integration.

## Support and Funding

The Swedish government and agencies provide funding streams that indirectly support ESD. For instance, the government’s climate budget includes money for “knowledge-raising initiatives” and awareness—some of which goes into educational programs and materials (Profiles Enhancing Education Reviews (PEER), 2025). Additionally, funding grants to schools (for implementing new curriculum elements or teacher training) and research funding agencies (like Formas and the Swedish Research Council) sponsor sustainability education research and innovation. Municipal education budgets in many regions also allocate funds for school development projects on sustainability (e.g., installing school gardens, solar panels, or teacher professional learning communities on ESD). Overall, Sweden’s investment in ESD is significant, although spread across different actors—reflecting a multi-stakeholder approach.

## Features of ESD

Sweden's strong commitment to sustainability in education is reflected in its progressive policies, active student involvement, and integration of sustainability into everyday learning experiences.

### *Integration into the national curriculum*

Sweden embeds sustainability across subjects rather than treating it as a separate discipline from K–12 and to higher education. Formal education is governed by national steering documents such as the Swedish Educational Act (Sveriges Riksdag, 2010) and the national curriculum (Skolverket, 2024), but again local school authorities or even schools can decide upon how to design instruction to meet the needs of students. The national curriculum mandates that all students learn about sustainable development, climate change, and environmental responsibility and agency among learners. Topics such as democracy, human rights, and ecological balance are incorporated into various subjects within the educational ecosystem.

### *An interdisciplinary and holistic approach*

ESD in Sweden promotes a cross-curricular approach, combining natural sciences, social sciences, and humanities. It encourages systems thinking, helping students understand the connections between environmental, economic, and social sustainability. Many Swedish schools participate in Grön Flagg (Green Flag), an environmental certification program where students and teachers work on sustainability projects. The Grön Flagg program, administered by the Keep Sweden Tidy Foundation (Håll Sverige Rent), is part of the international Eco-Schools initiative. In Sweden, approximately 2,500 schools participate in this program, engaging students and teachers in various sustainability projects, with one notable example being that a school in Stockholm reduced food waste by 30% by involving students in meal planning and composting (Borg,

2019).

### ***Student-centered and participatory learning***

There is an emphasis on critical thinking, problem-solving, and active student participation in sustainability-related projects. Schools often involve students in decision-making processes related to sustainability initiatives (e.g., waste management, energy use). Schools implement strict waste sorting programs, encouraging students to separate plastic, paper, food waste, and electronic waste.

### ***Experiential and outdoor learning***

Sweden incorporates nature-based education and outdoor learning to foster a deep connection with the environment. Many schools have outdoor classrooms and encourage hands-on activities such as gardening, recycling programs, and nature excursions in their regular educational activities. Some municipalities also have local educational resource centers where schools join outdoor expert teachers. For example, in Malmö, there is a primary school which teaches math and science in a forest setting, where students measure trees, study biodiversity, and learn about ecosystems (Council of Europe Development Bank, 2020). Additionally, in Nynäshamn municipality, all students are educated in the local resource center Naturskolan (Nature School), a well-renowned center in the outdoor teaching community (Nynäshamns Kommun, 2024). Nynäshamn Nature School offers outdoor education where nature is integrated into learning. Primary school pupils visit to explore the natural and cultural environment, focusing on hands-on experiences and sensory discoveries. The school follows various themes each year, including biodiversity, senses, ancient techniques, sustainability, and more. It also offers outdoor education activities at individual schools. This is one of many local initiatives.

## *Collaboration with society and industry*

Schools work closely with municipalities and companies to develop real-world sustainability projects. Universities collaborate with industries on research and innovation in sustainable development. ESD extends beyond formal education, involving lifelong learning initiatives for the public. Many municipalities provide organic, locally sourced, and vegetarian school meals to promote sustainability and discourage food waste. Lund Municipality serves 50% organic food in schools, reducing the carbon footprint and teaching students about sustainable food choices.

## **Trends and Issues in ESD**

### **Trends**

#### *Fridays for the future: A global movement for a call to action*

The global movement, Fridays for Future, was founded by Greta Thunberg, a Swedish year-nine student, as a protest climate change and call to action in 2018 (Fridays For Future, 2018). She sat outside the Swedish parliament on Fridays, skipping school as a protest, and drew attention to climate change for the upcoming parliamentary election. The movement has spread around the world, and is considered a symbol of young people's engagement in climate change. Fridays for Future is an anti-colonial and intersectional movement, emphasizing the evident: that the climate crisis is a social justice issue, and that it is already occurring, with those who are least responsible for causing it being among the hardest hit. In line with both research and local knowledge from communities on the front line of the climate crisis, a fundamental social transformation that puts lives before economic gain is being pushed for. This initiative has spread and engages young people across more than 100 coun-

tries.

### ***Important, but not for me***

The Swedish Royal Engineering Society with Vetenskap och Allmänhet (Public and Science) conducted an investigation involving 995 students 10–15-year-olds and concluded that young people in Sweden agree that sustainable development and environmental issues are important— but not for them personally, and only a minority see it as a future career pathway (Royal Swedish Academy of Engineering Sciences (IVA) & Vetenskap & Allmänhet, 2021). For some, the importance of sustainability is a “no-brainer,” while for others it is confusing and less interesting. The report highlights that only 5% of Swedish 10- to 15-year-olds expressed a desire to work with environmental and climate issues in the future. Despite growing global concerns, interest in sustainability-related careers remains low among young people. The report calls for greater collaboration between individuals, organizations, and policy-makers to make environmental and sustainability topics more appealing and relevant to young learners, ensuring a future workforce that is prepared to tackle climate challenges.

### ***Call for collaboration to increase interest for the future workforce***

Sweden has a long engineering and innovation tradition, but youngsters do not choose engineering to a sufficient extent. Reviews (e.g., Skolverket, 2023) have identified gender differences showing that boys are less engaged and less knowledgeable than girls, and this is documented in several official documents. Although many students recognize the importance of science and technology, they often find these subjects less engaging, especially as they progress in school. This lack of interest could pose challenges for future efforts in future workforce recruitment, but more importantly for sustainability, green technology, and climate solutions. In response, the Swedish government has initiated a national STEM strategy, which will be published after this book

chapter has been submitted during 2025.

### ***Gender differences in sustainability awareness and school certification***

Research by Olsson and Gericke (2016), based on a survey of over 2,400 students from 51 schools, indicated that girls demonstrate a higher awareness of sustainable development than boys, particularly in the social and environmental dimensions. The differences are less pronounced in the economic dimension and among younger students.

Interestingly, these gender differences are more pronounced in schools certified for sustainability education, suggesting that certified schools may adopt teaching styles that reinforce gender-based engagement patterns. The study posits that this could be due to a normative teaching approach, which aligns more closely with girls' values and attitudes toward sustainability. This value-driven approach may inadvertently exclude boys from more profound engagement.

To bridge this gap, the study recommends a shift in pedagogy toward critical thinking and open exploration of multiple perspectives, rather than simply imparting fixed sustainability values. Encouraging discussion, debate, and problem-solving could increase boys' engagement and help them relate to sustainability topics in a meaningful way. Additionally, addressing conflicts of interest within sustainability debates and using interactive or inquiry-based methods may help improve inclusivity in sustainability education.

### ***Gender differences in sustainability awareness increase with age***

Further findings from Olsson and Gericke (2016) suggest that gender differences in sustainability awareness become more pronounced as students get older. While younger students of both genders tend to show relatively similar levels of awareness, disparities widen during adolescence, with girls continu-

ing to show stronger engagement in social and environmental sustainability issues.

This growing gender divide is particularly evident in schools with sustainability certifications, where teaching methods may emphasize moral and ethical dimensions of sustainability—which, as observed, tend to resonate more with girls. However, this pedagogical style may unintentionally alienate boys, leading to lower engagement and even dismissive attitudes toward sustainability topics.

The study notes that boys are more likely to joke about or downplay controversial and complex sustainability issues, suggesting a disconnect between their personal interests and the way sustainability is framed in education. To counteract this disengagement, the report recommends:

- Diversifying pedagogical approaches to include more debate, inquiry-based learning, and real-world problem-solving.
- Integrating economic and technological aspects of sustainability, which may appeal more to male students.
- Creating space for critical discussions and conflict resolution, ensuring that sustainability education is not just value-driven but also exploratory and analytical.

By adopting a more inclusive and critical approach, sustainability education can engage both genders more equitably and foster a sense of agency among all students as they progress through school.

## Issues

### *Lack of commitment from students*

The Swedish School Inspectorate conducted a thematic review of how secondary schools (grades 7–9, ages 13–17) approach ESD (Skolinspektionen, 2023). The review identified a need to strengthen students' agency in a changing world, emphasizing that students should develop the skills to make independent and informed decisions on sustainability issues. However, the report found that few schools provide high-quality ESD, and there is a lack of shared understanding among educators regarding its implementation.

Teachers play a crucial role in fostering student engagement, yet many lack sufficient knowledge in sustainability topics. This gap, combined with the lack of a cohesive school-wide approach, limits students' ability to actively participate in sustainability efforts. While various professional development resources exist, their effectiveness in improving teachers' expertise remains unclear. Additionally, schools that strongly emphasize sustainable development—even receiving awards for their efforts—paradoxically report declining student interest, particularly among boys. These findings raise concerns about how ESD is communicated and whether students perceive it as meaningful and relevant.

### *Balancing time constraints with an abundance of instructional resources*

One of the major challenges in implementing ESD is the tension between limited instructional time and the vast number of available educational resources. The Swedish National Agency for Education, Skolverket, provides extensive materials, including lesson plans, professional development modules, interdisciplinary teaching strategies, and certification processes for schools excelling in sustainability education (Skolverket, 2025a).

For example, Skolverket offers structured professional development programs, such as a 30-hour module for teachers focusing on sustainability education across different grade levels. While comprehensive, these modules require significant time investment, making it difficult for busy teachers to engage fully. Similarly, leadership training for school administrators includes a six-module program on organizing and leading sustainability initiatives (Skolverket, 2025b). However, no evaluations of the impact of these programs have been found, leaving questions about their effectiveness.

Given the substantial time commitment required to engage with these resources, schools must make strategic decisions about which materials to prioritize. This raises concerns about whether time constraints prevent educators from fully utilizing the available support, leading to inconsistencies in how sustainability education is implemented across schools.

### ***Overabundance of educational resources: Utilization challenges***

Sweden offers a wealth of sustainability education resources through various organizations, including the Swedish National Agency for Education (Skolverket), the Swedish International Development Cooperation Agency (SIDA), and the Swedish Council for Higher Education (UHR). These materials cover a broad range of topics, from environmental science to ethical dilemmas related to gender equity, LGBTQ+ rights, and psychological well-being.

Despite the abundance of resources, questions remain about their actual usage and impact. Schools and teachers must navigate a complex landscape of instructional materials, often without clear guidance on which are most effective. Some initiatives, such as concept cartoons, aim to engage students in sustainability discussions by presenting multiple perspectives on issues such as climate change and energy resources. While these tools promote critical thinking, their integration into everyday teaching depends on individual educators' willingness and ability to adopt them.

A key finding from the Swedish School Inspectorate (Skolinspektionen, 2019) is that even schools receiving sustainability awards struggle with student engagement, particularly among boys. This suggests that simply having resources and structured programs is insufficient—teachers need practical strategies to make sustainability topics resonate with students in a meaningful way.

### ***Awards for sustainable development: A cultural shift in Sweden?***

Unlike some other countries, Sweden has traditionally had fewer awards recognizing excellence in education. However, there has been a shift recently toward acknowledging schools and teachers who excel in sustainability education with awards and prizes under *Skola för hållbar utveckling- Schools for sustainable development initiative*. The Teacher Award for Outstanding Educational Contributions, established by the Swedish government, aims to recognize innovative teaching methods, student engagement, and overall excellence in education. Additionally, the Grön Flagg (Green Flag) certification program encourages schools to actively engage in sustainability projects. Schools participating in this program focus on areas such as climate action, biodiversity, and waste reduction, integrating these themes into their curricula.

While these awards and certifications provide incentives for schools to prioritize sustainability education, their actual impact remains unclear. The question remains whether recognition alone is enough to drive long-term engagement and whether these initiatives effectively change student attitudes toward sustainability.

### ***Gender differences in engagement with ESD***

Gender disparities in engagement with sustainability education are an emerging concern. Studies indicate that boys are generally less engaged in ESD compared to girls, with some schools reporting a decline in male students' interest, even in institutions that emphasize sustainability efforts.

A broader issue within Swedish education is the declining interest in STEM (Science, Technology, Engineering, and Mathematics) subjects. The *Un-gas attityder till STEM* [Young people’s attitudes towards STEM] report by Teknikföretagen (Technology companies) highlights significant gender differences in how young people perceive STEM education and careers. While many students recognize the importance of STEM for the future, factors such as perceived difficulty, lack of relatable role models, and common misconceptions discourage engagement—particularly among girls.

To address these disparities, Sweden is developing a comprehensive STEM strategy aimed at increasing student interest in STEM subjects. This strategy focuses on:

- Strengthening mathematics education to build foundational skills
- Promoting enthusiasm for technology and natural sciences
- Increasing female participation in STEM fields through targeted interventions

The Swedish government presented this strategy in February 2025 (Regeringen, 2025), with the goal of ensuring a well-prepared workforce for the future. However, for ESD to be truly effective, it must address not only gender disparities in STEM but also broader questions of how to make sustainability education relevant and engaging for all students.

## Conclusion

In an era of rapid technological advancements and the increasing presence of artificial intelligence (AI), the role of Education for Sustainable Development (ESD) in equipping students with critical thinking, media literacy, and sustainability competencies is more crucial than ever. While Sweden has made significant strides in integrating sustainability across all levels of education, challenges persist in ensuring consistent implementation, student engagement, and long-term impact.

One major concern is the perceived disconnect between sustainability and students' personal interests. While young people acknowledge the importance of sustainable development, many do not see it as relevant to their future careers. Reports, such as those from the Swedish Academy of Engineering Sciences, highlight both potential and disengagement, underscoring the need for more targeted initiatives to both inspire and engage students.

Despite the strong policy foundation, efforts to enhance ESD remain fragmented and lack coordination. Numerous stakeholders—government agencies, NGOs, businesses, and educational institutions—contribute to sustainability education, yet better collaboration and integration are needed to maximize its impact. Additionally, the Whole-School Approach, recognized as an effective model for embedding sustainability, requires more institutional support to overcome its complexity and resource demands.

A key challenge is that much of the progress in ESD relies on individual champions within schools and organizations. While passionate educators and leaders drive change, the sustainability of these initiatives remains uncertain without systematic support and long-term strategies—a concern for everyone.

Looking ahead, the rapid evolution of AI and digital technology presents both

opportunities and challenges for sustainability education and sustainability overall, as the energy consumption needed for AI is considerable to say the least. Digital tools can enhance learning, personalize education, and facilitate global collaboration on sustainability issues. However, they also demand a re-assessment of knowledge, ethics, and information management within education systems. This could become a focus in future works.

This chapter has examined Sweden's policies, practices, and challenges in ESD, with a particular focus on STEM education as a key driver for sustainable innovation. While Sweden continues to refine its national STEM strategy, its finalization will mark an important step towards aligning education with future sustainability needs. To ensure lasting progress, coordinated, long-term efforts will be essential—embedding sustainability not just as an educational goal but as a fundamental societal value.

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# **Status, Trends and Issues of Education for Sustainable Development (ESD) in Taiwan**

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## Abstract

The implementation of sustainable education in Taiwan has gradually developed from environmental education practices in the 1980s. Promoting sustainable education in Taiwan includes five stages: campus environmental cleanup, Green School Partnership, Sustainable Campus Plan, Taiwan Environmental Education Act, and New Generation Environmental Education Plan. This chapter reviews the actions and performance of Education for Sustainable Development (ESD) in Taiwan regarding the four interconnected global challenges (climate change, loss of biodiversity, unsustainable use of resources, and inequality) and five priority action areas (advancing policy, transforming learning environments, building capacities of educators, empowering and mobilizing youth, and accelerating local-level actions). The chapter describes the ESD indicators based on the Ministry of Education's Voluntary Department report of Sustainable Development Goals (SDGs). The chapter analyzes the 2019 national curriculum framework which proposed two core competencies ("C1 moral practice and citizenship awareness" and "C3 multiculturalism and international understanding") and five concepts (environmental ethics, sustainable development, climate change, disaster preparedness, and sustainable use of energy and resources). The chapter concludes with seven features of ESD in Taiwan: systematic thinking, interdisciplinary integration, local-based education, project-oriented learning, cultivation of global citizenship literacy, enhanced environmental awareness, and policy support. It also summarizes the major trends of ESD in Taiwan: integrating sustainability into the national curriculum, implementing campus sustainability practices, applying technology and digital tools, conducting student-led action plans, and promoting teacher professional development. Five identified issues are: conflict between curriculum and pressure for further studies, insufficient professional knowledge of teachers, insufficient learning materials, insufficient administrative support, and limited social cognition and support.

**Keywords:** education for sustainability, Taiwan Environmental Education Act, Taiwan Eco-school Project, accreditation of environmental education teachers, core competencies of sustainability

## Introduction

### Overview of Sustainability Education in the World and Taiwan: Contexts and Characteristics

The economic and technological development in the 1950s and 1960s brought reflection and action on environmental protection (Carson, 1962). The environmental protection movement in the 1970s aroused concern about the economic development of poor countries, prompting the United Nations to establish the "World Commission on Environment and Development" in 1983, which proposed the declaration of "Our Common Future" and also advocated the promotion of sustainable development (World Commission on Environment and Development, 1987). The concept of sustainable development gradually became an essential policy for global national governance and cooperative development in 1987. The importance of education to sustainable development was emphasized in the 1987 document, "Our Common Future." In 1992, "Agenda 21" even included a complete chapter, Chapter 36, to clarify the approach to education (United Nations Development Commission, 1993). "Transforming our world: The 2030 Agenda for Sustainable Development" clearly states the importance of sustainable education in understanding the current world situation and practicing sustainable development (United Nations, 2015). The United Nations Educational, Scientific, and Cultural Organization (UNESCO) has continued to promote sustainable education since 1992. From 2005 to 2014, it was the "UN Decade for the Education for Sustainable Development (DESD) (UNESCO, 2014a)." From 2015 to 2019, it carried out

the "Global Action Program" (GAP) and published the "2030 Sustainable Education Blueprint (ESD for 2030) Roadmap," which lists the challenges facing all the earth, and emphasizes that the implementation of sustainable education can not only increase the contribution of education but is also the key to moving towards the implementation of the Sustainable Development Goals (SDGs) so as to build a fair, just and sustainable world (UNESCO, 2009, 2017, 2020).

Sustainability education has been developed from environmental education in Taiwan. Environmental education policies have been adopted and implemented since the 1980s, and they have significantly impacted citizens' attitudes and behavior toward environmental protection and ecological conservation in Taiwan. These policies include daily waste management and recycling practices, the Green School Partnership Program, the Taiwan Sustainable Campus Program, the infusion of environmental education into the national curriculum framework, the National Environmental Education Award, the Taiwan Environmental Education Act, and the Climate Change and Adaptation Program. Waste management and recycling education was oriented toward daily activity, and started as pioneering environmental education in Taiwan in the 1980s. The Taiwan Sustainable Campus Program and Green School Partnership Program were two important endeavors supported by the Taiwan Ministry of Education to promote sustainable development education. The former encourages schools to transform their campuses for sustainable development in terms of alternative energy, water conservation, material recycling, and health, and the latter highlights a whole school approach, which consists of administration, facilities, curriculum, and school life. The infusion of environmental education as an important issue into the national curriculum framework was a milestone of national recognition of the importance of environmental education and its status as a required aspect of school learning (Global Environmental Education Partnership, 2020). The National Environmental Education Awards of people, communities, schools, organizations, and businesses are announced

yearly and encourage participants' continuous efforts in environmental education (EE). Climate change mitigation and adaptation education teaches students and residents how to deal with climate change and natural disasters. The Taiwan Environmental Education Act took effect in 2011. It aims to achieve sustainability, and significantly impacts the implementation of EE in both formal and non-formal education settings (Global Environmental Education Partnership, 2021). No less than 4 hours of EE every year influences one quarter of the population of Taiwan, and certifying EE personnel, facility venues, and institutions helps build up a comprehensive EE platform. Reflecting the development of EE in Taiwan, each EE policy was issued considering its specific context in both global and local trends, and had its impact on EE in Taiwan. With consideration of the impacts of these policies, the development of EE in Taiwan consists of several factors: following global environmental trends, linking to daily life, building environmental awareness, promoting sharing and participation, infusing into school curricula, encouraging national environmental education awards, highlighting fundamental environmental literacy, building a comprehensive system of EE personnel, facilities and venues, and institutions, and a national survey of environmental literacy (Chang, 2023a).

## **Current Status of Education**

Taiwan's current schooling system is a 6/3/3/4-year system (Table 1) (Ministry of Education, 2025). In addition to compulsory education in national primary and secondary schools, school education at senior high schools and above (including 5-year colleges) includes the dual tracks of "general education" and "technical and vocational education." According to the Early Childhood Education and Care Act (Ministry of Education, 2022a), children over 2 years old and before entering a national elementary school are preschool children. Preschool education is not compulsory and is not included in the school system.

**Table 1** Taiwan's 6-3-3-4-Year Academic System

stage	grade	age
Primary school	1	7
	2	8
	3	9
	4	10
	5	11
	6	12
Junior high school	7	13
	8	14
	9	15
High school	10	16
	11	17
	12	18
University	Freshman	19
	Sophomore	20
	Junior	21
	Senior	22
Master	First year	23
	Second year	24

Regarding schooling age, there are 6 years of elementary school for students aged 6-12 years old, and 3 years of junior high school for students aged 12-15. Compulsory education was 9 years of elementary and junior high school from 1968, until the Twelve-Year National Basic Education was implemented in 2019. Senior secondary schools (divided into general, technical, comprehensive, and single subject) last for 3 years. The school age is 15-18 years old. The bachelor's degree program lasts 4 years, the master's degree program lasts 1-4 years, and the doctoral program lasts 2-7 years.

In their learning development, students have two essential choices and diversion points. After graduating from junior high school, they can attend a senior high school or a 5-year college. After graduating from a senior high school,

students can connect to a general university; after graduating from a technical high school, students can connect to a 2-year junior college, a 4-year technical college, or a University of Science and Technology. In addition, Taiwan has advanced training schools and multiple lifelong learning channels to provide the general public with a broader range of further education opportunities to allow them to develop appropriately.

## **The Status of Education for Sustainable Development (ESD)**

Sustainable education implemented in Taiwan has gradually developed from EE practices in the 1980s. Promoting sustainable education in Taiwan includes five stages: Campus Environmental Cleanup, Green School Partnership, Sustainable Campus Plan, the Taiwan Environmental Education Act, and the New Generation Environmental Education Plan (Ministry of Education, 2021a). The stage of campus cleanliness focuses on campus environment cleaning, implementing garbage classification and resource recycling actions, and cultivating the literacy of resource recycling. The Green School Partnership Plan emphasizes the specific implementation of campus environmental protection and ecological education, and forms a partnership to share implementation experience. The Sustainable Campus Plan focuses on the sustainable management of campus buildings and facilities, promoting sustainable school operations from the aspects of energy management, resource recycling, biodiversity, and green buildings. The Environmental Education Act regulates 4 hours of environmental education each year and requires designated EE personnel to promote EE. The recently promoted New Generation Environmental Education based on the connotation of sustainable development is mainly focused on issues of social justice and ecological environmental protection.

## **Actions Taken and Performance Achieved for ESD in Taiwan**

The following discusses the actions and performance of ESD in Taiwan regarding the four interconnected global challenges (climate change, loss of

biodiversity, unsustainable use of resources, and inequality) and five priority action areas (advancing policy, transforming learning environments, building capacities of educators, empowering and mobilizing youth, and accelerating local-level actions)(UNESCO, 2020).

### ***Advancing policy for ESD***

Taiwan has formulated relevant laws and policies for the four themes of sustainable education (climate change, biodiversity loss, unsustainable use of resources, and inequality); for the theme of climate change, it has formulated the Climate Change Response Act, a climate-friendly campus plan, and climate change talent cultivation methods; for laws related to the loss of biodiversity, there is the Food and Agriculture Education Act; for the concept of unsustainable use of resources, it has developed the Environmental Education Act and the New Generation Environmental Education and Sustainable Campus Plan; regarding inequality issues, it has issued the Gender Equality Education Act and Special Education Law.

### **Advancing policies for climate change**

To respond to COP 26, Taiwan established the Climate Change Response Act in 2021 to guide national endeavors to achieve its 2025 zero emissions promises. Accordingly, the Ministry of Education developed the Climate-Friendly Campus Plan and Climate Change Talent Cultivation Plan (Ministry of Education, 2021b).

In response to the global climate change trend and Taiwan's 2050 net-zero emissions goal, the Ministry of Education has recently launched the "Pilot Plan for Building a Smart and Climate-Friendly Campus" in 2023. Eighty-three schools have been subsidized to conduct campus environmental monitoring and carbon inventory, and to collect relevant monitoring and carbon inventory information. Based on this information, schools can develop rel-

evant measures to improve the campus environment, or implement sustainable use of energy resources. As a result, the schools will develop innovative and climate-friendly campuses.

### **Advancing policies for loss of biodiversity**

The Convention on Biological Diversity was launched in 1992 to promote the issue of loss of diversity, and designates May 22 each year as International Biodiversity Day to remind the public of the importance of diversity. The Forestry Conservation Administration of Taiwan is the central forestry authority that manages natural forests and is in charge of state-owned forestry areas. It is also the central nature conservation authority responsible for maintaining biodiversity. To respond to International Biodiversity Day, the Forestry Conservation Administration coordinates with all branch offices and county (municipal) governments under its jurisdiction to regularly organize a series of 522 biodiversity activities across Taiwan every year, including exhibitions and lectures, and welcomes people from across the country to participate and learn about the choices and actions that can maintain biodiversity.

In addition, the Forest Conservation Administration regularly holds "Biodiversity Promotion Workshops for Administrative Staff" every year to enhance understanding of the concepts of "sustainable development" and "biodiversity" among relevant business handlers of central ministries and local governments. For the public who care about environmental issues, the Forestry Conservation Department and the Natural Ecological Conservation Association have cooperated to obtain authorization from the World Wild Fund for Nature (WWF) to transform "Wild Horizons" into teaching materials suitable for Taiwan. Since 2003, two "National Biodiversity Education Training Courses" have been held regularly every year to train learners to become biodiversity seed teachers to share and promote the importance of biodiversity conservation in their environment.

## **Advancing policies for unsustainable use of resources**

Recycling has been a core subject of school EE in Taiwan since the 1980s. The Environmental Education Act and the New Generation Environmental Education and Sustainable Campus Plan are two critical policies for school EE to address the issue of unsustainable resource use.

(1) **The Environmental Education Act:** The Environmental Education Act was formulated to promote EE, assist citizens in understanding the interaction of individuals and society with the environment, and enhance the environmental awareness, environmental ethics, and responsibility of the nation as a whole, to safeguard the ecological balance of the environment, respect lives, promote social justice, and cultivate environmental citizens and environmental learning communities to achieve sustainable development.

(2) **Sustainable Campus Plan**

Taiwan's Sustainable Campus Plan is an important policy promoted by the Ministry of Education. It aims to integrate sustainability into campuses, cultivate students' environmental awareness, and promote green campuses through practical actions. The project was launched in 2002 to promote sustainable development concepts such as energy conservation and carbon reduction, resource recycling, and ecological conservation through transforming the campus environment and education. The plan covers the improvement of hardware facilities and the promotion of software education, hoping that schools will become demonstration bases for sustainable development.

## **Advancing policies for inequality**

Equality and fairness have always been cornerstones of social stability. In school settings, the Gender Equality Education Act and Special Education Law are two important laws dealing with gender inequality, learning talents,

and physical difficulties.

- (1) The Gender Equality Education Act of Taiwan was enacted on June 23, 2004. The General Provisions state the Act's purposes: "to promote substantive gender equality, eliminate gender discrimination, uphold human dignity, and improve and establish education resources and an environment of gender equality." In recent years, this Act has become controversial because it has implemented anti-discrimination policies regarding LGBT rights and LGBT sex education.
- (2) The Special Education Act: The Act is enacted to allow citizens with disabilities and giftedness/talents to receive adaptive and inclusive education, in order to fully develop their potential, foster their personality, and empower them to serve society.

### ***Transforming the learning environment for ESD***

The Ministry of Education's projects, the "Sustainable Campus Plan" and the "Climate-Friendly Campus Plan," have significantly impacted the learning environment for ESD.

The Sustainable Campus Plan contains five elements: Energy saving and carbon reduction: to promote energy-saving measures on campus, conduct energy audits, and develop energy-saving plans; Green Building: to promote green building design and apply for the Green Building Label; Ecological campus: to create an ecologically diverse environment, promote ecological education on campus and allow students to participate in ecological conservation; and Resource recycling: to promote waste classification, resource recovery and reuse, and composting facilities to convert food waste into fertilizer.

The Sustainable Campus Plan has achieved the following outstanding results in terms of transforming the learning environment for ESD: Setting up solar power generation systems to significantly reduce electricity consumption and

carbon emissions through energy-saving measures; obtaining green buildings designed to improve the campus environment and enhance the quality of life of teachers and students; establishing ecological ponds and native botanical gardens to increase campus biodiversity and to enhance students' environmental awareness; and implementation of food waste composting to promote resource recycling.

The Sustainable Campus Plan is a forward-looking and critical plan with "sustainability" as its core. It focuses on energy-saving, environmentally friendly green buildings, biodiversity, and adaptive learning campuses with partial renovations. Since 2015, the plan has been integrated with the United Nations' Sustainable Development Goals (SDGs) and has been implemented through practices of exploration and demonstration. The Sustainable Recycling Campus Exploration and Demonstration Plan consists of four major categories: resources and carbon emissions, water and green, environment and health, and energy and microclimate. Five demonstration schools were subsidized in 2023, each responding differently to the theme of smart, climate-friendly campuses. Taipei Medical University is an energy-saving and carbon-reduction demonstration project for high-energy-consuming colleges and universities in urban heat island areas; Taipei Jingxing Junior High School is a demonstration project to improve indoor environmental quality and energy conservation on campuses in urban heat island areas; Changhua County Pitou Elementary School has implemented a rural campus ventilation improvement and water and green system cooling and energy conservation demonstration project; Chiayi County Nanhua University has used water and green strategies for suburban college campuses to achieve carbon sequestration and carbon reduction, serving as a demonstration project; and Tainan Evergreen University uses water and green system carbon-negative strategies to improve the campus environment as a demonstration project for a single site (Ministry of Education, 2022b).

At the same time, it also subsidizes 83 basic schools to conduct carbon inventories, which will help them understand their current school carbon emission baseline and facilitate subsequent carbon reduction and carbon sequestration. Subsidies were also approved for 81 schools to conduct projects in 2024.

In 2023, the above-mentioned project built five locally-appropriate demonstration bases. Through the project, teachers and students can develop the ability to be resilient and adaptable in changing environments. The school as a whole has a sustainable mindset. The Ministry of Education encourages schools to visit model schools or basic schools for exchanges, depending on the current situation of their campus environment. Schools are also encouraged to actively participate in the program and work together to promote climate-friendly campuses.

### ***Developing educators' capacities***

Cultivating teachers' sustainable education capabilities can be divided into two stages in Taiwan. The first stage is pre-service teacher training. The Teacher Training Program is required for every pre-service teacher, and Environmental Education (EE) (Sustainability Education) is an integral part of the program. Issue education is a unique feature of the Taiwan 2019 curriculum framework. The curriculum framework incorporates 19 important contemporary issues into the curriculum core competencies and learning materials, and EE (sustainability education) is one of the issues. The other stage is in-service teacher training, which mainly relies on the training and certification practices of EE personnel certified by the Environmental Education Act to cultivate the sustainable education capabilities of in-service teachers.

Taiwan's EE personnel certification system was established by the Environmental Education Act, with the aim of cultivating professional EE talents and promoting the popularization and deepening of environmental education. The certification of environmental educators falls into two broad categories: Envi-

ronmental education administrators engaged in administrative affairs such as the planning and promotion of EE, and EE teaching staff involved in teaching activities such as environmental explanations, demonstrations, and performances.

The certified teaching staff are divided into nine professional areas: climate change, nature conservation, pollution prevention and control, etc. Applicants can obtain certification through the following channels:

- Educational qualifications: 24 credits or more of courses in environment-related fields, including core subjects (such as environmental education, environmental ethics, etc.), are required.
- Experience: Must have a certain number of years of experience in EE and participate in relevant research.
- Expertise: Have publications or notable contributions in environmental-related fields.
- Examination: Pass the written and oral examinations covering EE regulations, environmental introduction, etc.
- Training: Complete more than 100 hours of EE training courses and pass assessments.

### ***Empowering and mobilizing youth***

"Eco-School" was initiated by Foundation for Environmental Education (FEE) and continues to attract participation from many countries worldwide. It is now the most significant EE program in the world. Taiwan has established the Taiwan-U.S. Eco-School Partnership program in cooperation with the U.S. Environmental Protection Agency and the U.S. National Wildlife Federation (NWF). The ecological school plan attaches great importance to cultivating students' autonomy, and students actively participate in discussions and decision-making. During the implementation process, students not only passively learn but also actively understand the environment and take action, and can

further drive and influence the community. Teachers who play a guiding role also have a reference frame for cultivating students' ability to participate in discussions or make joint decisions (Global Environmental Education Partnership, 2023).

There are seven steps to building an eco-school: Forming an ecological action team is the most crucial step. Team members need to include students, teachers, parents, local community representatives, and experts and scholars in fields related to natural environment protection. The most indispensable role in the ecological action team is the "student."

Step 1: Students should lead the team, deciding how to conduct environmental audits and formulate action plans.

Step 2: The second step is environmental inspection. Through environmental inspection, students can understand the most urgent problems that need improvement in the school.

Step 3: Based on the results of the campus environment inspection, the causes of the problems are analyzed, and specific action (improvement) plans are discussed. The action plan should include an analysis of campus environmental problems, motivation for improvement, improvement goals at each stage, specific solution strategies and methods, implementation schedule, implementation manpower and resources, and assessment of expected benefits.

Step 4: Establish a review method for the action plan and record it during implementation. All records and review processes must be shared with the entire school or community.

Step 5: Teaching about environmental issues should be added to the curriculum, providing opportunities for students of all grades to participate in ecological exploration activities, and there must be relevant reports or works after the exploration.

Step 6: Combine various local community resources to get more support and practical help for the ecological action plan. This can also expand the influence of ecological actions and allow people in local communities to contribute to improving the environment and ecology.

Step 7: Develop an ecological manifesto that calls for environmental action across the school. The ecological declaration must clearly state the school's ecological goals, allowing all teachers, students, and local communities to understand and participate in environmental protection actions. It needs to be clear and imaginative, representing the school's commitment to improving the environment.

The Taiwan-US Eco-Campus Partnership Program was launched in 2015 and has achieved significant results. Through the professional development of teachers and thematic cooperation with students, the quality and effectiveness of EE in participating schools have been improved. Many participating schools have successfully obtained international ecological school certification and become benchmark schools that promote sustainable development. The program empowers and mobilizes students to act on environmental issues, and enhances their global citizenship awareness. In conclusion, the Taiwan-US Eco-School Project has built a bridge between EE and sustainable development for schools in Taiwan, cultivated future citizens with sustainability literacy and a global perspective, and contributed to sustainable development.

### *Accelerating local-level actions*

The Taiwan Ministry of Education Rural School Education and Community Sustainable Development Plan has been implemented for the past decade to encourage local-level actions in rural areas. It is an education and community collaborative development plan that cultivates rural areas for sustainable development (Ho et al., 2019). The project has three goals:

- Improve the quality of education in rural schools: Through multiple channels, improve teachers, curriculum, teaching equipment, and other aspects of rural schools to shorten the education gap between urban and rural areas.
- Promote sustainable community development: Combine school and community resources to develop local specialty industries, cultural heritage, environmental conservation, etc., to create momentum for sustainable community development.
- Establish a mechanism for schools and communities to learn and benefit from each other: Promote interaction and cooperation between schools and communities through courses, activities, resource sharing, etc., to create a win-win situation.

The Rural School Education and Community Sustainable Development Plan helps accelerate local-level actions through integrating education resources, local community resources connection and development, and mutual learning and sharing of schools and communities.

#### (1) Integration and improvement of educational resources

The plan is to provide professional development opportunities for rural teachers, and to establish an experience-sharing and exchange platform to promote their teaching experience of ecological and cultural inheritance and wisdom. It also offers preferential treatment and benefits to teachers in rural areas, such as additional allowances and dormitory subsidies to increase their willingness to stay. Regarding curriculum development and innovation, the plan encourages the development of special courses that meet the needs of rural students, such as local culture, environmental education, and industrial experience. It helps schools to collaborate with communities to develop school-based curricula and connect local resources with students' life experiences. In addition, subsidies to digital learning resources, computer equipment, school building renovation, and construction of barrier-free facilities are introduced to improve teaching

equipment and the learning environment.

## (2) Community resource connection and development

Community resources consist of three domains: local industrial development, cultural inheritance and innovation, and natural resources and sustainable development.

For the domain of the local business sector, the plan encourages schools to cooperate with local characteristic industries to develop unique courses and experiential activities to cultivate students' local employability. It also works with enterprises to implement industry-university cooperation projects, and provides student internships and employment opportunities. In conclusion, the plan aims to cultivate young entrepreneurial talents in local communities and promote the development of community industries.

In the domain of cultural inheritance and innovation, the project plans to combine local cultural resources, develop cultural experience courses and activities, and inherit local culture. Then, it encourages students to participate in community cultural activities and cultivate cultural identity and self-confidence. Digital technology is integrated to innovate cultural inheritance methods so as to attract the participation of younger generations.

The domain of environmental conservation and sustainable development includes approaches to combine local environmental resources to develop environmental education courses and activities to cultivate students' environmental awareness, encourage students to participate in community environmental conservation activities, such as beach cleaning and tree planting, and promote sustainable community development and the harmonious coexistence of the community and the environment.

### (3) Mutual learning and sharing of rural schools and communities

The Ministry of Education encourages mutual sharing and learning of rural schools and communities by establishing communication and cooperation mechanisms, building platforms for resource sharing and mutual assistance, and collective actions of experiential learning.

The Rural School Education and Community Sustainable Development Plan establishes communication and cooperation mechanisms. It holds regular school-community meetings to discuss opinions and needs, and sets up school-community cooperative development committees to jointly plan and promote cooperation projects.

Resource sharing and mutual assistance are key to local-level actions. The plan establishes a platform for sharing resources. It encourages mutual aid and cooperation between schools and the community, such as community volunteers assisting in school activities, schools providing community learning resources, etc.

The plan identifies learning subjects and experiential learning activities as the targets of collaboration between rural schools and communities. It encourages schools to cooperate with communities to develop courses and activities, such as community service learning, cultural experiences, and industry visits. It invites community members to participate in school curriculum teaching and share professional knowledge and expertise.

In conclusion, this project aims to improve the quality of education in rural areas, promote sustainable community development, and create a better future for rural areas through collaboration between education and the community.

## Key Themes in ESD

### *Indicators of SDG 4—The Volunteer Department Report of the Ministry of Education*

The Ministry of Education published its Volunteer Department Report (VDR) for SDGs in 2020. The report describes the department's efforts on the indicators of Sustainable Development Goal 4 – Quality of Education (SDG 4), which demonstrates national ESD indicators for K-12 education in Taiwan (Ministry of Education, 2022c).

SDG 4 – Quality of Education has seven targets. The indicator for target 4.1 set by the Ministry of Education is the percentage of students who reach PISA level 2 in reading and mathematics when they complete basic education before age 15. The indicator for 4.2 is the supply of early childhood education services. Target 4.3 includes two indicators: the participation rate of youth and adults in higher education in the past 12 months, and strengthening various student aid measures and expanding the effectiveness of multiple measures for disadvantaged students. Target 4.4 comprises two indicators: the first concerns the rate of students in undergraduate programs in colleges and universities taking programming-related courses, and the second is the rate of senior secondary schools offering information technology-related courses to enable young people to acquire ICT skills. Target 4.5 has eight indicators mainly focusing on indigenous and disadvantaged students: opportunities for indigenous students to study in higher education, number of indigenous experimental education schools, enrollment rate of indigenous students in elementary, junior high and high schools, ratio of indigenous dropouts among middle school dropouts, employment ratio of students with disabilities in colleges and universities, appropriate guidance and placement rate of students with disabilities, overview of the employment transition and counseling service centers for students with disabilities, and the kindergarten enrollment rate of 5-year-old economically disadvantaged children. Target 4.6, regarding the lifelong learning participa-

tion rate of adults over 18 years old, is less relative to K-12 education. By contrast, target 4.7 has a direct relation to ESD as follows:

4.7.1 In line with the 12-year national curriculum framework, integrating gender equality education, human rights education, and global citizenship education into K-12 education

4.7.2 The number of teachers who have acquired professional knowledge such as gender equality education, human rights education, and global citizenship education

4.7.3 The rate of student unions elected by all students in senior secondary schools and above

### ***The ESD core competencies of the Taiwan 2019 Curriculum Framework***

Sustainability is an important competency of the Taiwan national curriculum framework. The core competencies of the Taiwan 2019 curriculum syllabus include three levels, namely spontaneity, interaction, and common good. Each level includes three competencies, making a total of nine core competencies. The first level, "spontaneous," emphasizes individual physical and mental development, with personal learning as the core; the second level, "interaction," values the interaction between people and the mutual relationships between social groups, especially the impact of media and digital technology on social interaction; the third level, "common good," focuses on international literacy across regions and cultures, and even extends to the ecological environment outside human society and sustainable development across generations. The core competencies of "sharing the good" clearly point out the belief, value, and connotation of sustainable development in Taiwan's national curriculum (Ministry of Education, 2014).

Sustainable development has been integrated into the syllabus of the Taiwan

2019 curriculum framework and has been fully integrated with the "common good" of the third aspect of the core competencies: "spontaneity, interaction, and mutual good." This emphasizes social participation, including "ethical practice and citizenship awareness," "interpersonal relationships and teamwork," and "multiculturalism and international understanding."

"Care for natural ecology and sustainable development" is the core narrative of "C1 Moral Practice and Citizenship Awareness," which clearly points out that caring for human sustainable development is an essential core competency, and the connotation of "C3 Multiculturalism and International Understanding": "Respect and appreciate multiculturalism, actively care about global issues and international situations, and be able to adapt to the pulse of the times and social needs" and "Develop international understanding, multicultural values and a mind for world peace" are closely related to the connotation of sustainable development, and also directly echo Sustainable Development Goal 16, "Peace, justice and mechanisms" (SDG 16 Peace, Justice & Strong Institutions) and 17 "Partnership" (SDG 17 Partnership for the Goals). The following content of "C1 Moral Practice and Citizenship Awareness" and "C3 Multiculturalism and International Understanding" fully demonstrates the concept and connotation of sustainable development (Ministry of Education, 2014).

"C1 Ethical Practice and Citizenship:"

“Possess the quality of moral practice. From an individual to a social citizen, step by step, develop a sense of social responsibility and citizenship, actively pay attention to public issues and actively participate in social activities, care about the natural ecology and the sustainable development of humanity, and demonstrate knowledge and kindness and the character of doing good.”

"C3 Multiculturalism and International Understanding:"

“Believe in self-cultural identity, respect and appreciate multiculturalism, actively care about global issues and international situations, adapt to the pulse of the times and social needs, and develop international understanding, multicultural values, and world peace.”

The competence of “C1 Ethical Practice and Citizenship” consists of three sub-competencies to fit the learning stages: primary school, junior high, and high school. The sub-competency for grades 1-6 is “E-C1 possesses the knowledge of personal life ethics and the ability to judge right and wrong, understands and abides by social ethics, cultivates citizenship, and cares for the ecological environment”; for grades 7-9 it is “J-C1 Cultivate moral thinking and practical abilities, possess democratic literacy, legal concepts, and environmental awareness, actively participate in public welfare group activities, and care about bioethical issues and the ecological environment”; and for grades 10-12 it is “U-C1 Can think and dialogue on moral issues and public issues, cultivate good moral character, citizenship, and social responsibility, and actively participate in environmental conservation and social public affairs.”

Like “C1 Ethical Practice and Citizenship,” “C3 Multiculturalism and International Understanding” also has three sub-competencies to fit the learning stages: primary school, junior high, and high school. The sub-competency for grades 1-6 is “E-C3 Can understand and care about local and international affairs and recognize and tolerate cultural diversity”; for grades 7-9 it is “J-C3 Can be sensitive to and accept diverse cultures, care about local and international affairs, and respect and appreciate differences”; and for grades 10-12 it is “U-C3 is firm in its cultural values; it can also respect and appreciate multiculturalism, have an international perspective, proactively care about global issues or situations, and possess international mobility.”

## *Curriculum — The ESD content of the Taiwan 2019 Curriculum Framework*

An outstanding achievement of EE in Taiwan is its infusion into the national curriculum framework. In 2001, EE was recognized and was required to be included in the national grade 1-9 curriculum framework. However, compared to other learning fields, EE is a relatively new subject, the goals, content, and pedagogies of which must be developed. The Ministry of Education, the Environmental Protection Administration of Taiwan, and several NGOs have helped researchers and practitioners develop EE's goals and content. Value-inherited and action-oriented were included in the 2001 national curriculum framework, and sustainability was incorporated into the 2019 national curriculum framework. EE in the 2019 national curriculum framework consisted of five core concepts: environmental ethics, sustainable development, climate change, disaster preparedness, and sustainable use of energy and resources.

**Environmental ethics:** The connotation of environmental ethics includes care for people (social justice, generational justice, etc.), care for life, animal welfare, and care for the environment, environmental experience, and ecological conservation. It starts with experiencing the surrounding natural environment and life care, and extends to ecological conservation and environmental protection. The primary school education stage focuses on awareness of ecological balance, life care, and the relationship between people and the environment; the junior high school education stage focuses on understanding biological diversity, and the environmental stage focuses on understanding biological diversity, environmental carrying capacity, animal welfare, environmental aesthetics, and environmental literature. The high school education stage focuses on topic exploration, thinking, and value judgment, and discusses environmental research, thinking, and value judgment. Concepts include the conflict between environmental protection and development, compensatory justice, social and ecological protection and development, and social ecology.

**Sustainable development:** The connotation of sustainable development is humanity's reflection on industrial, economic, and technological development and future development planning; its core concept is generational justice and social justice, and its primary connotation is the ecological environment, social culture, and economic development. The primary school education stage focuses on awareness of the impact of human economic development, lifestyle, and material consumption on the environment. The junior high school education stage focuses on understanding the connotation of sustainable development, the promotion of sustainable development by the United Nations, and the sustainability of population, food, and nutrition. The high school education stage concerns thinking about the meaning of human development and exploring the value clarification of how the quality of life and lifestyle can promote sustainable development.

**Climate change:** The connotation of climate change includes global warming and the changes in climate patterns it induces, as well as its impact on human beings. From the awareness of climate change in daily life, we can understand the causes and impacts of climate change and then practice the mitigation of and adaptation to climate change in our lives. The primary school education stage focuses on awareness of the effects of climate change on life, the junior high school education stage focuses on understanding the concepts of the greenhouse effect and climate change, resilience and vulnerability to climate change, and climate change-related policies, and the high school education stage emphasizes international research on climate change development and international conventions, and participation in regional climate change actions.

**Disaster prevention and relief:** The connotation of disaster prevention and relief is the causes, trends, related impacts, and ways to reduce and avoid disasters. It is a relatively new topic. Especially after experiencing several significant earthquakes, the South Asian tsunami, Hurricane Katrina in the United States, Japan's Fukushima nuclear disaster, Taiwan's 921 earthquake,

and Typhoon Morakot, disaster prevention and relief have become significant international concerns. The primary school education stage focuses on being aware of the impact of disasters and cultivating disaster vigilance. The junior high school education stage focuses on understanding natural disaster factors and impact concepts, and participating in disaster prevention drills. The high school education stage focuses on action participation in monitoring, mapping, and planning drills.

**Sustainable utilization of energy and resources:** The connotation of sustainable utilization is mainly the circulation of resources and the flow of energy. It includes topics such as water resources, resource circulation, renewable energy, and waste reuse. They relate to the fundamental theories of environmental science and daily life applications such as organic foods, simplicity, carbon footprint, and circular society. The primary school education stage focuses on awareness of the importance of energy, resources, and resource recycling, and developing related good living habits. The junior high school education stage focuses on understanding energy flow, material circulation, ecological operations, life cycles, and alternative energy. The high school education stage focuses on an in-depth understanding of recycling mechanisms, clean production, green buildings, and practices in green consumption and environmentally friendly lifestyles. It is also the key to moving toward implementing the SDGs to build a fair, just, and sustainable world.

## **ESD in Formal Education**

ESD's core competencies and conceptual content (environmental ethics, sustainable development, climate change, disaster preparedness, and sustainable use of energy and resources) are taught equally in K-12. In addition to the core competencies and concepts, ESD programs and activities have improved students' learning of sustainable development and the SDGs. The Ministry of Education's promotion of sustainable education covers the following five programs (Ministry of Education, 2024):

- (1) Environmental education: In line with the "Environmental Education Act," the Environmental Education Personnel Certification Program was established in 2012. By the end of 2023, the total number of valid certifications in nationwide schools exceeded 5,344. To implement the goal of 2050 zero-emission, the Ministry of Education empowered environmental education teachers, strengthened the promotion of tree-loving education, and initiated the "New Generation Environmental Education Development" learning blueprint with sustainable development education as the core in 2023.
- (2) Climate change education: The Ministry of Education promotes the climate change talent training plan through the Climate Change Response Act.  
By the 2022 academic year, 386 teaching activities had been subsidized, and a creative implementation competition on climate change had been organized to enhance climate change awareness and skills.
- (3) Sustainable campus: Since 1991, the Sustainable Campus Plan has been promoted to make school campuses sustainable by saving energy resources, ecological restoration, and disaster prevention and reduction. Since 2019, it had been transformed into the Sustainable Recycling Campus Exploration and Demonstration Project to assist schools in exploring sustainable development approaches, integrating the United Nations' SDGs, and promoting sustainable campus transformation cases. In response to global climate change issues and the 2050 net-zero emission goal, the Sustainable Recycling Campus Exploration and Demonstration Plan was changed in 2023 to the Constructing a Smart Climate-Friendly Campus Pilot Plan. The plan equipped schools to measure and collect real-time environmental information monitored online and encouraged students to use it with campus carbon inventories to understand the school's carbon emission information, analyze the relevant information, and apply it. The Ministry of Education intends to establish an innovative and climate-friendly campus model to

improve the sustainable literacy of teachers and students on climate change and sustainable development. A total of 1,697 schools were subsidized in 2023.

- (4) Disaster prevention education: The Ministry of Education implements disaster prevention education programs in alignment with the Disaster Prevention and Protection Act. School disaster management and various response actions are organized into four stages: disaster reduction, preparation, response, and recovery. The Building a Resilient Disaster Prevention Campus and Disaster Prevention Technology Resource Application Plan has been promoted since 2019 to cultivate disaster prevention education concepts for teachers and students in schools at all levels. The Ministry of Education has actively set up Resilient Disaster-Resistant Campuses recently, and 5,066 schools have been subsidized to build disaster-resistant campuses.
- (5) Environmental safety and health education: The Ministry of Education cooperates with environmental protection laws and regulations to supervise affiliated schools to remove and dispose of laboratory waste, prevent air pollution, and conserve water resources. It also follows the rules of occupational safety and health to strengthen teachers' and students' capabilities of hazard identification and handling hazardous waste to improve school safety and health management. From the 2019 school year, the Ministry of Education has established the Occupational Safety and Health Mutual Aid Alliance of Universities and Colleges in the North, South, Central, and South Districts to strengthen occupational safety and health business, and has conducted a Universities and Colleges Campus Environmental Management Survey to implement campus environmental safety and health management work, establish and improve management systems, and continue to guide schools to implement campus environmental, safety and health management.

(6) Tree-loving education: Based on the principle of "planting small trees, planting suitable trees in the right place, and native tree species," the Ministry of Education has established a tree-loving education counseling group, a "campus tree resource" database, a "campus tree information platform" and a tree-planting game, "Guarding the Trees." It has also conducted training workshops using the tree-planting game, "Guarding the Woods," and the campus tree information platform to cultivate teachers' and students' love for trees. In addition, the Ministry of Education cooperates with the Executive Yuan Committee on Agriculture and the National Tree Planting Consultation Center of the Executive Yuan Committee on Agriculture to improve the landscapes of schools by setting up campus green fences. It also reduces noise and other environmental issues, enhances the beauty of the campus, and turns tree-loving education into practical actions.

## ***Teacher training***

### **Pre-service teacher training**

The Teacher Education Act regulates pre-service teacher training in Taiwan. Pre-service teacher education courses include general courses, Professional Education Courses, and specialization courses. General courses develop teachers' broad sense of the humanities and aspirations for an educational career. Professional Education Courses equip teachers with the teaching knowledge and skills needed by a qualified teacher in their subject area(s). Area of specialization courses are courses designed to equip teachers with specialized knowledge and skills in teaching particular subjects, disciplines, and specialized fields.

ESD and EE are not specific subjects in the K-12 curriculum. However, EE, which includes ESD, is recognized as an essential issue and must be infused into all the learning subjects by the 2019 National Curriculum Framework. As

a result, the pre-service teacher training program has trained pre-service teachers with ESD competency, which consists of student-learning-centered educational competence, respect for diversity, ethnic cultures, social concerns, and an international vision.

To respond to the ESD trend, the pre-service teacher training system in Taiwan promotes EE through the incorporation of the concepts of environment, social justice, and sustainability into a formal course, "Environmental Education Theory and Practice," as a required or elective course, and integrating SDGs, ecological conservation, climate change, and other issues to cultivate the environmental literacy of future teachers. As for the feature of cross-disciplinary integration of ESD, the pre-service teacher training program integrates environmental education into the teaching of various subjects, such as social impacts of green energy development in natural science classes and explaining land use and sustainable development in social subjects, and organizes cross-department collaborations, such as with the Department of Earth Sciences, Geography and Education to offer practical courses jointly.

### **In-service teacher training**

The in-service teacher training for ESD is more received than pre-service teacher training. According to the Environmental Education Act, each primary school, junior high school, high school, college, and university has to assign a teacher to implement EE. The assigned teacher has to be certified as an EE teacher by the Environmental Education Certification System. To get the certification, teachers must take 24 hours of EE courses conducted by either the Ministry of Education or the Ministry of Environment. About 5,000 teachers complete the courses and are certified every year. A total of 5,344 teachers were certified in 2023 (Ministry of Education, 2024).

In-service teacher training has significantly contributed to the implementation of ESD in Taiwan. Both the Ministry of Education and the Ministry of Envi-

ronment promote the certification of EE personnel, encourage teachers to obtain certificates, and improve their profession. The Environmental Education Personnel Certification courses include the Theoretical Basis of Environmental Education— environmental ethics, sustainable development, social justice, and environmental values and thinking; Curriculum Design and Teaching Practice, which consists of outdoor experiential learning, issue investigation design, natural observation, and recording, and integrating EE into the 12-year national education; and Sustainable Education and Global Perspective including the connection between SDGs and education, climate change education and environmental justice, environmental advocacy, and citizen action.

### ***Non-formal ESD***

The Ministry of Education is responsible for formal ESD, and the Ministry of Environment leads non-formal ESD. Unlike formal ESD, which usually takes place in school settings, non-formal ESD emphasizes field learning experience and often arranges for students to participate in internships in nature education centers, conservation areas, museums, and rural communities. Instead of school classrooms and conference rooms, the Ministry of Environment has certified Environmental Education Facilities to offer ESD programs (Ministry of Environment, 2024).

Most of the renowned museums in Taiwan have received certification in ESD. As an important place for cultural education, museums actively promote EE as their social responsibility. Museums can popularize environmental protection knowledge to the public and improve the public's environmental awareness by holding environmental protection-themed exhibitions, conducting environmental protection knowledge lectures, and organizing environmental protection practice activities. At the same time, museums can cooperate with schools and communities to integrate EE into daily activities and jointly contribute to building a sustainable society.

Some museums have taken concrete steps to promote EE and sustainability education. For example, the National Taiwan Museum in Taipei regularly holds exhibitions related to the natural environment and ecological protection, such as the "Biodiversity" exhibition, to raise public awareness of the importance of biodiversity protection by displaying Taiwan's rich biological species and ecosystems. In addition, the museum runs a range of educational activities, including lectures, workshops, and field trips, designed to educate students and the public on how to take practical action to protect the environment.

Another example is the National Museum of Natural Science in Taichung, which has a dedicated EE area that introduces visitors to the importance of climate change, resource recycling, and sustainable development through interactive exhibits and educational activities. These exhibitions and activities encourage visitors to consider how to practice sustainable development in their daily lives.

### ***Social partnerships***

Non-governmental organizations (NGOs) play an essential role in ESD in Taiwan. They aim to improve citizens' sustainability literacy and promote the practice of sustainable development actions. They are usually closely integrated with local communities and can design and implement ESD projects according to local needs, enhancing local connections and practical effects.

NGOs can provide additional support and resources to promote the development of ESD with the help of government funding. The Ministry of Environment depends on social partnerships with foundations, associations, and companies to implement ESD in Taiwan. With the support of the Environmental Education Fund and certified Environmental Education Facilities, the Ministry of Environment conducts many ESD events every year. The following events were held in 2023 (Ministry of Environment, 2024).

- (1) In conjunction with the Earth Day theme of Invest in Our Planet, the Ministry of Environment engaged civil societies and enterprises to organize the Net Zero Green Home Vegetarian Traceless Family Day event to help the public understand how to drive life transformation through net zero green actions.
- (2) In conjunction with the theme of World Environment Day, which is Only One Earth, local environmental protection agencies organized the 2023 World Environment Day Plastic Fight and Sustainable Food Style event to teach the public how to reduce plastics, implement food prudence, and use net-zero green living actions to move towards the 2050 net-zero goal.
- (3) The Ministry of Environment and local Environmental Protection Bureaus collaborated to conduct the National Environmental Knowledge Contest.
- (4) The Ministry of Environment and local communities collaborated to hold the 2024 Commendation of Outstanding Environmental Education Volunteers to demonstrate the vitality of and to inspire a sense of honor of environmental volunteers.
- (5) The Ministry of Environment sponsored NGOs to organize environmental protection experience workshops to enhance young people's environmental awareness and enable them to participate in environmental protection actions.
- (6) The Ministry of Environment organized the Taiwan-Denmark Environmental Education Cooperation and Environmental Design Competition Exhibition and the International Environmental Design Master Class to promote Denmark's sustainability design concepts.
- (7) Responding to the innovative technology of the Circular Economy, the Ministry of Environment organized the 2023 Taiwan Innovation Technology Expo to promote resource recycling technologies and achievements

and the 4th 2030 Beyond the Circle—Circular Economy New Innovation Exhibition.

### ***Key statistics and practical examples of ESD***

To respond to SDG 4 Quality of Education – “4.7.1 In line with the 12-year national curriculum framework, integrating gender equality education, human rights education, and global citizenship education into K-12 education”—the 12-year national curriculum framework has been implemented, and gender equality, human rights, and global citizenship have been infused into learning subjects since 2019. As for “4.7.2 The number of teachers who have acquired professional knowledge such as gender equality education, human rights education, and global citizenship education,” the number of environmental education certified teachers is about 5,000 every year, with 5,433 certified in 2023 (Ministry of Education, 2024).

In response to the Environmental Education Act, all primary, junior high, and high schools conduct more than 4 hours of EE every year. Regarding the Environmental Education Certification Programs, the Ministry of Environment has certified 11,350 EE professionals, 256 EE facility sites, and 25 EE institutions. As for the funding for EE, the Environmental Education Fund has offered about 400 million NT dollars to implement EE (including ESD) for several years.

### **Features of ESD**

Sustainable education aims to cultivate citizens’ sustainable values and build a green and environmentally friendly economic and social system. UNESCO’s Global Action Program (GAP) for Sustainable Education focuses on the following two education goals (UNESCO, 2014b):

- Provide learners with "green collar jobs" skills and inspire people to adopt sustainable lifestyles to upgrade to a more environmentally

friendly economic and social system.

- Enable people to become "global citizens" who participate and play an active role locally and globally to face and solve global challenges and become active contributors in creating a more just, peaceful, tolerant, inclusive, secure, and sustainable world.

Based on the above-mentioned sustainable education goals and their implementations in Taiwan, Chang (2023b) summarized the following features of sustainable education:

**(1) Sustainable education is the education of values**

The United Nations' International Implementation Scheme (IIS) for the Decade of Sustainable Education states that sustainable education is an education that conveys values and beliefs, with "respect" as its core - respect for others (including current and future generations), respect for the environment, respect for diversity and difference, and respect for all resources on the earth. In addition to respect, sustainable development emphasizes the balanced consideration of economic growth, environmental ecology, and social fairness and justice, which is the education of values (UNESCO, 2005).

**(2) Sustainable education is the education of sustainable living practice**

Sustainable education teaches learners how to solve the social, environmental, and development challenges they face. The content of learning is actual life experience, and the learning results are practiced in life. For example, to reduce the impact of climate change and greenhouse gas emissions, people must practice environmentally friendly green living.

**(3) Sustainable education is education that participates in and builds sustainable economic and social systems**

Sustainable education uses the perspective of "sustainability" to think about a

living model that can meet the current generation's needs without harming future generations. At the same time, it also considers economics, environmental ecology, and social equity when making decisions. Therefore, sustainable education encourages learners to participate in transforming social and economic systems, such as participating in the energy, industry, life, and social transformation of Taiwan's 2050 net-zero emission policy.

#### **(4) Sustainable education is the education of global citizens**

The meaning of sustainable development goals is to care about international fairness and justice, assume responsibility for human society and natural ecology, and promote the ideal of global common development; sustainable education conveys cross-border international literacy and is education to cultivate global citizens.

#### **(5) Sustainable education is the education of "future imagination"**

Sustainable education cultivates people to have the values, lifestyles, and behavioral patterns required for future sustainable development. It is a dynamic learning process that teaches people how to make analytical judgments and decisions, considering the equality of all communities and the long-term future of the economy and ecology.

Taiwan's ESD has multi-faceted features and aims to cultivate students' environmental awareness, social responsibility, and global citizenship to cope with future challenges.

# Trends and Issues in ESD

## Trends

### *Integrating sustainability into the national curriculum*

The Taiwan National Curriculum Framework requires EE (including ESD) to be an essential issue integrated into the K-12 curriculum. The integration of ESD into the 12-year national basic education curriculum has the following essential implications (Ministry of Education, 2019). It:

- emphasizes and practices the universal values of "respect, care, justice, and sustainability."
- emphasizes the understanding and application of knowledge and the establishment of value beliefs, problem-solving skills, and the practice of specific actions, which can enhance the educational value of domain knowledge content learning.
- promotes the connection of domain knowledge content through the topic's characteristics, including the connection of cross-domain knowledge connotation, life practical experience, situations, etc.
- highlights teaching theory to make learning content meaningful and unified by connecting topics and avoiding the fragmentation of domain/subject knowledge content.
- requires using multiple teaching strategies, such as critical inquiry, discussion and dialogue, and experience and practice.
- responding to international trends, promotes the learning of critical thinking and problem-solving valued by the Program for International Student Assessment (PISA), and also fully responds to the connotation of the United Nations' 17 SDGs, especially the fourth goal of sustainable education.

The integration of sustainable development education into the curriculum of various subjects, such as discussing climate change and biodiversity in natural sciences or exploring environmental justice and resource allocation in social sciences. In addition, it encourages the use of innovative teaching methods, such as project-based learning (PBL), contextual teaching, and game-based learning to increase students' engagement and interest in sustainable development issues. The encouragement of teachers of different subjects to jointly design courses to allow students to understand sustainability issues from multiple perspectives, such as analyzing the impact of climate change from scientific, social, economic, and cultural perspectives (Chang, 2023b).

The Sustainable Campus Plan and the Climate-Friendly Campus Plan of the Ministry of Education encourage implementing sustainable development management and education on school campuses. Since 2023, in response to Taiwan's 2050 net-zero emission goal, the Ministry of Education has further promoted the Pilot Plan for Building a Smart and Climate-Friendly Campus (2023-2026), which conducts campus environmental monitoring and carbon inventory through the Internet of Things (IoT), and uses monitoring information and carbon inventory data to promote campus carbon reduction related work. The projects indicate the following two trends.

### ***Implementing campus sustainability practices***

The promotion of green campus projects such as campus energy management, water-saving measures, waste sorting, plastic reduction initiatives, and food waste reduction.

### ***Applying technology and digital tools***

The use of digital learning resources and technologies (such as environmental monitoring data, simulation tools, and VR/AR) allows students to deeply understand environmental issues and participate in solving them.

### *Conducting student-led action plans*

The Taiwan-U.S. Eco-School Partnership consists of seven steps, including the first and most crucial step of forming a learning team led by students, and the sixth step of coordinating the resources of communities to implement ESD. The project highlights the trends of student-led action plans and cooperation between schools and communities. The project encourages sharing the results between Taiwan and United States eco-schools to promote global citizenship.

The ESD in Taiwan encourages students to lead actions in planning and implementing sustainability action plans, such as establishing environmental clubs, organizing forums on sustainability issues, monitoring the campus environment, and even further to carry out community service learning and environmental transformation to promote local ecological sustainability.

### *Promoting teacher professional development*

As climate change and environmental issues receive increasing attention, environmental educators are required to respond effectively and in a timely fashion, such as promoting net-zero green living, energy conservation, and carbon reduction. Taiwan's EE personnel certification system, based on the Taiwan Environmental Education Act, has improved professionalism, expanded influence, and increased the number of ESD educators. If the process can be continuously optimized and resource integration strengthened in the future, it will further promote sustainable development. It has been well agreed that the provision of professional growth opportunities to teachers, such as sustainable development education research or workshops, to enhance their understanding of relevant issues and teaching abilities.

### **Issues**

Promoting sustainable development education in Taiwan involves many controversies and challenges, including policy implementation, curriculum de-

sign, and social cognition (Chang, 2017). Thus, the following issues in ESD exist:

### ***Conflict between the curriculum and pressure for further studies***

Taiwan's education system has long been affected by the pressure to enter higher education, which means the importance of ESD is often overlooked. When faced with heavy academic burdens, many teachers and students find it challenging to focus on the concept and practice of sustainable development, thus failing to allow sustainable thinking to take root in the hearts of the people. In this case, students' attention to environmental issues is reduced, and they are unable to form a positive sense of action.

### ***Insufficient professional knowledge of teachers***

Many teachers lack an adequate understanding of the SDGs, which prevents them from effectively integrating relevant content into their teaching. Research indicates that teachers lack the necessary professional training and resource support, resulting in poor promotion of sustainable development education. This problem reflects that the emphasis on sustainable education within the education system still needs to be improved.

### ***Insufficient learning materials***

ESD is a relatively new topic in K-12 education, and the materials for teaching ESD, such as teaching modules, readings, learning tools, and practicing models, are insufficient.

### ***Insufficient administrative support***

When schools promote sustainable development education, they often face the dilemma of insufficient administrative support. Many teachers have said that their schools fail to provide sufficient help in terms of resource allocation

and policy support, making them feel powerless when implementing relevant courses. In addition, teachers are overwhelmed by too many policy promotions and administrative affairs, and so cannot focus on teaching.

### ***Limited social cognition and support***

Society's awareness of sustainable development education is still limited, and many people lack sufficient understanding of its importance. Family and community support are insufficient, making it difficult for students to obtain sustainability learning and practice opportunities outside of school. Therefore, improving the understanding and support of sustainable development education from all walks of life is an important issue that needs to be solved urgently.

Although Taiwan has made some progress in promoting sustainable development education, it still faces many challenges, including pressure to enter higher education, insufficient teachers' professional knowledge and learning materials, lack of administrative support, and inadequate social awareness. To effectively promote ESD, comprehensive improvements need to be made in multiple aspects, such as policy, curriculum design, teacher training, and social support, to cultivate a new generation with sustainable thinking.

## **Conclusion**

The first Earth Day was launched in 1970, followed by the United Nations Conference on Human Environment in 1972 to review environmental problems caused by irresponsible economic development and to formally promote global environmental education. After many international EE conferences, workshops, and cooperation projects, EE has developed a complete and systematic structure with environmental concepts, educational goals, character-

istics, principles, connotations, teaching strategies, and promotion strategies. Sustainable education inherits the development model of environmental education. From the sustainable development trend driven by Our Common Future in 1987, through the implementation of the United Nations Decade of Sustainable Education (DESD) and the current globally focused SDGs, and Enhancing Our World: the 2030 Agenda for Sustainable Development, sustainable education has developed into a systematic outline structure and complete curriculum content.

The SDGs are an agenda signed and recognized by all member nations of the United Nations (Agenda 2030), and their connotation is the basic literacy of global citizens; the goal of sustainable education is the civic cultivation of sustainable values and the building of a green and environmentally friendly economic and social system. Therefore, it emphasizes social and international participation and is a civic education of multicultural care and tolerance. The characteristics of sustainable education are education in values and life practices, involvement in the construction of social and economic systems, global citizenship, and future imagination. Therefore, it is suitable for the teaching design of issue integration and the strategy of the whole-school business model. Sustainable education can enhance learners' international vision and life practice, as well as their ability to participate in system construction, which are the core qualities of future talents.

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# **Status, Trends and Issues of Educating for Sustainable Development (ESD) in the United States**

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## Abstract

The U.S. K-12 education system does not use a national curriculum but instead provides support for Educating for Sustainable Development (ESD) through initiatives led by the Department of Education. As a committed partner in achieving the United Nations' Sustainable Development Goals (SDGs), the U.S. has made measurable progress, achieving an overall status of 44% in meeting the 17 SDGs. However, significant challenges remain in adapting to the evolving needs of sustainable education, particularly in promoting equity, social justice, and social-emotional learning for students. A key obstacle is the lack of alignment between rigid state and local curriculum guidelines and the integration of specific sustainability objectives into existing educational standards. Additionally, teachers report feeling underprepared to address sustainability topics in their classrooms due to limited training and professional resources. Despite these challenges, the U.S. educational system is taking steps toward fostering sustainable development through targeted reforms in teacher preparation programs and ongoing professional development. These efforts aim to increase educator confidence in incorporating SDGs into lesson plans and curricula. Moreover, community partnerships and collaborations between schools, non-profit organizations, and local governments are emerging as vital tools to bridge gaps in sustainability education. These collective efforts underscore the growing recognition of education's critical role in advancing sustainable development, not just as a policy objective but as a transformative force in shaping future generations.

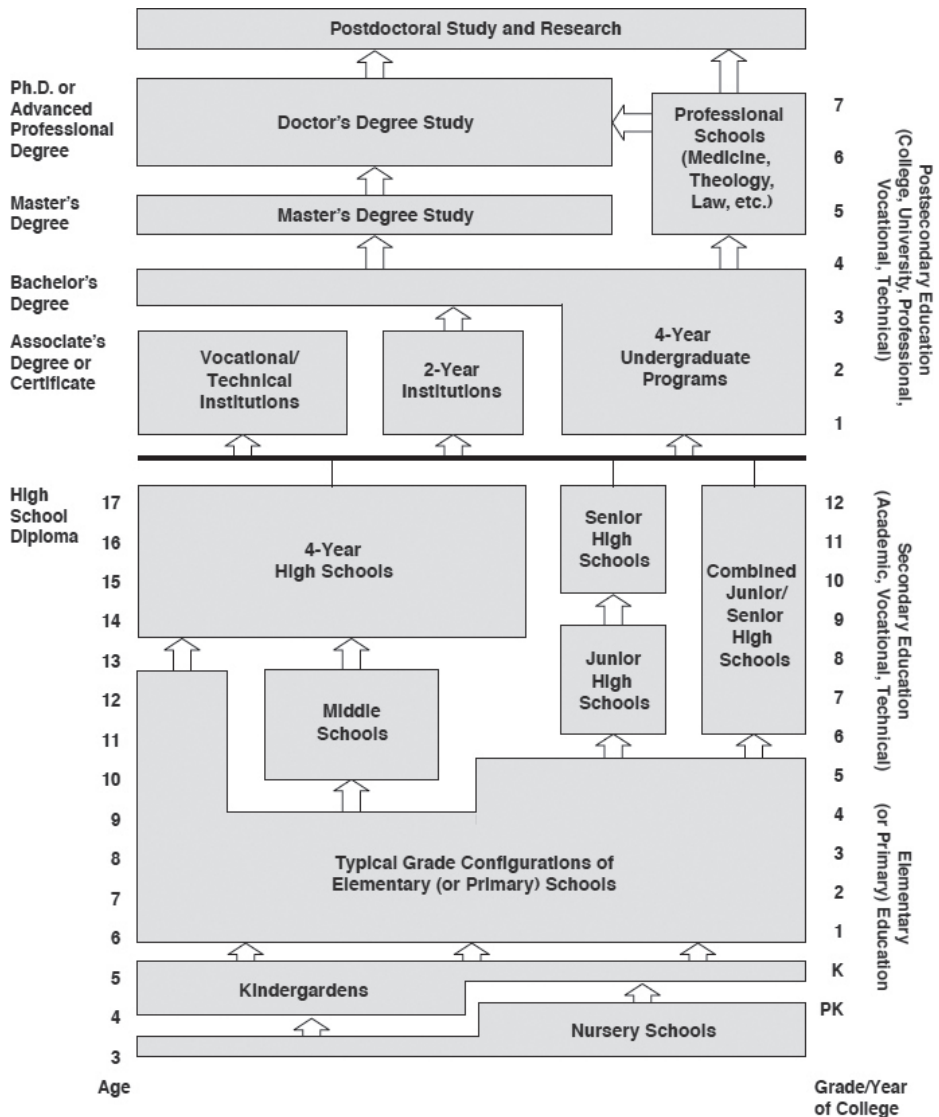
**Keywords:** sustainability education, environmental education, equity, social justice, curriculum reform

# Introduction

## Structure of the Education System in the United States (U.S.)

The United States (U.S.) offers a free, public-school K-12 system of education that has been in place since the early 19th century. Implemented as a 13-year progressive structure, in 2013, President Obama (2013) legislated for expansion of PreK as a “priority to educate our youngest children” (para. 1) and this has been added in most states, making it a 14-year structure. The intent of nationwide public schooling was to provide free educational opportunities to all children. The public-school years are delineated as early childhood education (denoted as elementary schools in the U.S.), middle or junior high (middle level education), and secondary education (high or senior high schools). The U.S. educational system also provides individualized special education programs throughout most of its educational levels to assist all citizens in achieving an educational credential. Post secondary education, also known as tertiary education, also encompasses non-degree programs for career studies, the general education diploma (GED), or a diploma. In the U.S., there are six distinct categories of post-secondary degree attainment including associate, bachelor, first professional, master, advanced intermediate, and research doctorate. The U.S. does not offer second or higher-level doctorates but does have post doctorate studies to continue in research programs. In the U.S. there are also various adult and continuing education opportunities in workforce training (U.S. Department of Education, 2008). Figure 1 below provides an overview of the current U.S. educational system structure.

**Figure 1** The Structure of Education in the United States



NOTE: Adult education programs, while not separately delineated above, may provide instruction at the elementary, secondary, or postsecondary education level. Chart reflects typical patterns of progression rather than all possible variations.  
 SOURCE: U.S. Department of Education, National Center for Education Statistics, Annual Reports Program.

Source: U.S. Department of Education, National Center for Education Statistics. n.d.

The United States does maintain a U.S. Department of Education whose primary job is to provide guidance and oversight. The department does not operate under a centralized model of regulation over the states. This model allows for a wide variety of laws, court decisions, regulations, and local policies in each state. Each locality, be it a city, township, or county in each state, has a responsibility to provide education for its citizens. They also have flexibility as to how, when, and where educational programs are offered to a large extent. Each state department of education has the primary responsibility of ensuring continuity in educational opportunities by ensuring compliance with federally mandated framework laws. The U.S. Department of Education (2024b) places the responsibility for developing schools, curricula, enrollment and education requirements to each state department of education and the local school boards.

In 2009, an academic group comprised of assessment specialists backed by the National Governors Association (NGA) and the Council of Chief State School Officers, developed the Common Core State Standards (CCSS). These standards were to ensure educational equity across the nation, bring a cohesive core to the K-12 instructional core of study, and raise student proficiencies in the core subjects such as English and mathematics (Greer, 2018). Although not mandated as a national curriculum, 45 of the 50 states, the District of Columbia (DC), and the Department of Defense Education Activity (DoDEA) adopted them. Yet four states have successfully withdrawn from the adoption of the standards, with another 12 states considering their repeal (World Population Review, 2024). These data reflect the resolute stance of local school systems to maintain autonomy for curriculum development based on the historical nature of the decentralized U.S. educational system (Greer, 2018). Another seminal standard, the Next Generation Science Standards (NGSS) was released in April 2013 to provide a “voluntary [emphasis added], rigorous, and internationally benchmarked set of standards for K-12 science education” (Next Generation Science Standards, 2013, para. 2). The standards focus on

three-dimensional learning of engaging practices, crosscutting concepts, and disciplinary core ideas to provide curricula to relate to the “interests and life experiences of students” or “societal or personal concerns” (Next Generation Science Standards, n.d., para. 5). The implementation of these standards was an effort to increase educational attainment without mandating a national curriculum. The NGSS specifically addressed global concerns of human activity, our place in the universe, biological evolution, and specifically unity and diversity. These areas provide another venue to address education for sustainability in the U.S. (Next Generation Science Standards, 2013).

Educational attainment in the U.S. public school system in comparison to its international counterparts was ranked in the top quarter of participating education systems in both mathematics and science for the fourth and eighth grade levels (U.S. Department of Education, 2024) at a 90<sup>th</sup>-10<sup>th</sup> percentile score gap of 219 in mathematics for fourth grade testing, and a 90<sup>th</sup>-10<sup>th</sup> percentile score gap of 256 in mathematics for eighth grade, with science at a 90<sup>th</sup>-10<sup>th</sup> percentile score gap of 214 for fourth grade, and a 90<sup>th</sup>-10<sup>th</sup> percentile score gap of 254 for eighth grade. According to the Trends in International Mathematics and Science Study (TIMSS), the “Score gaps are the differences between the scores of students in the 90<sup>th</sup> and 10<sup>th</sup> percentiles of the distribution in a given subject. These gaps can be seen as an indicator of equity within an education system” (U.S. Department of Education, 2024, para. 3). High school graduation rates were reported for the year 2021-22 with an adjusted cohort graduate rate of 87%, which is seven percentage points higher than the prior decade (U.S. Department of Education, 2024a). The TIMSS study reported that the U.S. undergraduate retention and graduation rates were ranked at 6 years to complete a bachelor’s degree at a 4-year institution with females persisting at a higher rate (67%) than their male counterparts (60%) (U.S. Department of Education, 2022a).

Funding for public education in the U.S. comes primarily from state, local, and private sources. The federal contribution is approximately 8% compared

to the 92% from the abovenamed sources. Of this 8%, the funds include not only the Department of Education but also other federal agencies such as the Head Start Program (Department of Health and Human Services) and school lunch programs (Department of Agriculture) (U.S. Department of Education, 2024b).

The U.S. Department of Education (2024c) states its goal has remained the same since its inception in 1867 which is “to promote student achievement and preparation for global competitiveness [emphasis added] by fostering educational excellence and ensuring equal access [emphasis added]” (para.1). This goal is consistent with the United Nations’ (UN) 17 Sustainable Development Goals (SDGs). The U.S. has programs in place to address climate change, biodiversity, inequality, and justice in its educational curricula as well as in the educational infrastructure. Still recognized by state and local educational entities mostly as environmental (science) education and environmental infrastructure, there is an undercurrent of educating for sustainability in many federally supported grant programs along with the optional standards previously mentioned.

## **Status of Overall ESD Policies and Practices in the U.S.**

Overall, the U.S. achieved steady progress in advancing policy through federally funded grant projects awarded to states and school systems. To focus on the four interconnected global challenges of climate change, loss of biodiversity, unsustainable use of resources, and inequality, the U.S. Department of Education was required to increase its collaborations with other federal agencies as well as local partnerships. The U.S. Department of Education focused its strategic plan on the areas of policy reform, sustainability and transformation of learning environments, promoting high quality teacher preparation and

professional development, along with strategies to increase learner involvement in ensuring the U.S. protects its valuable resources of human capital as well as natural resources. The strategies enumerated in the plan are described later. Additionally, the Department adopted Agency Priority Goals (APGs) which are highly focused, achievable goals to meet the strategic plan objectives in a 24-month period (U.S. Department of Education, 2022b). The APGs include:

1. Understand the impact of the COVID-19 pandemic on students, educators, and others in the community and the Department's response to the disruption.
2. Effectively manage federal student loans.
3. Reduce disparities in attainment of high-quality degrees and credentials.
4. Meet students' social, emotional, and academic needs.
5. Increase post-secondary value by focusing on equity-conscious strategies to address affordability, completion, post-enrollment success, and support for inclusive institutions.
6. Effectively manage federal students. (U.S. Department of Education, 2022b, p. 92)

The APGs, with a 24-month turnaround, address policy learning environments, building capacity of educators, and empowering and mobilizing youth through removing barriers for educational opportunities. The exceptions are that they do not address the loss of biodiversity, climate change, or unsustainable use of resources, but these are managed under the umbrella of advancing policy, specifically through the strategic objectives in the Department's strategic plan.

## ISCED level 0

### *Early Childhood: Birth to Age Two*

In the U.S. education system, there is no formal pathway for early learners, although many children are connected to learning through day care, church-based, or other care centers. The U.S. Department of Health and Human Services (HHS) does publish performance standards for the teaching and learning environment that ensure teachers “implement well-organized learning environments with developmentally appropriate schedules, lesson plans, and indoor and outdoor learning experiences that provide adequate opportunities for choice, play, exploration, and experimentation among a variety of learning, sensory, and motor experiences...” (U.S. Department of Health & Human Services, n.d., para c.). The HHS department provides a *Head Start Early Learning Outcomes Framework: Ages Birth to Five*, providing five central domains for preschoolers at this level. These domains include “Approaches to Learning; Social and Emotional Development; Language and Communication; Cognition; and Perceptual, Motor, and Physical Development” (U.S. Department of Health & Human Services, 2015, p. 6). At this age, the focus for education for sustainability is on overcoming inequalities in early learning or home-based learning opportunities and ensuring a well-organized learning environment with developmentally appropriate experiences. These experiences must include opportunities, as well as appropriate spaces, for indoor and outdoor learning environments and activities (U.S. Department of Health & Human Services, n.d.).

## ISCED level 1

### *Lower Primary Education*

Lower primary education in the U.S. has two separate classifications—lower primary (elementary) and upper primary (elementary). For lower primary edu-

cation, the categorization is Prekindergarten through grade 2, ages 4 through 5/6. Acknowledging the link between high-quality preschool environments and student success, the U.S. Department of Education (2024e) revised its guidance on serving preschool children through Title 1, Part A of the Elementary and Secondary Education Act (ESEA). This revision allowed educators and learning centers to leverage Title I funds to improve early access to programs and to enhance program quality. The funding available in this act also provides for teacher professional development and training to improve learners' educational opportunities. Education at this level focuses on the basics of comprehension and the acquisition of knowledge, yet it also embraces social and emotional learning to help equip learners with the necessary tools for future success. Students in lower primary education focus on “cross cutting concepts of patterns; cause and effect; structure and function; and [the] influence of engineering, technology, and science on society and the natural world” (Next Generation Science Standards, 2017a, p. 8). This level of education utilizes outdoor activities to develop these social-emotional skills as well as to interact with the environment. Outdoor play allows the environment and the children's interests to guide investigations and how the learning/play unfolds (Luckenbill & Reddick, 2024). Environmental education activities often seen in these grade levels include recycling, plant propagation, and exploration of animals and their young.

### ***Upper Primary Education***

Upper primary education in the U.S. is comprised of grades 3 to 5, usually ages 6 through 8, with some local systems maintaining grade 6 in this classification. Learners in these grade levels focus on introductory environmental concepts such as recycling, reducing waste, understanding and learning about ecosystems, and the importance of plants and animals to human survival. They also explore food webs and food chains and the importance of water conservation. A key sustainability lesson they begin to explore is the impact of human actions and decisions on the environment (National Environmental Education

Foundation, 2024; New Jersey Climate Education, n.d.; North American Association for Environmental Education, n.d.). For these grade levels, the cross-cutting curriculum includes “concepts of patterns; cause and effect; scale, proportion, and quantity; systems and system models; interdependence of science, engineering, and technology; and influence of engineering, technology, and science on society and the natural world” (Next Generation Science Standards, 2017b, p. 1).

## **ISCED level 2**

### ***Lower Secondary Education***

For U.S. schools, lower secondary education is comprised of grades 6 through 8, with learners aged 9-13. This level is called middle level education or junior high school. This age group is a critical age for learners as they progress through adolescence and begin to form their social and cultural identities. This period of their educational pathway is “complete with physical and cognitive changes as well as shifts in their social relationships” (National Association of Secondary School Principals, 2022, p. 1). The core curricula offered in this level are based on the American Common Core State Standards which include “English, Social Studies, Science, Math, History, Geography, and Next Generation Sciences” (Nord Anglia Education, 2024, para. 1). The Next Generation Science standards present a framework for a broad scope of sciences including life sciences, earth and space sciences, and engineering design processes. The life science performance standards, ESS1 and ESS2, Earth’s Place in the Universe, and Earth and Human activity, focus on the interrelatedness of humans and our limited natural resources. Standards ESS3, Earth and Human Activity promotes a critical lens on “four sub-ideas: natural resources, natural hazards, human impact on Earth systems, and global climate changes. Students understand the ways that human activities impact Earth’s other systems” (Next Generation Science Standards, 2013, p. 52). The NGSS engineering design process, MS-ETS1, is applied to ensure students understand “the uses of tech-

nologies and any limitations on their use are driven by individual or societal needs, desires, and values; ... and by differences in such factors as climate, natural resources, and economic conditions” (Next Generation Science Standards, 2013, p. 74).

### **ISCED level 3**

#### ***Upper Secondary Education***

This level of education contains grades 9 through 12, traditionally called high schools, with learners aged 14 to the upper limit of 21, at which point they are referred to an adult learning center. While requirements can vary by state, students are usually required to take eight classes of core subjects of English, mathematics, social studies, and science to matriculate. There are choices in the science courses they take including environmental science, physical science, and biology. They also have the opportunity to study a variety of electives including foreign languages, career and technical education courses, visual arts, and dual enrollment (college credit eligible) courses. A few high schools offer an academy approach to learning whereby students focus on a particular subject, such as engineering, marine biology, or environmental science, with all their core coursework relating to the topic (Oakland Unified School District, n.d.). High school is a time of preparation for post-secondary education or entering the workforce, so skills and courses attained during the 4 years are tailored to assist students in achieving their goals. Students are to assimilate core concepts from their previous courses and develop an understanding that decisions are not made by scientific exploration alone, but coexist with social and cultural contexts to resolve human issues. Equally important is the realization that modern civilization is dependent on technology systems, and biological evolution including unity and diversity awareness will promote their understanding of our current sustainability on Earth (Next Generation Science Standards, 2013).

## **Actions Taken and Performance Achievement for Education for Sustainable Development**

Education for Sustainable Development (ESD) in the U.S. is typically referred to as environmental education or environmental science, a narrower definition when compared to the scope of the broader sense of educating for sustainability offered by the United Nations, although the term ESD is having more prominent use in the U.S. Sustainability is defined as fostering a sustainable green economy and “is valued in education both as a motivator for responsible behavior and as a factor in preparing tomorrow’s workforce to meet the economic imperatives for sustainable industries” (U.S. Department of Education, 2011, p. 6). U.S. education has a two-pronged approach to ESD, with a strong focus on infrastructure and education, with numerous government initiatives and grants to promote each of these areas throughout PreK-12 education.

Mandated by the 110th Congress in Higher Education Opportunity Act (Public Law 110-315), enacted Aug. 14, 2008, the U.S. Department of Education held the first summit, entitled Sustainability Education Summit: Citizenship and Pathways for a Green Economy, in September 2010. Promoted as a summit for leaders in higher education, business and industry, and non-governmental organizations, it served as an opportunity to articulate steps for education and other stakeholders, especially the environmental community, to develop steps to transition the country to a sustainable, green economy (U.S. Department of Education, 2011). The summit acknowledged that citizenship and career pathways (in education) would enable students to advance in a sustainable career and meet the needs of our country for a green economy. Education Secretary, Arne Duncan, is quoted in part as saying, “...Right now, in the second decade of the 21st century, preparing our students to be good environmental citizens is some of the most important work that any of us can do. It is for our children, it’s for our children’s children, and it’s for generations to come” (U.S. Department of Education, 2011, p. 1). Under Secretary Kanter also emphasized the

importance of science, technology, engineering, and math (STEM) as the vehicle for students to develop 21st century sustainable skills (U.S. Department of Education, 2011).

Following this inaugural Sustainability Education summit in 2010, Senators Collins and Reed introduced an act (bill) in United States Congress, No Child Left Inside (NCLI), designed to bring high quality environmental education programs to schools on a national level (Collins, 2023). This Congressional act reported the following findings, in part,

(3) Quality education for students includes regular opportunities to make connections outside of the classroom.

(8) Environmental education, as part of the formal prekindergarten through grade 12 school curriculum, has positive impacts on student achievement in all subjects, and especially in science, reading, mathematics, and social studies, and improves critical thinking skills, enthusiasm for learning, stewardship, and healthy lifestyles. (Congress. gov, 2023, para. 5)

The U.S. emphasized the need for environmental education, beginning in 2010, and again showed a renewed focus in 2023 for sustainability through congressional acts, grants, and corporate partnerships to promote the Sustainable Development Goals (SDGs) of the United Nations (UN). The U.S. Department of Education (2024f) lists as a goal to “complete and promote required federal Environmental and Sustainability reporting” (para. 4). It also stated its renewed commitments to schools for sustainability. These commitments with three designated priorities are listed in its Green Ribbon Schools initiative:

Priority #1: Ensure equitable access to healthy, safe, sustainable, 21st century physical learning environments.

Priority #2: Develop, maintain, and provide environmen-

tal sustainability learning, such as climate literacy, green workforce development, and outdoor learning.

Priority #3: Build capacity for infrastructure, sustainability, environmental justice, and climate mitigation and adaptation in schools. (U.S. Department of Education, 2024f, para. 15)

The U.S. reports an overall status of 44% in meeting the U.N.'s 17 Sustainable Development Goals based on 248 indicators, with 109 goals reporting data online, and with 139 goals exploring data sources for achievement/development, or slightly more than half (56%) of the U.N. Sustainable Development goal indicators reported in the exploration stage. The U.S. shows notable achievements in the U.N. goals listed in Table 1, which relate directly to the U.S. community as a whole. The goals presented in Table 2 show SDGs that are directly applicable to PreK-12 education in the U.S. The United States is on target to meet goal 4, ensure inclusive and equitable quality education and promote lifelong learning opportunities for all, by the 2030 U.N. target (U.S. National Statistics, 2024).

**Table 1** U.N. Sustainable Development Goals for U.S. Overall

U.N. Sustainable Development Goal	% Achieved
Good health and well-being	61
Affordable and clean energy	67
Decent work and economic growth	69
Industry, innovation, and infrastructure	67
Climate action	75

Source: Adapted from U.S. National Statistics (2024). *Reporting Status*.

**Table 2** Sustainable Development Goals for the U.S. Education System

U.N. Sustainable Development Goal	# of Indicators	Reported online	% achieved	Exploring data sources	% in exploration
Gender equality	14	6	43%	8	57%
Quality education	12	11	92%	1	8%
Reduced inequalities	14	2	14%	12	86%
Peace, justice and institutions	24	7	29%	17	71%

Source: Adapted from U.S. National Statistics (2024). *Reporting Status*.

## Key Themes in Education for Sustainability

### Competencies

As stated previously, the U.S. Department of Education does not provide a national curriculum, but provides guidance and competencies through federal legislation, mandates, and funding opportunities. The Fiscal Year Strategic Plan 2022-2026 (U.S. Department of Education, 2022b) presented its focus on the following competencies, defined as strategic goals, in the PreK through postsecondary educational system.

- Strategic Goal 1: Promote equity in student access to educational resources, opportunities, and inclusive environment.
- Strategic Goal 2: Support a diverse and talented educator workforce and professional growth to strengthen student learning.
- Strategic Goal 3: Meet students' social, emotional, and academic needs.
- Strategic Goal 4: Increase postsecondary value by focusing on equity-conscious strategies to address access to high-quality institutions, affordability, completion, post-enrollment success, and support for inclusive institutions.
- Strategic Goal 5: Enhance the Department's internal capacity to optimize the delivery of its mission. (pp. 8-9)

The fifth goal is critical as the U.S. does not have national competencies, yet the Department of Education states that its mission is “to promote student achievement and preparation for global competitiveness by fostering educational excellence and ensuring equal access” (U.S. Department of Education, 2022b, p. 3). To accomplish this lofty mission, the Department of Education (2022b) funds programs such as “early intervention services and employment training,” providing services from birth through adulthood (p. 3). The funding comes in the form of grants to states and local educational agencies, and supports those protected by Federal civil rights and other laws including those with differing abilities or socio-economically disadvantaged backgrounds. Other programs funded by the Department of Education include research to improve the U.S. education system. These competencies outlined in the Strategic Plan highlight the priorities for the future of education in our nation. These competencies stated as “improving educational equity and meeting the needs of students, are highlighted and woven throughout” the plan and “require cross-organizational collaboration to achieve successful outcomes” (U.S. Department of Education, 2022b, p. 5). Cardona, the U.S. Secretary of Education, stated, “the Department has an opportunity and *responsibility* [emphasis added] to support states, districts, teachers, school leaders, and institutions of higher education (IHEs) in delivery on America’s promise of high-quality, equitable, and accessible education” (U.S. Department of Education, 2022b, p. i). Strategic goals 1 - 4 are explained in the following paragraphs.

## **PreK-12 Curriculum**

The U.S. Department of Education strategic goals 1 and 2 play strong roles in the establishment of curricula throughout the distinct state educational systems. Each state has its own educational department and state funding with each locality, either city or county, responsible for the implementation of the curriculum in their region.

Research from Warner and Elser (2015) stated that solutions-based, or the

more modern concept of systems-based, education should be a foundation for education for sustainable development in U.S. schools. This systems-based foundation allows schools the opportunity to expand their traditional curricula into one that is cognizant of our need to recognize that being socially and environmentally literate is for the overall good of our society. Education for sustainable development, most often referred to as environmental education in the U.S., is not a mandated part of most educational systems, but is either integrated into subjects such as the sciences, an add-on program, or is an extractive event such as a field trip, where “the schools were not interacting or giving back to the community resources” they were accessing (Warner & Elser, 2015, p. 14).

In acknowledgment that there are no national standards, many school systems have adopted standards promulgated by organizations such as the North American Association for Environmental Education ([naaee.org](http://naaee.org)), The Green Schools Alliance ([www.greenschoolsalliance.org](http://www.greenschoolsalliance.org)), the US partnership for Education for Sustainable Development (<https://uspartnership.org>), Discovery Education ([www.discoveryeducation.com](http://www.discoveryeducation.com)), and the Smithsonian Institution (<https://science.si.edu>). The U.S. Department of Education does support a federal recognition award program for designated Green Ribbon Schools (ED-GSR). The U.S. Department of Education (2024g) states that “highlighting schools, districts, postsecondary institutions, and early learning centers’ cost-saving, health, promoting, and performance-enhancing sustainability practices... brings more attention to their work” (para. 1). This program has been in place since 2011 and is considered a recognition, not a certification, as well as being a one-year recognition of the awardee’s *progress* [emphasis added] in the award’s three sustainability pillars. These pillars are (a) reduced environmental impact and costs, (b) improved health and wellness, and (c) effective environmental and sustainability education (U.S. Department of Education, 2024g). A key component of the ED-GSR pillar framework is evidence of whole school sustainability or interconnectedness (Warner & Esler, 2015).

Research by Warner and Esler (2015) asserted their analysis of schools in the program in 2015 had an interconnectedness ratio of less than 0.6. They concluded that, “approximately half of the projects undertaken by the schools in this group exist in isolation from the rest of the school” (p. 15).

## Formal Education

A Smithsonian-Gallup, Inc. survey in the Spring of 2023 studied K-12 educators, in the United States and four peer countries: Brazil, Canada, France, and India. The goal of this survey was to measure U.S. progress “toward inclusion of sustainable development in U.S. K-12 education and beyond” (Smithsonian Institution, 2023, p. 3).

Key findings from the 2023 survey are explained in Figures 2, 3, and 4 below.

**Figure 2** Key finding 1

### 2023 KEY FINDING 1

Compared with teachers in Brazil, Canada, France and India, U.S. teachers report having less support, time and expertise to incorporate sustainable development into their curriculum.

- On average, teachers in these four countries are more than three times as likely as U.S. teachers to say they have the necessary support to incorporate sustainable development topics into other subjects (60% vs. 17%).
- In the U.S., administrators perceive this support more positively than teachers; 36% agree there is sufficient support (compared with 17% of teachers).
- Ninety percent of U.S. teachers say a lack of time poses a great deal or some challenge, and more than seven in 10 say the same about a lack of instruction materials (76%) and expertise on the subject (74%).



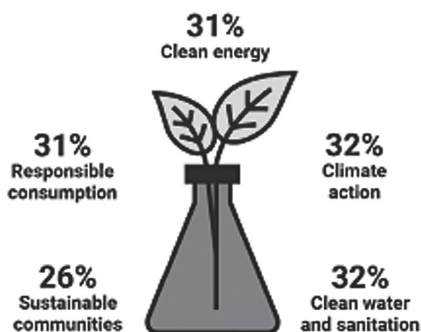
Source: Smithsonian Institution, 2024b, p. 2.

**Figure 3** Key finding 2

**2023 KEY FINDING 2**

Teachers say sustainable development — particularly socio-scientific topics — is largely missing from U.S. curriculum, especially compared with Brazil, Canada, France and India.

- For example, 31% of U.S. teachers say clean energy is a dedicated part of the curriculum, compared with 78% of teachers in Brazil.
- Content with socio-scientific topics — such as sustainable communities (26%), responsible consumption (31%), clean energy (31%), climate action (32%), and clean water and sanitation (32%) — are among the sustainable development topics least likely to be found in U.S. curricula.
- Nearly half (49%) of U.S. teachers say these topics receive too little attention, on average.
- Most U.S. teachers (65%) say sustainability does not fit within the topics they teach, including a majority (59%) of those who teach science.



Source: Smithsonian Institution, 2024b, p. 3.

**Figure 4** Key finding 3

**2023 KEY FINDING 3**

U.S. teachers and administrators believe teaching about sustainable development is important and want to incorporate it into their lessons.

- Most teachers see the benefits of teaching about sustainability, such as having a positive impact on the world (83%) and local community (79%), making learning about science more accessible to students (73%), increasing students' interest in STEM/STEAM topics (71%), increasing students' interest in current events (73%) and supporting students' personal resilience (67%).
- U.S. teachers say direct experiences — such as field trips (57%) and hands-on materials (56%) — and professional development on sustainability topics (69%) would be most helpful for teaching about sustainability.

**Sustainability Teaching Importance Across Countries**

Please indicate the extent to which you agree or disagree with each of the following statements:  
*I believe teaching about sustainability is important.*  
 % Strongly agree or Somewhat agree, among teachers



Source: Smithsonian Institution, 2024b, p. 3.

The Smithsonian Gallup, Inc. global comparison survey of 2023 identified key deficiencies in state or local support for sustainable development topics in the curriculum. The survey reported 17% (one in six surveyed) of U.S. teachers felt there was sufficient support for incorporating education for sustain-

able development (Smithsonian Institute, 2023). Three barriers stated were “support from other stakeholders, sufficient time for instruction and the right instructional materials” (p. 7). Of six possible challenges to incorporating sustainability, the teachers most often stated a lack of time as the greatest barrier. Most teachers acknowledged that sustainability topics were relevant to their students, while 32% felt they were not appropriate for their level of students (Smithsonian Institute, 2023). See Table 3 below for a listing of greatest challenges among U.S. teachers.

**Table 3** Greatest Challenges for U.S. Teachers for Incorporating Sustainability Topics

Challenge	% a great deal	% some	% overall
A lack of time to cover additional topics	69	21	90
A lack of available instructional materials on sustainability	34	41	76
A lack of access to high-quality professional development on sustainability	25	44	69
Sustainability topics do not fit with what I teach	27	38	65
Sustainability topics are not appropriate for the level of my students	9	23	31

Source: Adapted from Smithsonian Institute, 2023, p. 8.

The lack of a formal curriculum is particularly troublesome as the survey reported that the U.S. lags behind its global cohort, especially “in the inclusion of socio-scientific topics, including climate action, sustainable communities, responsible consumption, clean energy, and clean water and sanitation” (Smithsonian Institute, 2023, p. 9). The U.S. does excel in educational content related to societal topics of good health and wellbeing. The survey stated the U.S. ranks last in eight of the 11 sustainable development topics and the U.S. “ranks last behind Brazil, Canada, France and India in its incorporation of

those topics in K-12 curriculum” (Smithsonian Institute, 2023, p. 9).

**Table 4** Inclusion of Sustainable Development Topics in the U.S. Curriculum

Topic	% of inclusion
Socio-Scientific topics	
Sustainable communities	26
Responsibility consumption	31
Clean energy	32
Climate action	32
Clean water and sanitation	32
Peace	43
Global citizenry	46
Innovation	39
Justice	49
Reducing inequality	54
Good health and well-being	70

Source: Adapted from Smithsonian Institute, 2023, p. 9.

As noted from Table 4, socio-scientific topics are the least likely to be included in the U.S. curriculum, while teachers did report they felt these topics needed more inclusion.

The Smithsonian-Gallup, Inc. survey in 2024 implemented a different approach using a landscape analysis of U.S. standards which were then analyzed with reference to UNESCO’s global standards for learning (Smithsonian Institution, 2024a). This approach helped highlight challenges and opportunities experienced in the classroom with teachers, along with administrators, parents, and students. The Smithsonian Institution stated they built on their previous research for sustainable development and listened to the voices responsible for implementing these topics while still complying and aligning with state standards (Smithsonian Institution, 2024a).

There was no discernable increase in the focus on education for sustainability in the U.S., although teachers maintained a strong interest in teaching about sustainable development and a belief that it has a significant impact on our society and globally. The 2024 survey showed that 80% of the majority of teachers agreed that education for sustainable development was an important component of their curriculum (Smithsonian Institution, 2024b). Teachers reported that these sustainability topics were less likely to be included in the curricula, which highlights a wide gap between teachers' interest in teaching the subject and its inclusion in the classroom by state or local curriculum authorities. The key findings from the 2024 survey are shown below in Figures 5, 6, 7, and 8. Several strands are the same findings as in the 2023 survey such as lack of time, materials, expertise, and especially community involvement. A major difference is the realization that the U.S. curriculum focuses on natural sciences cognitive domains and not on all three domains, as illustrated in Figure 5.

### Figure 5 Key Finding 1

#### KEY FINDING 1

**U.S. science standards concentrate on the natural sciences and the cognitive domain of learning, but they are mostly missing the social and behavioral domains of learning, which UNESCO sees as necessary to educate for sustainable development.**

- The U.S. natural sciences standards mostly focus on the cognitive domain of learning (knowledge and thinking skills), whereas UNESCO's learning standards for sustainable development integrate the cognitive, socioemotional (social skills, values, attitudes) and behavioral (action-taking) domains of learning.
- States in the U.S. vary in how they incorporate sustainable development topics. In the three states reviewed in this study (California, Pennsylvania and Texas), science standards cover similar core scientific knowledge and skills but diverge in their implementation and topic coverage related to sustainable development.

Source: Smithsonian Institution, 2024b, p. 9.

### Figure 6 Key Finding 2

#### KEY FINDING 2

**Teachers say lack of time, materials and expertise are major challenges to incorporating sustainable development topics into their lesson plans.**

- New qualitative findings echo prior quantitative findings on the barriers educators face when teaching about sustainable development and emphasize the ways a lack of time, materials or expertise can compound with one another.
- High-quality materials are difficult to find and vet, and a lack of familiarity with sustainable development standards can make it harder for teachers to connect the topics to their existing lessons.

Source: Smithsonian Institution, 2024b, p. 9.

## Figure 7 Key Finding 3

### KEY FINDING 3

Teachers consider sustainable development topics to be valuable to students' learning and their future.

- Teachers see sustainable development as an opportunity for cross-disciplinary integration. Some teachers suggest sustainable development can also improve student engagement, a view supported by some parents and students in the study sample.
- To improve their capacity for teaching about sustainable development, teachers want more opportunities to collaborate with their colleagues and learn from experts in the field.

Source: Smithsonian Institution, 2024b, p. 9

## Figure 8 Key Finding 4

### KEY FINDING 4

Many teachers want resources and expertise about sustainability from scientific, cultural and educational organizations.

- Numerous teachers say high-quality materials that are aligned with their content standards are needed to more effectively incorporate more sustainable development topics.
- Teachers see knowledge related to sustainable development (with real-world examples) as part of their students' futures, a view supported by some parents and students in the study sample. Scientific, cultural and educational organizations can help elevate the ways sustainable development is connected to necessary core skills (like reading and math).

Source: Smithsonian Institution, 2024b, p. 9.

As local area educational authorities, state departments of education, and nation leaders promote adoption of standards for teachers' lessons, select required curricula and decide upon content, the conundrum arises: Are the Next Generation Science Standards (NGSS), a widely used (but not mandated) foundational standard for state science standards in the U.S., aligned for promotion education for sustainable development (Smithsonian Institution, 2024b)?

The Smithsonian Gallup, Inc. 2024 survey compared the NGSS to the UNESCO standards, noting the differences in the learning domains covered by each standard. While the NGSS has a primary focus on the cognitive learning domain of knowledge and thinking skills, UNESCO focuses on cognitive, as well as socioemotional aspects, covering social skills as well as values and attitudes, and the behavioral domain with action competencies (Smithsonian

Institution, 2024b). This prompts the question: Is the U.S. not using a global perspective to ensure all learners are gaining the competencies needed for education for sustainable development?

Although NGSS does serve as a basis for most state standards, several states go beyond these and are more inclusive of environmental sustainability. For example, Pennsylvania published new science standards in 2022, “STEELS – Science, Technology and Engineering, Environmental Literacy and Sustainability” (Smithsonian Institution, 2024b, p. 17). These standards have clearly defined learning objectives for Environmental Literacy and Sustainability. This results in more exposure to the sustainable development concepts and takes the learning beyond the cognitive to include the socioemotional and behavioral domains (Smithsonian Institution, 2024b). California utilizes the NGSS standards but adds a “state-mandated focus on five ‘Environmental Principles and Concepts’” (Smithsonian Institution, 2024b, p. 17). These five principles were also integrated into their instructional resources and will be incorporated into new state textbooks and curricula adoptions. These five principles and concepts do reside primarily in the cognitive domain of learning (Smithsonian Institution, 2024b). Texas did not adopt the inclusion of the national NGSS standards but developed their own standards to cover sustainable development topics specific to grade level and course expectations. The K-8th grade curriculum standards cover sustainable development topics in a similar manner to the NGSS. For grades 9-12 there are many optional courses that incorporate more of the sustainable development topics than the NGSS does, specifically courses on responsible consumption, innovation and global citizenry (Smithsonian Institution, 2024b).

## **Teacher Training**

Teacher education in the United States has evolved significantly in the past decade in both its structure and the inclusion of more contemporary pedagogical principles such as ESD. The traditional pathways focused on content knowl-

edge, pedagogical knowledge, field experiences (student teaching), and training on ethical standards, cultural competence, and the legalities of teaching. Teacher education programs and professional development programs must be purposefully developed as ESD “requires an active and reflective practitioner – a professional who promotes the transformation of learning and changes into attitudes, values, and behaviors of their students” (Anđić, 2020, p. 144). The Higher Education Sustainability Initiative (HESI), a partnership between several United Nations countries and higher education institutions, reminded universities and colleges that they play a pivotal role in ensuring teacher education programs, along with all higher education programs, address “global challenges such as poverty, inequality, and climate change” (Higher Education Sustainability Initiative, 2024, p. 2).

Incorporating education for sustainable development is a focus of teacher education programs in the U.S. These programs at many universities strive to prepare teachers to teach ESD holistically with a special emphasis on stewardship of our earth, social equity, and economic responsibility. Professional development for current teachers also focuses on ESD to promote cross-disciplinary concepts, systems thinking, and project-based learning.

The focus on ESD is not incorporated into all teacher education programs and is often offered as an additional certification or a certificate at the master’s degree level. Challenges in offering pre-service teacher education and professional development include a lack of uniformity in ESD implementation or adoption throughout the states and a lack of institutional commitment.

There is federal support for promoting knowledge and adoption of education for sustainable development, and research shows that this knowledge and understanding by educators are vital to “connect teachers’ perceptions and promote integration and connections with the principles” of ESD (Garcia-González et al., 2020, p. 2). The researchers asserted that learning to teach ESD requires a profound transformation in the way teachers think and act;

they must be agents of change (Garcia-González et al., 2020).

## **Non-Formal Education**

The U.S. has numerous non-formal settings such as non-profits, nongovernmental entities, museums, after school technology-based clubs (STEM, STEAM, etc.), and summer camps that incorporate education for sustainable development. Many local, grassroots settings offer non-formal opportunities such as faith-based programs, local festivals or public events with a sustainability focus, or community advocacy groups. Industries may offer sustainability training for employees. Often these settings focus on a particular sustainability topic such as climate action, local community interest areas such as recycling, protecting our local resources, or health and well-being topics. Non-formal settings do provide valuable learnings, especially in areas of the country where ESD is not incorporated into the formal curriculum.

## **Social Partnerships**

Social partnerships are prevalent in the U.S., providing another avenue for ESD that is not incorporated into local or state curricula. Prominent foundations such as the Smithsonian Institution, the U.S. Partnership for Education for Sustainable Development, and Google promote the use of AI to accelerate progress on sustainable goal development. The Smithsonian has a Science Center focused on environmental sustainability, and they partnered with Gallup, Inc. to poll U.S. educators for the past 2 years (2023-2024) regarding their perspectives on educating for sustainable development. The U.S. Partnership for Education for Sustainable Development (2025) is comprised of stakeholders across the U.S. – individuals, organizations, and institutions, and states its primary goal is to “act as a convener, catalyst, and communicator working across all sectors of society” (para. 1). Google developed a new function of their organization called Technology and Society to help shape the future of technology innovations and specifically their impact on society (Manyika

2022). Practitioner-based organizations such as the Association for Career and Technical Education (ACTE) and the International Technology Engineering Educators Association (ITEEA) promote ESD through their published educational standards, systems approach to teaching and learning, and interdisciplinary connections for subjects. ITEEA delineated three core standards in its Standards for Technological and Engineering Literacy (STEL), including the influence of technology on human progress, the influence of society on technological development, and impacts of technology (International Technology and Engineering Educators Association, 2020).

## Features of ESD in the United States

The U.S. Department of Education (ED) adopted their sustainability plan to meet or exceed the national standards outlines in the White House’s Executive Order 14057, Catalyzing Clean Energy Industries and Jobs Through Federal Sustainability (Federal Facilities Environmental Stewardship & Compliance Assistance Center, 2021) which states in part, the government must lead by example and “safeguard Federal investments against the effects of climate change, respond to the needs of all of America’s communities, and expand American technologies, industries, and jobs” (para. 2). The Department’s Sustainability Plan has a strong focus on net-zero emissions, reducing waste and pollution, and accelerating progress through partnerships (U.S. Department of Education, 2022b). The Department of Education (ED) initiated a concerted effort to integrate more sustainability into their educational environments through various avenues such as increasing government funding and grants. As noted, the U.S. Department of Education does not develop a national curriculum, but promotes and advises policies and procedures for state departments of education to follow or embrace. The following sections list key features of educating for sustainability in the U.S., yet they are also current trends

and areas that need further enhancement. The U.S. is promoting ESD through federal funding and policies with a stronger focus on equipping learners with the knowledge, skills, and values needed to address global sustainability challenges.

### ***Focus on local and global climate change challenges***

The U.S., by means of Executive Order 14057, has a goal of a “carbon pollution free electricity sector by 2023 and a net-zero emissions economy-wide by no later than 2050” (Federal Facilities Environmental Stewardship & Compliance Assistance Center, 2021, para. 2). School operations affect the U.S. environment as there are 99,000 K-12 schools which account for a large portion of public sector buildings. Broadly stated, the education sector, encompassing both non- and public school settings at all levels, presents tremendous opportunities to reduce environmental impacts and costs (U.S. Department of Education Infrastructure and Sustainability Notes, n.d. -a). In school settings, this translates the ability to mitigate further impacts and adapt to current and upcoming changes such as the use of Leadership in Energy and Environmental Design (LEED) certified building materials for new construction or renovations. It also includes water efficiency and waste disposal including recycling at buildings and campuses for all educational facilities. State educational systems are also converting buses, a major component of the educational system as well as a contributor of polluting emissions, to propane or electric. The federal government provides incentives for state education departments to make these changes, including an approximately \$40 million dollar grant, Supporting America’s School Infrastructure (SASI), to eight state agencies. This grant is targeted to systems “in high-need school districts, hire new staff, and develop or improve public school infrastructure data systems, training, and technical assistance” (U.S. Department of Education, 2024f, para. 6). The National Center on School Infrastructure (NCSI) grants awards of approximately \$2 million to a consortium that established a national clearinghouse and technical assistance center that consolidates federal resources for safe, healthy, sustain-

able, and equitable public school facilities. The NCSI provided specialized assistance to SASI grantees to assist with their expertise in school infrastructure. The Department of Education also promotes the Green Ribbon Schools as initiatives to institute changes in each school building that encompass a wide variety of climate change and educational initiatives.

Approaching climate change from a student learning perspective, it was acknowledged there is a risk of disrupting learning, yet all acknowledged it as an opportunity to interconnect all subject areas, thereby preparing students for career pathways in the green economy, civic learning, and higher education (U. S. Department of Education Infrastructure and Sustainability Notes, n.d.-b para. 4).

### ***Incorporation of environmental justice***

The U.S. Department of Education’s (ED) Strategic plan strongly supports environmental justice and has taken significant steps to address the issues with a new program related to sustainable schools at federal agencies including the Environmental Protection Agency (EPA). As their School Environmental Justice as Social Justice notes, this is defined as “a lens that can be used to ensure equitable access to healthy, safe, sustainable, and educationally appropriate school physical environments” (U. S. Department of Education Infrastructure and Sustainability Notes, n.d.-c para. 1). The Department acknowledges that it does not have “environmental education or school infrastructure role efforts to ensure equitable access to healthy, safe environments” (U.S. Department of Education, 2022b, p. 6). The Department strongly asserts that “equity is central to the ED mission, with most grant programs targeted toward underserved communities” (U.S. Department of Education, 2022b, p. 6).

### ***Emphasis on experiential and community-based learning***

This feature has a strong impact as community-based learning plays a pivotal role in promoting ESD. The ED participates in many partnerships on a nation-

al level, and this participation assists state systems with utilizing these community resources through training, professional development opportunities, and community action-based events. Three national collaborations of note are:

- Partners on Reducing Lead Levels in Drinking Water in Schools/Child Care Facilities
- President’s Task Force on Children’s Environmental Health
- DOE’s Efficient, Healthy Schools Campaign (U.S. Department of Education, 2022b, p. 6)

State departments of education use extensive partnerships with local businesses to provide on-site learning opportunities for students about environmental sustainability. They also work in collaboration with institutes of higher education to broaden their ability to offer environmental literacy outcomes. There is a strong community-based effort to promote early childhood environmental education throughout the U.S., not through a national focus, as research has shown it has wide ranging benefits such as increased learning in mathematics, science, and language as well as enhanced social and emotional skills and improved physical development (North American Association for Environmental Education, n.d.). Prominent museums such as the Smithsonian, the Cecilia Berg Center for Environmental Education, the Heffner Museum of Natural History, and the North Carolina Museum of Natural Sciences offer field experiences, hands-on learning, school outreach programs, and experiential learning activities.

# Trends and Issues in ESD

## Trends

### *Integration of ESD into the curriculum*

Sustainability issues are complex and interconnected. ESD touches on many subjects and requires collaboration across disciplines such as science, economics, social studies, and the arts. The U.S. is working to assist state departments and educators to integrate these fields to provide students with a holistic understanding of challenges and solutions.

The use of artificial intelligence, digital platforms, virtual simulations, and online resources is expanding the opportunities available to integrate subject content into ESD. Technologies such as Geographic Information Systems (GIS), augmented reality, interactive data visualization, the Internet of Things (IoT), 3D modeling, and collaborative platforms are excellent modalities to assist students in understanding sustainability concepts and engaging with real-world environmental challenges. Many schools and universities are embedding sustainability topics into subjects such as science, geography, economics, and social studies.

The University of California's Global Food Initiative (U.C. GFI) addresses the critical issue of sustainable and nutritious food for the burgeoning world population. The initiative combines the university's research efforts along with outreach to help demonstrate and export workable solutions throughout California, the U.S. and the world in the areas of food security, health, and sustainability (California Department of Education, n.d.). The GFI combines studies in agriculture, nutrition, economics, and environmental science to address food security and sustainable food systems. The GFI has expanded into offering similar outreach initiatives at other University of California cam-

puses, with a total of 27 centers at U.C. Davis, the Berkeley Food Institute, the Microbiome Initiative at U.C. Riverside, and U.C. Santa Cruz's Center for Agroecology and Sustainable Food Systems (Johnson, 2014).

K-12 schools nationwide can participate in the U.S. Department of Education's Green Ribbon Schools Program through an application process. They are evaluated on their ability to reduce environmental impact, improve health and wellness, and provide effective sustainability education. The goal is to integrate sustainability themes into science, technology, engineering, and mathematics (STEM) education, alongside arts and humanities through the school campus and local community (U.S. Department of Education, 2024d). Eco-Schools U.S. is sponsored by the National Wildlife Federation and provides resources to help K-12 schools implement sustainability practices while embedding environmental education into their curriculum (EcoSchools U.S., n.d.).

### ***Experiential and problem solving learning opportunities***

Educating for sustainable development has a strong emphasis on hands-on, place-based learning experiences. Activities like outdoor education, school gardens, and community projects enable students to connect with local environments and cultures while exploring sustainability issues in context. Hands-on activities and partnerships with community organizations help students apply what they learn in real-world contexts. Experiential learning fosters deeper engagement and practical skills. ESD encourages learners to assess evidence, analyze systems, and think innovatively to propose solutions to sustainability challenges.

The Student Conservation Association (SCA) organizes youth and young adult programs to involve participants in environmental restoration and conservation projects in national parks and urban areas, and it is considered one of the largest providers of authentic, hands-on environmental conservation programs

(Student Conservation Association, 2025). The SCA was founded in 1957 and has devoted itself to “creating equitable access to nature, providing green job opportunities for young people and teaching crew members how to become environmental stewards” (Student Conservation Association, 2025, para. 4).

Community colleges, such as those in the Sustainable Agriculture Education Association (<https://saea.org>), teach students sustainable farming techniques through partnerships with local farms. For K-12 classrooms, the Project Learning Tree (PLT USA) curriculum helps students analyze environmental problems, such as deforestation or pollution, and brainstorm actionable solutions. The instructional materials are distributed in conjunction with professional development opportunities for educators including in-person or online workshops (Project Learning Tree, n.d.). These organizations also provide opportunities to work on sustainable topics such as climate change and reducing environmental impact.

### ***Focus on climate education***

The U.S has renewed its focus on climate and environmental impact through initiatives to engage K-12 and college students in addressing problems both in their communities and worldwide, with the understanding that local actions can and do lead to global concerns and solutions.

In higher education, Arizona State University’s School of Sustainability offers programs that combine global policy discussions on climate change with local projects like water management in desert regions. The university offers degree programs (bachelors and masters) in sustainability, sustainable food, as well as certificates and professional development opportunities. The curriculum is touted as transdisciplinary to create synergies between the disciplines for new sustainable insights. Their goal is to “foster innovative research, impactful education and engaged communities to achievement environmental integrity, social equity and well-being” (Arizona State University, n.d., para. 1).

U.S. K-12 schools use many of the programs highlighted previously to focus on climate education. They also rely heavily on community resources such as local weather stations, county government outreach offices and local environmental groups. The National Oceanic and Atmospheric Administration (NOAA) supports the Climate Program Office (CPO) that “currently monitors climate education, engagement, and workforce development and training activities in the U.S.” (Climate Program Office, n.d., para. 22). The CPO provides educational resources on climate science and justice. The CPO provides formal and informal education with tools including climate data, information products, multimedia resources, visualization, and professional development opportunities (Climate Program Office, n.d.).

### ***Indigenous knowledge and traditional ecological practices***

The U.S. instituted programs to recognize the practices of its many indigenous communities and their practices of sustainable land management, conversation, and environmental stewardship. Through a focus on Indigenous Knowledge (IK) and Traditional Ecological Knowledge (TEK) these program and policies work to incorporate a deeper understanding of land stewardship, ecological resilience, climate change and justice through a traditional indigenous lens. Several state public school curricula such as Washington, Oregon, and Montana incorporate indigenous practice in the curriculum. The Indigenous STEAM Collaborative (<https://indigenousteam.org/>) develops and co-designs curricula with educational systems to promote indigenous knowledge systems and intergenerational ways of teaching and learning. In higher education, the University of Minnesota houses an institute on Environment with collaborates with Native American Communities (McDill, 2024). The University of Arizona has an Indigenous Resilience Center (<https://resilience.arizona.edu/>) that works collaboratively with tribal nations on water security and purity, and climate adaptations.

There are several community based collaborations between Tribal schools and

public K-12 schools such as the Native American Fish and Wildlife Society (<https://nafws.org/>), Indigenous water protections efforts led by the Standing Rock Sioux Tribe (Kremer, 2016), Indigenous Youth Council, and Earth Guardians. The Earth Guardians Indigenous Youth Initiative encourages students through virtual and in-person training opportunities to learn practical approaches in environmental justice and indigenous rights including traditional ecological knowledge, environmental/social justice issues, cultural resilience and decolonization (Earth Guardians, 2020).

### ***Emphasis on equity and justice***

The U.S. Department of Education (2022b) states in its Strategic Plan that equity is a cross-cutting priority integrated into every goal of the plan. The Department has a commitment to focusing on “universally accessible, high-quality prekindergarten” (p. ii) and further stated that “improving educational equity for all is a priority” (p. 16). ESD increasingly addresses the intersection of sustainability with social justice, focusing on how marginalized communities are disproportionately affected by environmental degradation and climate change, along with other important trends in U.S. education. A growing emphasis on social and environmental justice is shaping ESD in the U.S. where programs increasingly address issues such as environmental racism, equitable resource distribution, and community resilience, ensuring that sustainability education aligns with broader social justice goals. The U.S. Department of Education stated in its strategic plan that it focuses on addressing the disproportionate impacts of environmental challenges on underrepresented and marginalized groups. It emphasizes diversity, equity, and inclusion in education and sustainability efforts (U.S. Department of Education, 2022b).

Broadly speaking, some U.S. high schools use the ecopedagogy approach which is defined as “a critical theory that critiques environmental education for inaccurately presenting the relationship of social, economic, and environmental oppressions” ( Rainey, 2022, p. v.). This theory is designed to chal-

lenge students to think critically about environmental stewardship and sustainability. Ecopedagogy is a pedagogical approach based on the theories of Freire and Kahn. It challenges learners to view their relationship with Earth as being connected to all our human activities such as cultural self-determination, sustainability, and social and material justice (Simukenaite, n.d.). A few examples of eco-schools, touted as models of environmental education, are the Academy of Global Citizenship (Illinois), Alder Ave Middle School (New Jersey), Brooklyn New School (New York), Centreville Elementary School (Virginia), Earth's Magnet School, (California), Eisenhower High School (Kansas), Green Tech Academy at Clint Small Middle School (Texas), Heritage Elementary School (Colorado), J.C. Parks Elementary School (Maryland) and Jitta Bug Learning Center (Florida). These eco-schools use variations of ecopedagogy as several are elementary schools, and Jitta Bug is the first pre-school to achieve this status (Grant, 2015).

The Just Sustainabilities Initiative at Tufts University examines environmental justice issues, such as urban green spaces and access to clean energy, to highlight social equity in sustainability. The founder of this initiative, Agyeman proposed that there is a complicated link between environment quality and social justice (McNeil & Nuscher, 2022). He further defined barriers to social justice such as urban planning and housing policies of the U.S. that helped create food deserts and racist infrastructure such as freeways (McNeil & Nuscher, 2022). These barriers affect the livelihood of students across the K-12 spectrum.

The Urban Sustainability Directors Network (USDN) collaborates with communities to create equitable climate action plans, integrating these ideas into education and outreach programs for K-12 students.

## Issues

### *Inconsistent implementation across states*

Education policy in the U.S is decentralized, although there is a federal Department of Education that provides guidance, policies, and funding for certain ESD initiatives. This decentralization leads to significant variation in the state and local adoption of initiatives related to ESD. The Smithsonian-Gallup, Inc. survey (Smithsonian Institution, 2024a) showed that in “eight of the 11 sustainable development topics..., the U.S. ranks last behind Brazil, Canada, France, and India in its incorporation of those topics in K-12 curriculum” (p. 9).

A few states such as California and Washington have made inroads by integrating climate change and sustainability into their curricula. California has integrated climate change education in the NGSS. It also passed Assembly Bill 285, requiring public schools to teach about climate in grades 1-12, and has Environmental Principles and Concepts (EP&Cs) in its curriculum frameworks (California Department of Education, n.d.). Similarly, Washington (state) passed House Bill 113 to establish green schools programs for resource conservation and published integrated K-12 learning standards that are supported by the state’s Environmental and Sustainability Literacy Plan (Washington Office of Superintendent of Public Instruction, n.d.).

### *Lack of teacher training and professional development*

Many educators feel underprepared to teach sustainability topics effectively due to insufficient professional development opportunities or resources. The deficit coupled with the teacher shortages requiring conditionally certified educators in many classrooms compounds this concern. Higher education entities providing teacher training and professional development have had a strong focus on ensuring teachers have knowledge and understanding of the sustainable development goals and how they would apply to their classroom.

This ties in strongly with the concept of self-efficacy as it helps connect teachers' perceptions and promote the interconnectedness that is needed to teach sustainability (Dahl, 2019; Garcia-González et al., 2020). Bandura's theory of self-efficacy is a strong factor not only for preservice teachers but also for those who are veterans in the classroom, as teaching for sustainability requires a profound change in the way teachers think and act in preparing their classroom activities (Garcia-González et al., 2020). According to the Smithsonian Institution and Gallup, Inc. survey of 2024, teachers consider sustainable development topics very valuable to their students' learning, yet they have a lack of time, materials and expertise to incorporate them into their lesson plans. The survey also highlighted that teachers need more research and expertise, specifically from scientific cultural and educational organizations and partnerships (Smithsonian Institution, 2024b). The Smithsonian Institution and Gallup, Inc. survey of 2023 found that “just 17% of US teachers say they have the necessary support to incorporate sustainable development topics, significantly lagging the support teachers in Brazil, Canada, France and India report” (Smithsonian Institution, 2023, p. 7). Teachers indicated that “more than seven in 10 U.S. teachers say that a lack of instructional materials (76%), expertise (94%) and professional development (69%) pose a challenge” (Smithsonian Institution, 2023, p. 8). Efforts to promote confidence in teachers include peer learning networks, access to free ESD resources, certificate programs for in-service teachers, and workshops and professional development.

### ***Funding challenges***

Funding challenges are an ever present issue in educational settings. The U.S. Department of Education provides grants and funding to cover certain aspects of ESD, yet many States and local educational authorities still struggle with securing funding to integrate ESD into their curricula. ESD programs often require additional funding for materials, technology, and experiential learning activities, which can be a barrier, especially in underfunded schools. In the U.S. local school funding is predominantly tax based, thereby exacerbating the

inequity in rural or impoverished areas. The use of public-private partnerships helps fund initiatives and helps develop infrastructure in school systems. Integrating ESD principles into the broader curriculum helps with overcrowded curricula and assists with funding to teach these principles.

### ***Political and ideological resistance***

Topics such as climate change and environmental justice can be politically contentious, leading to resistance from parents, policymakers, or community members. Pipa (2023) stated that the U. S. was slow to accept the fact that SDGs should apply to the nation’s own social economic and environmental challenges. The U.S. also “has been slow to make the SDG's meaningful in any real policy sense” (Pipa, 2023, p. 53). Efforts to combat negative perceptions of ESD include advocacy campaigns, evidence-based research, community engagement, bi-partisan support, and increasing the flexibility with which states and local systems can adopt and implement curricula.

### ***Overcrowded curricula***

Educators face the challenge of fitting sustainability topics into already packed curricula, often competing with standardized testing requirements and other priorities. U.S. teachers support sustainability as an important curriculum topic, yet only “one in five (20%)” have the time to incorporate it into the curriculum (Smithsonian Institution, 2023, p. 12). Teachers support the inclusion of field trips and hands-on materials as a top resource for inclusion of sustainability topics in their curricula (Smithsonian Institute, 2023). Advocates for inclusion promote streamlining and integration of ESD concepts into existing curricular areas such as science, social studies, and language. The use of project-based learning helps interconnect all areas of learning. Employing digital tools to assist with integration of ESD is another key component of reducing the overload on teachers and teachers. A concerted effort from the Department of Education is needed to promote integration of ESD into subjects by sup-

porting standards that are inclusive, funding curriculum integration projects, and working with community partners to provide integrated ESD resources that are freely accessible to all.

By addressing these issues and leveraging emerging trends, education for sustainable development in the U.S. can be expanded and strengthened to create informed and engaged citizens.

## Conclusion

The U.S. is committed to its partnership with the United Nations and meeting the Sustainable Development Goals (SDGs). The U.S. has made significant strides in aligning K-12 education with the SDGs through the Department of Education's initiatives promoting environmental literacy, equity in education, and technological advances. The U.S. has shown progress in achieving goals of SDG-4 Quality Education, SDG-13 Climate Action, and SDG-10 Reduced Inequalities.

However, there remains considerable room for growth, particularly in addressing systemic disparities, expanding access to resources, and integrating the SDGs more comprehensively into state curricula. In such a vast country, educational funding and disparities exist due to local funding by locality tax bases, and this is an area that perpetuates inequalities in educational opportunities. The U.S. needs to promote more funding opportunities and industry partnerships to help equalize funding disparities. By prioritizing collaboration among policymakers, educators, and communities, the U.S. can further harness its educational system to advance sustainable development on both national and global scales.

While challenges persist, the achievements in K-12 education provide a strong

foundation for continued progress toward the SDGs, ensuring that future generations of learners are not only aware of sustainability issues but are also empowered to create solutions for a more equitable and sustainable world.

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# **An International Comparison of Education for Sustainable Development (ESD) in Ten Highly Competitive Countries**

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## Abstract

This chapter presents a comparative analysis of Education for Sustainable Development (ESD) across ten highly competitive countries: Australia (AU), the Czech Republic (CZ), Finland (FI), Hong Kong SAR (HK), Iceland (IS), Norway (NO), Singapore (SG), Sweden (SE), Taiwan (TW), and the United States (US), listed in alphabetical order. The analysis is organized around three core dimensions: (1) the structure of the schooling systems and ESD policies and practices; (2) the status of ESD implementation, including actions undertaken, performance achieved, and features of ESD; and (3) the trends and challenges encountered. The findings on the first dimension reveal that while the schooling systems in these countries share a common commitment to free and compulsory education, they differ in their structural organization, levels of support, and student progression pathways, all of which are shaped by distinct policy environments and cultural contexts. National ESD policies are increasingly aligned with global sustainability goals and are embedded into both formal and non-formal education systems. However, implementation remains inconsistent, with challenges related to coordination, coherence, and policy execution. In the second dimension, the status of ESD implementation was analyzed in terms of the actions undertaken, indicators, competences, curricula, teacher training, non-formal education, and social partnerships. Results indicate that diverse strategies have been adopted to address global challenges, particularly climate change, biodiversity loss, unsustainable use of resources, and inequality. Over half of the countries have shown meaningful progress, although implementation remains uneven. ESD indicators vary widely; some countries have established clear frameworks for curriculum integration and Sustainable Development Goals (SDGs) monitoring, while others lack defined benchmarks or provide only limited references. Most countries define sustainability competences as systems thinking, critical reflection, and environmental responsibility, although levels of clarity and coherence differ. Sustainability is

increasingly integrated into school curricula, but the depth and consistency of implementation remain variable. Teacher training in ESD is available at both pre-service and in-service levels, but differs in scope, content, and whether it is mandatory. Non-formal education often emphasizes experiential and community-based learning through youth programs and public institutions, although its degree of institutionalization varies. Social partnerships involving governments, civil society, and private actors are widely recognized as important, yet often lack strong coordination. Despite contextual differences, common features include interdisciplinary curriculum design, experiential and action-oriented learning, teacher professional development, youth engagement, and institutional support, which reflect shared ESD priorities. Finally, a number of common trends and issues shape the current ESD landscape. Key trends include a growing emphasis on experiential learning and student agency, the wider adoption of interdisciplinary and curriculum-integrated approaches, the expansion of teacher capacity-building efforts, enhanced youth participation, and increased policy and institutional engagement. Despite these advancements, the countries continue to face notable challenges, including insufficient teacher preparedness, fragmented curricula, a persistent gap between awareness and action, weak policy coherence, and limited resources. In sum, the analysis highlights the critical need for multi-level collaboration and cross-sectoral partnerships to overcome systemic barriers and scale effective practices. While significant progress has been made in institutionalizing ESD, further innovation, stronger policy alignment, and sustained investment in equity-driven, context-responsive strategies are essential to close the gaps.

**Keywords:** international comparative analysis, Education for Sustainable Development (ESD), highly competitive country

## Introduction

The adoption of the 2030 Agenda for Sustainable Development by all 193 United Nations member states has positioned Education for Sustainable Development (ESD) as a global priority (UNESCO, 2017). In response, education systems at all levels have been urged to undertake structural and pedagogical reforms to integrate sustainability principles into curricula and institutional practices (Acosta Castellanos & Queiruga-Dios, 2022). As a transformative approach, ESD serves as a crucial mechanism for translating sustainability goals into practice by fostering the knowledge, skills, and values that enable individuals to make informed decisions and to address global environmental, social, and economic challenges (Abulibdeh et al., 2024).

This book presents national reports on ESD from ten highly competitive countries, each authored using a detailed manuscript template with key components developed by the two editors-in-chief. To enhance understanding of ESD implementation across these countries, this chapter provides a comparative analysis of key similarities and differences, drawing on information from the country reports. The comparison was structured around thirteen analytical components across three main dimensions. The first dimension offers an overview of schooling structures and overarching ESD policies and practices across the ten highly competitive countries. The second dimension analyzes the current status of ESD implementation, focusing on actions undertaken, curriculum integration, competence development, teacher preparation, non-formal education, social partnerships, and shared features across national contexts. The third dimension addresses emerging trends and challenges that have shaped the evolving direction of ESD in these countries. Through this comparison, the chapter identifies promising approaches and common obstacles, offering insights that may inform future policy development and support international collaboration toward more effective and context-sensitive ESD

implementation.

## **A comparison of schooling structures, ESD policies, and practices in ten highly competitive countries**

This section presents a comparative analysis of the first dimension, which concerns the structure of schooling systems and overarching ESD policies and practices. Table 1 summarizes two key comparative components examined across the ten countries. The following discussion explores the major findings identified in the structural and policy-related aspects.

### **Component 1: The structure of schooling systems**

Several commonalities and divergences, shaped by national policies and cultural contexts, are evident. First, all ten countries mandate compulsory education lasting between 9 and 12 years, although the starting age, scope, and degree of enforcement differ. Most countries require 9 to 10 years of education, beginning at age 6 or 7 and extending until age 15 or 16 (e.g., CZ, FI, IS, NO, SG, SE). Australia and the United States follow a similar pattern, but implementation varies by state. Hong Kong SAR and Taiwan have extended compulsory education to 12 years, although upper secondary education in Taiwan remains non-mandatory. Despite these differences, all ten countries share a common commitment to early and structured learning as a universal foundation.

Second, while most countries provide free education during the compulsory years, the extent and form of government support differ. Sweden, Norway, and Finland offer fully subsidized education, with Finland notably providing additional services, such as free meals, materials, and equipment. Singapore, Taiwan, and Hong Kong SAR ensure free access to public schooling, although

government support in these systems is comparatively limited. The United States and Australia likewise provide free compulsory education, but funding models vary across states and territories. Despite these variations, all systems prioritize equitable access to quality education.

In addition, countries differ in how students are streamed after lower secondary education. The Czech Republic, Finland, Iceland, Norway, Taiwan, Hong Kong SAR, and Sweden maintain distinct academic and vocational tracks at the upper secondary level. In contrast, the United States and Australia adopt more flexible models, offering both pathways within the same schools. Singapore employs a more selective system, introducing academic streaming in early secondary education, and directing students into differentiated post-secondary tracks via national exams. These approaches reflect diverse policy choices regarding equity, flexibility, and centralized control in shaping student progression.

## **Component 2: The overarching ESD policies and practices**

This analysis explores the evolution of ESD policies and practices across ten countries, highlighting diverse approaches and varying levels of policy integration. Several countries (e.g., AU, CZ, IS, SG) have progressed from fragmented or limited initiatives to more structured national strategies. A common trend is the increasing alignment of national ESD policies with global frameworks, particularly the Sustainable Development Goals (SDGs), as observed in the Czech Republic, Iceland, Norway, Sweden, and the United States. There is also growing emphasis on integrating both formal and non-formal education to promote ESD, notably in the Czech Republic, Finland, Iceland, Singapore, and Sweden. In Hong Kong SAR, the School Outreach Programme promotes sustainability through community-based, non-formal learning activities. Countries such as Norway, Sweden, and Taiwan have embedded sustainability within their curricula, either as a cross-cutting theme or as specific subject content. The Czech Republic, Finland, Singapore, and Taiwan represent systemic and

long-term policy approaches, whereas Australia, Norway, and Sweden continue to face challenges in bridging policy and practice. Persistent issues include uneven implementation, limited inter-agency coordination, and difficulties in embedding sustainability within existing curricula. These cross-national variations reflect both the progress achieved and the ongoing challenges in aligning education systems with global sustainability goals.

**Table 1** A summary of the structure of the schooling system and ESD policies and practices in ten countries

Component	Countries									
	Australia (AU)	Czech Republic (CZ)	Finland (FI)	Hong Kong SAR (HK)	Iceland (IS)	Norway (NO)	Singapore (SG)	Sweden (SE)	Taiwan (TW)	The United States (US)
The structure of the schooling system	<p>1. The AU education system includes preschool (1+ years) and primary school (7 years), secondary school (4 years), and senior secondary school (2 years).</p> <p>2. Schooling is compulsory from ages 5 to 16, varying by state.</p> <p>3. Schools are divided into Government, Catholic, and Independent sectors.</p> <p>4. Only Tasmania, South Australia, the Northern Territory, and the ACT fully use the Australian Curriculum, while other states have their own curriculum guidelines.</p>	<p>1. The system includes preschools (3+ years), primary and lower secondary (9 years), and higher education (2-4 years), and access public, private, and church institutions.</p> <p>2. Upper secondary schools comprise general schools, conservatories, and vocational schools.</p> <p>3. Compulsory education lasts 10 years, incl. 1 year of pre-school.</p> <p>4. Schools follow the Czech law and the FEP but differ in practice (School Education Programs).</p>	<p>1. Basic education includes early childhood care (5 years), primary (1 year), and lower secondary (6 years, ages 7-12).</p> <p>2. Most schools are public, offering free tuition and other support, such as materials, equipment, and lunch.</p> <p>3. Homeschooling is permitted under current regulations.</p>	<p>1. The education system includes kindergarten (3 years, ages 3-6), primary (6 years, ages 6-12), secondary (3-3 years, ages 12-16), post-secondary (4 years, ages 18+), and vocational education.</p> <p>2. Primary and upper secondary are free and compulsory.</p> <p>3. Three main types of local middle schools: government/schools, aided/caput (subsidized) schools, and Direct Subsidy Scheme schools.</p>	<p>1. The system includes primary (under 6), primary and lower secondary (6-16), upper secondary (16-19), general academic, and vocational education.</p> <p>2. Compulsory education includes primary and lower secondary levels.</p> <p>3. Upper secondary education is optional and offers a 3-year general academic education, leading to the university-entry matriculation exam, as well as vocational education tracks.</p> <p>4. Compulsory and upper secondary schools are required to conduct self-evaluations.</p>	<p>1. The education system consists of primary (7 years), lower secondary (3 years), upper secondary (3-4 years), and tertiary education.</p> <p>2. Upper secondary and tertiary education include both general and vocational education.</p> <p>3. Primary and lower secondary education are compulsory and free.</p>	<p>1. The education system includes 6 years of primary education (ages 6-12), 4 years of secondary education (ages 12-16), followed by post-secondary pathways.</p> <p>2. Students have to take the national exam (PSLE) before entering secondary education.</p> <p>3. After secondary school, students can choose post-secondary paths for higher education or vocational training.</p>	<p>1. Public education is free at all levels.</p> <p>2. Preschool class (age 6), primary school (Grades 1-6, ages 7-12), and lower secondary school (Grades 7-9, ages 13-16) are compulsory.</p> <p>3. Students aged 16-18 may continue to upper secondary/vocational preparatory education.</p> <p>4. In higher education, students can access financial aid for living expenses.</p>	<p>1. Preschool education (ages 2-6) is optional and is not included in the formal education system.</p> <p>2. The education system includes elementary (6 years), junior high (3 years), senior secondary (3 years), and higher education.</p> <p>3. Compulsory education covers 9 years (elementary and junior high) since 1966 and was extended to senior secondary in 2019, which is not fully compulsory but is widely accessible.</p> <p>4. After junior high school, students choose between senior high school and fifth-level college.</p> <p>5. Senior secondary education includes various school types and leads to universities or technical colleges based on the chosen track.</p>	<p>1. Since PreK was added in 2013, the system covers early childhood (birth to age 2), middle education (PreK-grade 5, ages 4-6), and secondary education (grades 6-12, ages 9-21).</p> <p>2. The system provides free K-12 education, expanded to 14 years.</p> <p>3. Post-secondary education includes non-degree programs, GED, diplomas, and other six-degree types.</p> <p>4. Adult and continuing education are also available.</p>

**Table 1 (continued)**

Component	Countries									
	Australia (AU)	Czech Republic (CZ)	Finland (FI)	Hong Kong SAR (HK)	Iceland (IS)	Norway (NO)	Singapore (SG)	Sweden (SE)	Taiwan (TW)	The United States (US)
The overall ESD policies and practices	<p>1. Environmental laws emerged in the 1970s, but education policies lagged behind, with inconsistent efforts from the 1970s to 2010.</p> <p>2. State-level environmental education (EE) policies developed from the mid 1970s but faced revisions due to national curriculum changes.</p> <p>3. Since 2020, some state education departments, like New South Wales, have adopted environmental sustainability policies.</p>	<p>1. Earlier ESD efforts (2008-2015) were unsuccessful.</p> <p>2. ESD is now part of key policies like the Education Policy Strategy 2030+ and the Long-term Plan for Education (2023-2027).</p> <p>3. As a regional strategic goal, ESD is integrated into School Education Programmes via the Long-term Plan for Education and Development of the System of the Regions.</p> <p>4. The National UNESCO ESD 2030 country initiative should integrate non-formal education into formal curricula.</p>	<p>1. Already in the 1980s, Finnish curricula included care of nature and the environment.</p> <p>The Finnish Core Curriculum for Basic Education even mentioned environmental education as a goal (1985). In 1991, a Finnish UNESCO strategy addressed the need.</p> <p>Sustainability of including environmental education and sustainable development in all education, both formal and non-formal, and also in teacher education.</p> <p>2. In the 2000s, strategies and policy have further addressed the need for sustainability education at all levels.</p>	<p>1. "The Guidelines on Environmental Education in Schools" was the first environmental education (EE) policy issued in 1999 by the Department of Education.</p> <p>2. Since 2005, the Council for Sustainable Development has operated the "School Outreach Programme," with a focus on ESD.</p>	<p>ESD is implemented through:</p> <ul style="list-style-type: none"> <li>- legal frameworks (e.g. the Law on each school level).</li> <li>- Municipal involvement (including Voluntary Local Reviews and SDG toolboxes).</li> <li>- National resources (the MOE and UN Association of Iceland for formal and non-formal education).</li> </ul>	<p>1. Sustainability is mentioned in key policies like the National Strategy for Sustainable Development (2007) and the Curriculum Renewal (2020), setting it as a cross-cutting theme.</p> <p>2. Norway's 2021 Action Plan targets seven SDG 4 sub-goals to achieve the SDGs by 2030.</p> <p>3. Despite the emphasis on sustainability in education, challenges remain in translating policies into educational practices, such as curriculum integration.</p>	<p>ESD is implemented via:</p> <ul style="list-style-type: none"> <li>- international commitments (such as the Kyoto Protocol and the Paris Agreement),</li> <li>- policy (Green Plan 2030)</li> <li>- initiatives (e.g., the Eco Stewardship Programme - ESP).</li> </ul>	<p>1. Sustainability is embedded in subjects at all levels of formal education, supporting Sweden's UN SDG commitment.</p> <p>2. Audit and non-formal education promotes sustainability, integrating ESD into all education and engaging youth in green action.</p> <p>3. Challenges persist with inconsistent ESD implementation, low engagement, and a gap in career aspirations.</p>	<p>ESD policies encompass daily practices in waste management and recycling, green campus plans, curriculum integration, national awards, environmental legislation, and climate adaptation programs.</p>	<p>1. Since 2010, the U.S. has prioritized environmental education, renewing its focus in 2023 through legislation, grants, and partnerships to support the UN SDGs.</p> <p>2. Three U.S. sustainability priorities for schools are ensuring equitable access, promoting environmental education, and building sustainable infrastructure.</p>

## **A comparison of the status of ESD in the ten highly competitive countries**

This section provides a comparative analysis of the status of ESD across the ten countries. Nine key components guide the comparison: actions undertaken and performance achieved, indicators, competences, curricula, formal education structures, teacher training, non-formal education, social partnerships in ESD implementation, and features. Table 2 summarizes the comparative results. The following discussion highlights both cross-country similarities as well as differences based on these components.

### **Component 3: Actions undertaken and performance achieved for ESD**

This section analyzes five key ESD action areas identified by UNESCO: advancing policy, transforming learning environments, building educator capacity, empowering youth, and accelerating local-level actions, with a particular focus on their connection to four global challenges: climate change, biodiversity loss, unsustainable use of resources, and inequality. First, a growing number of countries have aligned national education policies with global sustainability goals. In many cases, ESD is embedded in national strategies that explicitly or implicitly address these challenges. Several countries (e.g., AU, CZ, HK, NO, SE, TW) have developed frameworks targeting all four areas, whereas the United States omits biodiversity loss and Singapore focuses primarily on climate change and resource use. Iceland promotes sustainability broadly without direct reference to each challenge. These differences illustrate both the aspirations and constraints of national ESD policymaking.

The integration of sustainability into learning environments also varies. The Czech Republic, Hong Kong SAR, and Sweden have adopted whole-school or systemic approaches that address all four challenges. Finland includes these

themes but applies them inconsistently. Singapore and Taiwan often overlook inequality, while Australia and Iceland pay limited attention to unsustainable resource use. Biodiversity loss remains underrepresented in Norway and the United States. These patterns suggest that although transformation is underway, comprehensive and balanced implementation remains limited.

Efforts to build educator capacity for ESD vary in scope and coherence. Several countries (e.g., AU, CZ, FI, HK, SE) offer structured professional development programs explicitly linked to the four challenges. In contrast, Singapore and Taiwan do not systematically address inequality, and the United States tends to omit biodiversity loss in teacher training. Iceland and Norway prioritize general teacher development, with limited integration of sustainability themes. While educator training is widely prioritized, alignment with the broader global challenges remains uneven.

Across the ten countries, youth empowerment in ESD commonly aims to develop action competence and civic responsibility through engagement with climate change, biodiversity loss, and resource use (e.g., CZ, IS, NO, SG, TW, US). Many systems emphasize critical thinking, problem-solving, and environmental participation via formal curricula and NGO partnerships (e.g., AU, HK, NO, SG, SE, TW, US). However, notable differences exist. In Finland and Norway, youth activism tends to be more proactive than institutional ESD initiatives. Iceland links empowerment to social justice, while Sweden notes low male engagement and limited interest in sustainability careers. The United States promotes indigenous-led, justice-based initiatives, whereas Australian youth activism stems from perceived institutional inaction.

Local-level ESD actions across the ten countries reveal a dynamic interplay between top-down policies and bottom-up innovations. A common emphasis is placed on community engagement and partnerships with local organizations, NGOs, and businesses (e.g., AU, CZ, HK, NO, SG, SE, TW, US). Many systems promote experiential learning to address localized global challenges

such as climate change, biodiversity loss, and resource use (e.g., CZ, HK, IS, NO, SG, TW, US). Several differences exist: in Australia and Finland, local efforts are often fragmented or individually driven, revealing gaps between policy and implementation. In contrast, Hong Kong SAR and Taiwan exhibit more structured, government-led initiatives. Sweden supports multiple local goals, including climate adaptation and social inclusion. Norway, although characterized by strong youth awareness, reports uneven regional implementation.

#### **Component 4: ESD indicators**

ESD indicators refer to a set of criteria or measurable elements used to monitor, evaluate, and guide ESD implementation. Among the ten countries, all but the Czech Republic and Norway have established national systems to varying extents. Where such systems exist, their design and emphasis differ, shaped by alignment with global frameworks, curricular priorities, or whole-school practices. Sweden and Taiwan have developed national indicator systems closely aligned with SDG 4, with a particular focus on equity. The United States leverages existing national datasets to track progress in areas such as gender equality, quality education, and institutional development. Hong Kong SAR employs school-level performance indicators that encompass school ethos, student support, and environmental engagement. Australia and Finland report efforts to incorporate sustainability indicators into educational planning, although their frameworks remain broadly and loosely defined.

In addition, Iceland and Singapore adopt more integrated approaches, linking ESD to national education visions and embedding sustainability into curriculum frameworks, teacher preparation, and whole-school practices. Singapore emphasizes future-oriented competencies, such as critical thinking and green economy awareness, while Iceland connects ESD to local values and student agency through place-based learning. Overall, while these systems reflect a commitment to ESD monitoring, they vary in formality, scope, and focus, il-

lustrating how national contexts influence ESD indicator development in K-12 education.

### **Component 5: ESD competencies**

Several core ESD competences are emphasized across the ten countries. Critical and systems thinking, which enable learners to analyze and respond to complex sustainability challenges, are prioritized in Iceland, Singapore, and Sweden. Collaborative skills, involving social interaction and cooperative problem-solving, are valued in Singapore, Sweden, and Taiwan. Ethical awareness and self-reflection, related to personal values and responsibility, are integral to the competence frameworks of Norway, Singapore, and Sweden. Notably, action competence, the ability to apply knowledge in real-world contexts, is particularly emphasized in Iceland and Singapore.

Some countries have established more structured competency frameworks. Iceland adopts all eight SDG competences proposed by the United Nations. Singapore and Sweden differentiate frameworks for students and teachers. The United States prioritizes broader educational goals, particularly those related to equity and systemic capacity, while the Czech Republic and Hong Kong SAR emphasize civic values and responsible decision-making. Taiwan categorizes competences into personal, social, and civic domains. Although Australia and Finland do not explicitly define ESD competences, both reference general learning outcomes aligned with sustainability-related goals and values. Despite variations in specificity, most countries address key elements such as critical thinking, collaboration, practical action, and ethical awareness.

### **Component 6: ESD curriculum**

The integration of ESD into national curricula represents a common policy direction across countries. With the exception of the United States, the other nine countries have established national curricula that incorporate sustainabili-

ty-related content and competences to different extents. A shared feature is the interdisciplinary integration of ESD, rather than treating it as a separate subject. Moreover, many frameworks align ESD with broader educational goals, including civic responsibility (CZ, TW), environmental ethics (NO, TW), and sustainable development (FI, SG, SE).

Although most countries share the goal of embedding sustainability into curricula, their approaches diverge, shaped by government structures, policy priorities, and institutional capacity. In Australia, sustainability is included as a cross-curricular priority, yet its implementation remains uneven across subjects, particularly in Mathematics. Iceland designates ESD as a core curricular component, but its flexible national framework grants substantial autonomy to schools and teachers, resulting in regional variation in implementation. In Sweden, while ESD is embedded in the national K-12 framework, its effectiveness often depends on the availability of teaching materials and local-level institutional support. The United States adopts a decentralized model, with curriculum decisions determined at the state and district levels; environmental education is not nationally mandated and typically appears as an optional topic within science curricula or through extracurricular activities. These differences underscore how national education systems and policy contexts shape the practical realization of ESD.

## **Component 7: ESD in formal education**

Most countries have established structured approaches to implementing ESD across formal education levels. A notable trend is the progressive introduction of ESD into early childhood education, where foundational concepts such as environmental awareness, ethical reasoning, and appreciation of nature begin to take shape (e.g., FI, NO, SE). At the primary level, ESD is more systematically embedded. Many countries incorporate it through science curricula, thematic units, or daily-life practices such as waste sorting, energy conservation, and food sustainability (e.g., FI, HK, SG, SE, US). At this stage, the emphasis

often lies in understanding human-environment interactions and cultivating sustainable habits. Additionally, some systems integrate ESD with the development of civic and emotional competencies through sustainability themes (e.g., CZ, FI).

In secondary education, more varied implementation patterns are evident. Countries adopt both subject-based and interdisciplinary models, with integration often occurring in geography, biology, and environmental science (e.g., FI, NO, SG, US). Several systems incorporate flexible scheduling or cross-disciplinary projects that target systems thinking and promote student agency (e.g., CZ, HK). Furthermore, climate change and other global sustainability issues are explicitly addressed in some national curricula (e.g., CZ, HK). At the upper secondary and pre-university levels, ESD is further extended in certain countries through civic-oriented and vocational pathways. Topics such as sustainable development, climate responsibility, and global citizenship are introduced in either subject-specific curricula or general education frameworks (e.g., FI, HK, NO, SG, TW). However, this educational stage exhibits greater variability, often influenced by curricular autonomy and institutional discretion (e.g., CZ, IS).

## **Component 8: Teacher training in ESD**

Teacher training in ESD is present across the ten countries, although it varies in its integration into pre-service or in-service programs, as well as in the degree of policy enforcement and institutional consistency. In some countries (e.g., IS, TW), ESD is explicitly embedded in pre-service teacher education under strong institutional or national mandates. In contrast, other countries incorporate ESD primarily through interdisciplinary courses or subject-specific modules, yet implementation is often left to the discretion of universities or faculties (e.g., AU, FI, HK, SG, SE), resulting in inconsistent and often optional inclusion. By comparison, countries such as the Czech Republic and Norway provide limited pre-service ESD, reflecting a lack of national coordi-

nation in preparing future teachers for sustainability education.

In-service teacher training in ESD is more widely implemented. Some countries have established national programs with defined certification requirements and sustained institutional support. For instance, Taiwan requires 24 hours of environmental training for teacher qualification, and Hong Kong SAR has offered professional development programs since the late 1990s through collaborations with government agencies and non-governmental organizations (NGOs). Australia delivers in-service ESD via field-based organizations and environmental networks. In contrast, other countries offer in-service training that is optional, locally initiated, or unevenly implemented across schools and regions (e.g., CZ, FI, SG, SE, US). Iceland and Norway continue to face challenges of fragmented implementation, weak curriculum alignment, and insufficient incentives, all of which hinder the institutionalization of in-service ESD. Overall, the extent and coherence of ESD integration into teacher education depend largely on the consistency of national support and cross-institutional coordination.

### **Component 9: ESD in non-formal education**

Non-formal ESD is broadly implemented across all ten countries, employing various structures and pedagogical approaches. These programs aim to cultivate sustainability awareness and competencies through community-based initiatives, public institutions, and hands-on learning experiences. A common strategy involves the use of public spaces, outdoor education, and youth engagement programs (e.g., AU, CZ, IS, NO, SG, TW, US). Museums, nature reserves, and community-based settings are frequently utilized as platforms for sustainability education. Many systems also incorporate hands-on and outdoor learning through camps, field trips, and internships (e.g., FI, HK, SG, TW, US). Youth participation is further promoted through student-led initiatives, ambassador programs, and sustainability clubs (e.g., SE, TW, US).

A key distinction across countries is the level of governmental involvement and coordination. Finland, Hong Kong SAR, and Taiwan have developed structured, state-led programs where government agencies coordinate activities and administer certification mechanisms. In contrast, the Czech Republic, Iceland, and the United States often rely on local institutions, NGOs, and voluntary initiatives, leading to varied degrees of consistency and formal recognition. Collectively, these non-formal ESD models aim to extend sustainability learning beyond formal schooling, fostering active community participation and practical engagement.

### **Component 10: Social partnership in ESD implementation**

Social partnerships play a critical role in advancing ESD by facilitating collaboration among diverse stakeholders committed to shared sustainability goals. A wide range of actors, such as national and international NGOs, government agencies, private enterprises, foundations, and community organizations, contribute to sustainability efforts through both formal and non-formal educational avenues. In some countries (e.g., FI, SG, SE, US), ESD partnerships are broadly structured, involving cross-sectoral collaborations among NGOs, industry, educational institutions, and international organizations. These collaborations enable resource sharing, support teacher training, and expand outreach efforts, thereby increasing both the scale and systemic integration of ESD. Similarly, Australia and Taiwan emphasize institutional and policy-public partnerships, leveraging governmental coordination alongside local stakeholders to implement targeted programs.

In contrast, countries such as the Czech Republic, Iceland, and Norway adopt more localized or sector-specific partnership models. The Czech Republic relies on networks of eco-centers and advocacy groups to organize environmental initiatives, while Iceland engages municipalities and business federations to promote sustainability agendas. In Norway, cultural and sports institutions, such as the Norwegian Sports Confederation and the Music Council, play a

role in promoting ESD, reflecting a broader integration of social sectors beyond traditional education systems. Despite variations in formality and coordination, a shared feature across these contexts is the recognition that effective ESD depends on robust cross-sectoral collaboration. Such partnerships not only extend the reach of ESD but also ensure contextual relevance, strengthen community engagement, and promote long-term sustainability outcomes.

## **Component 11: Features of ESD**

This section outlines key features of ESD implementation across the ten countries, focusing on five core aspects: curricular integration, interdisciplinary approaches, participatory learning, environmental education, and contextual engagement (see Figure 1). First, sustainability is increasingly embedded in national education frameworks through curriculum alignment, value-driven approaches, and context-specific priorities (e.g., AU, CZ, FI, HK, IS, NO, SE, TW, US). In countries like Iceland and Sweden, ESD serves as a foundational curricular element, reflecting its central role in shaping educational goals. Similarly, Norway and Taiwan adopt holistic, value-driven models that emphasize transformative learning and sustainable practices. Hong Kong SAR and the United States place stronger emphasis on environmental concerns such as ecological security, climate change, and environmental justice, while the Czech Republic and Finland frame sustainability in terms of regional transformation and national development.

Second, interdisciplinary and holistic strategies are widely used to integrate sustainability across subjects such as science, geography, and civics (e.g., FI, NO, SG, SE, TW). These approaches foster systems thinking and cultivate sustainable mindsets, shifting from siloed instruction to integrative learning frameworks. Third, participatory learning and cross-sector collaboration are regarded as essential components of ESD (e.g., CZ, HK, SE, TW, US). Grassroots networks, government coordination, and community-based initiatives enhance inclusivity and contextual relevance, reinforcing the collective

responsibility inherent in sustainability education.

Fourth, environmental education and justice constitute core elements of ESD in several systems (e.g., IS, SE, US). Iceland embeds environmental literacy within the national curriculum; Sweden emphasizes nature-based, experiential learning; and the United States prioritizes action-oriented, community-driven responses to climate change. Fifth, contextual and action-based learning is promoted to ground ESD in real-world challenges. Countries like Australia, Taiwan, and the United States advocate place-based approaches that connect knowledge with practice, empowering learners as agents of local change.

In conclusion, sustainability has emerged as a global priority in education systems, supported by diverse strategies that facilitate curricular integration, interdisciplinary approaches, and collaborative learning. While implementation varies across contexts, a common emphasis on environmental literacy, social justice, and community engagement reflects a shared commitment to preparing learners for a more sustainable future.



**Table 2** A summary of the status of ESD in ten countries

Component	Australia (AU)	Czech Republic (CZ)	Finland (FI)	Hong Kong SAR (HK)	Iceland (IS)	Norway (NO)	Singapore (SG)	Sweden (SE)	Taiwan (TW)	The United States (US)
Actions taken and performance achieved for ESD	<p>1. A sustainability cross-curriculum priority in the curriculum or voluntary programs like Sustainable Schools and ResourcesSmart Schools.</p> <p>2. Advancing policy includes several mentions of climate change, biodiversity, and inequality in the AU Curriculum at ISCED level 2, while unsustainable resource use is mentioned only 5 times.</p> <p>3. Transforming learning environments addresses climate change, biodiversity, and inequality through sustainable school programs, and education policies.</p> <p>4. Building educator capacities addresses individual and institutional challenges by integrating courses on inequality into some teacher education programs.</p> <p>5. Empowering and involving youth involves climate action by youth groups and engagement from environmental and LGBTQI+ organizations.</p> <p>6. Accelerating local actions with support from environmental and LGBTQI+ organizations to address all four global challenges.</p>	<p>1. Advancing policy fosters climate adaptation through education, biodiversity conservation, and equity through government programs and inclusive curricula.</p> <p>2. Transforming learning environments integrates sustainability, decarbonization, and equity into schools, promoting biodiversity, and enhancing equity through ESD.</p> <p>3. Building educator capacity via inclusive training programs, new methodological resources, and research.</p> <p>4. Empowering youth through environmental education, ESD, action competency, internal locus of control, and MEYS initiatives.</p> <p>5. Accelerating local action via teacher training, place-based learning, and regional environmental education efforts.</p>	<p>1. Policies address climate change, biodiversity, and inequality, but lack clear interpretation.</p> <p>2. Learning environments need transition for a whole-school sustainability approach, but remain limited.</p> <p>3. Educator capacity-building remains uneven due to limited support from teacher education, authorities, and teachers' initiative.</p> <p>4. The empowerment of youth in climate action often exceeds efforts made by schools, but all challenges need improvement.</p> <p>5. While accelerating local actions across all sustainability challenges is needed, efforts by municipalities and schools remain fragmented and are largely driven by individual interests.</p>	<p>1. Advancing policies include climate education, biodiversity integration, early nature education, waste reduction campaigns, and frameworks such as Agenda 21 to address inequality.</p> <p>2. Transforming learning environments addresses sustainability and voluntary use of self-evaluation tools.</p> <p>3. Educator capacities are built through research-based projects, university-school partnerships, and supportive evaluation tools such as curriculum analysis and self-evaluation frameworks.</p> <p>4. Empowering youth for sustainability emphasizes social justice, critical reflection on global and local issues, and active citizenship to promote pro-environmental behaviors and become agents of change.</p> <p>5. Local-level actions in schools empower students to apply global ESD principles by studying their environment.</p>	<p>1. Despite a core pillar since 2011, ESD needs transformative learning, teacher support, and government action.</p> <p>2. A mandatory whole-institution ESD approach is supported by expanding sustainability and voluntary use of self-evaluation tools.</p> <p>3. ESD Educators' capacities are built through research-based projects, university-school partnerships, and supportive evaluation tools such as curriculum analysis and self-evaluation frameworks.</p> <p>4. Empowering youth for sustainability emphasizes social justice, critical reflection on global and local issues, and active citizenship to promote pro-environmental behaviors and become agents of change.</p> <p>5. Local-level actions in schools empower students to apply global ESD principles by studying their environment.</p>	<p>1. Advancing policy promotes inclusion, equity, and sustainability, with strong implementation via institutionalized policies and legislation.</p> <p>2. Transforming learning environments creates inclusive, sustainable spaces that support well-being, environmental challenges, and student participation.</p> <p>3. Building educator capacity enhances professional development, reflective practices, and evidence-based teaching.</p> <p>4. Empowering youth fosters critical thinking, and active citizenship for social responsibility and achieving strong performance.</p> <p>5. Local actions drive environmental sustainability and community engagement through local curriculum adaptations and youth involvement.</p>	<p>1. ESP advances education policy by integrating sustainability themes into the curriculum, addressing climate change and unsustainable resource use.</p> <p>2. ESP transforms learning environments by enhancing school infrastructure, planting trees, and adopting energy-efficient technologies.</p> <p>3. Professional development of teachers for ESD is provided for both pre- and in-service teachers.</p> <p>4. Youth are empowered and mobilized through the school environment by raising awareness of their impact on the environment and encouraging sustainable behaviors.</p> <p>5. ESP accelerates local actions by expanding environmental volunteering and enrichment activities.</p>	<p>1. Advancing policies embed sustainability and equity into both curricula and legislation in order to tackle global challenges.</p> <p>2. Students can join in climate projects, outdoor biodiversity education, sustainable practices, and equity-focused discussions.</p> <p>3. Teachers are supported with resources and professional development to teach ESD, despite gender differences in student engagement.</p> <p>4. Youth are engaged in climate action, biodiversity projects, and sustainability initiatives, but connect to green careers.</p> <p>5. Local actions promote climate adaptation skills, biodiversity protection, sustainable transport, and social inclusion through vocational training and academic collaboration with organizations and NGOs.</p>	<p>1. ESD policy has established laws and policies for the four themes of sustainable education.</p> <p>2. The learning environment for ESD is being transformed via the MOE projects, including the Sustainable Campus and Climate-Friendly Campus plans.</p> <p>3. Cultivating teachers' ESD capabilities involves pre-service and in-service training.</p> <p>4. Future citizens have been cultivated with sustainability literacy and a global perspective via the Taiwan-US Eco-School Project since 2015.</p> <p>5. Local-level actions in rural areas have been accelerated over the past decade via an education and community collaborative development plan.</p>	<p>1. Strengthened federal and local collaborations.</p> <p>2. Strategic plan prioritizes policy reform, sustainable learning, teacher development, and learner engagement to protect resources.</p> <p>3. The APGs, adopted with a 24-month turnaround, focus on policy, educator capacity, and youth empowerment by removing educational barriers.</p> <p>4. Biodiversity loss, climate change, and resource overuse are indirectly managed through strategic policy objectives.</p>

**Table 2 (continued)**

Component	Countries									
	Australia (AU)	Czech Republic (CZ)	Finland (FI)	Hong Kong SAR (HK)	Iceland (IS)	Norway (NO)	Singapore (SG)	Sweden (SE)	Taiwan (TW)	The United States (US)
<p>Key themes in ESD:</p> <ol style="list-style-type: none"> <li>ESD indicators</li> </ol>	<p>The Australian Curriculum includes a Sustainability priority with 4 ideas:</p> <ol style="list-style-type: none"> <li>"Systems" refers to the interdependence of Earth's systems and socioeconomic systems.</li> <li>"World views" shape how individuals and communities understand the world through their attitudes, values, and beliefs.</li> <li>"Design" highlights the role of creativity in developing sustainable solutions to reduce negative impacts or restore systems.</li> <li>"Futures" emphasizes empowering young people to create actions leading to a fair, sustainable, and inclusive future. However, these ideas are not reflected in the content or assessments, resulting in a lack of accountability.</li> </ol>	<p>Outlined in action plans but lacking sufficient data for evaluation.</p>	<ol style="list-style-type: none"> <li>No indicators for ESD.</li> <li>Institutions meeting specific criteria can voluntarily apply for sustainability certification</li> </ol>	<p>The Performance Indicators for Hong Kong Schools can be used to assess ESD implementation or features of a "green" school, including management and organization, learning and teaching, school ethos and student support, and student performance.</p>	<p>National ESD indicators include sustainability integration, student action competency, social justice focus, and participation in the Eco-Schools programme.</p>	<p>No national ESD indicators</p>	<p>Despite the lack of explicit K-12 ESD indicators, ESD policies aim to cultivate eco-conscious individuals for green economy roles and active sustainability engagement.</p>	<p>ESD indicators (environment, economy, and society) are reflected through curriculum integration, critical thinking, participation, global-local perspectives, and teacher competency.</p>	<p>The indicators for each of the 7 targets of SDG 4 include: 1 for Targets 4.1, 4.2, and 4.6; 2 for Targets 4.3 and 4.4; 3 for Target 4.7; and 8 for Target 4.5.</p>	<ol style="list-style-type: none"> <li>Pre-K-12 education addresses key challenges through indicators for gender equality (14), quality education (12), reduced inequalities (14), peace, justice, and strong institutions (24).</li> <li>Achievement levels vary: 92% in quality education, 43% in gender equality, 29% in peace, justice, and institutions, and only 14% in reduced inequalities.</li> </ol>

**Table 2 (continued)**

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2. ESD competencies	No competencies identified.	Key competencies include respect for life, global interconnectedness, sustainable action, responsible decision-making, and active citizenship	1. No specific competencies for ESD. 2. There are general competency areas, including sustainability aims.	ESD competencies can be conceptualized through a tripartite framework encompassing environmental awareness, the cultivation of positive attitudes toward conservation, and the encouragement of proactive environmental action.	Action competency is developed alongside the UN's eight key competencies for the SDGs, including critical thinking, systems thinking, anticipation, non-maturity, strategy, collaboration, self-awareness, and problem-solving.	ESD competency goals embed sustainability across subjects, fostering knowledge and skills in environmental responsibility, climate change biodiversity, and ethical resource management.	1. The knowing approach fosters students' competencies in critical questioning and addressing real-life issues. 2. The doing approach fosters competencies in inquiry, critical evaluation, evidence-based communication, and contributing solutions to complex environmental issues. 3. The being approach fosters self-awareness and responsibility, cultivating ethical reasoning skills in sustainability contexts.	1. Student competencies include: - Systems thinking - Critical thinking - Future thinking - Collaboration and communication - Values and ethics - Action competency 2. Teacher competencies include: - Holistic and interdisciplinary teaching strategies - Supporting student voices - Lifelong learning - Cultural awareness and inclusion - Assessment of sustainability learning	ESD is embedded across the 9 core competencies within the 3 levels of spontaneity (personal development and learning), interaction (social interaction and communication), and common good (civic responsibility and sustainability) in the 2019 National Curriculum.	The Fiscal Year Strategic Plan 2022-2026 focuses on five key competencies: 1. Equity in student access to resources, opportunities, and inclusive environments. 2. Educator development and professional growth 3. Holistic student support addressing social, emotional, and academic needs. 4. Postsecondary equity strategies for access, affordability, completion, and post-enrollment success. 5. Building internal capacity to enhance mission delivery, addressing U.S. competency gaps while promoting student achievement and global competitiveness.

**Table 2 (continued)**

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3. The ESD curriculum	<p>1. The sustainability cross-curriculum priority in the Curriculum is theoretically linked to all 8 learning areas, but lacks sustainability content in Math.</p> <p>2. The senior secondary curricula for Earth and Environmental Science and Geography explicitly connect to the themes of the Sustainability cross-curriculum area, offering relevant subjects at the ISCED3 level.</p>	<p>The curriculum revision is participatory, integrating environmental education, ESD competencies, and sustainability-focused cross-cutting themes.</p>	<p>Four core curricula for the four educational levels</p>	<p>The ESD learning elements are embedded within the curricular content of various subjects across different year levels.</p>	<p>ESD is central to the national curriculum, but autonomy and an open curriculum mean that teachers need more support.</p>	<p>The ESD curriculum promotes holistic development, critical thinking, and lifelong learning, integrating health, democracy and sustainability across subjects in line with the SDGs.</p>	<p>1. ESD is guided by ESP, a whole-school approach organized around the four pillars of Curriculum, Campus, Culture, and Community.</p> <p>2. The curriculum integrates sustainability topics to develop students' understanding of human-environment relationships and sustainable management.</p>	<p>1. The national K-12 ESD curriculum exists, but lacks sufficient textbooks or guides to support its implementation.</p> <p>2. ESD in adult education follows the principles of national secondary curriculum, tailored to meet adult learning goals.</p> <p>3. ESD in higher education follows the Higher Education Act and Ordinance, rather than a national curriculum.</p>	<p>ESD in the 2019 National Curriculum includes 5 core concepts: environmental ethics, sustainable development, climate change, disaster preparedness, and resource sustainability.</p>	<p>1. No national curriculum; states manage education departments and funding, while localities oversee curriculum implementation.</p> <p>2. Schools follow guidelines from environmental or sustainability organizations.</p> <p>3. Competencies 1 and 2 play key roles in shaping curricula across state educational systems.</p> <p>4. Environmental education is optional; it is integrated into science, offered as a program, or as standalone events.</p>

**Table 2 (continued)**

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4. ESD in formal education	<p>1. ESD implementation in schools remains inconsistent, relying largely on individual teachers' choices.</p> <p>2. Schools in programs like Sustainable Schools or ResourceSmart Schools are more likely to integrate sustainability education.</p>	<p>1. Aligns with the CR's Education Policy Strategy 2030+.</p> <p>2. Nursery schools may implement alternative programs to support environmental initiatives.</p> <p>3. FEPs for primary schools emphasize environmental education, fostering local action on global challenges and sustainable practices.</p> <p>4. Around 30 secondary and vocational schools offer ecology and environment programs.</p> <p>5. Some upper secondary schools may prioritize other issues.</p>	<p>1. In early childhood education and care, ESD emphasizes ethical thinking and action across social, cultural, economic, and ecological dimensions.</p> <p>2. In pre-primary education, ESD emphasizes lifestyle choices across four dimensions and includes transversal skills.</p> <p>3. In primary education and lower secondary education, ESD is fully implemented through Environmental Studies and Health Education (grades 1-6), and is incorporated into most of the subjects, focusing on lifestyle choices across four dimensions.</p> <p>4. In general upper secondary education, ESD (since 2022) is integrated into many subjects, emphasizing sustainable lifestyles, students' agency, and global responsibility.</p> <p>5. Limitations: lack of decrees, curriculum plans, national exam data since 2012, and inconsistent application across schools.</p>	<p>1. Schools adopt a cross-curricular approach to promote ESD</p> <p>2. In kindergarten, ESD is integrated via "family," "festivals," and "community" themes in the "Nature and Living" area, offering multi-sensory experiences, observation, prediction, and comparison.</p> <p>3. In primary Science, ESD can be promoted through subject-based or interdisciplinary projects during flexible periods.</p> <p>4. In secondary education, a "Climate Change" resource pack was developed with inter-related plans for Science, Geography, and Liberal Studies.</p>	<p>1. In pre- and compulsory schools, ESD is determined by teachers and administrators, mainly with a focus on environmental issues.</p> <p>2. Compulsory schools are required to holistically incorporate sustainability into their entire curriculum and school culture.</p> <p>3. In upper secondary schools, there is a common emphasis on environmental issues.</p>	<p>1. Early childhood education embeds sustainability as a guiding principle and emphasizes its interconnected nature.</p> <p>2. Primary and lower secondary education integrates sustainability into subjects like Natural Science, Social Science, and Food and Health, covering climate change, biodiversity, and resource management, with core curriculum objectives.</p> <p>3. Upper secondary education emphasizes sustainability in Natural Sciences, Geography, and Social Studies for academic programs, and is linked to industry-specific competencies in VET programs.</p>	<p>The formal curriculum includes field-based and school-based learning for all students.</p> <p>1. At the primary level, the focus is on developing awareness of the human-environment relationship and anthropogenic environmental issues.</p> <p>2. At the secondary level, students focus on the impact of human actions on the environment and the need for management.</p> <p>3. At the pre-university level, the focus is on human-environment interactions and taking action for sustainability.</p>	<p>1. ESD for K-12 is integrated across subjects</p> <p>2. The national curriculum stresses that students should adopt sustainable practices in daily life.</p> <p>- Waste sorting, energy saving, and carbon reduction are practiced in K-12 and higher education.</p> <p>- Free K-12 lunches use local food and sea-food to reduce waste for sustainability.</p>	<p>ESD competencies, the key concepts, and related programs and activities are consistently taught across K-12.</p>	<p>1. ESD in Early Childhood addresses learning inequalities and ensures a well-organized environment with suitable activities.</p> <p>2. Primary ESD focuses on recycling, plant propagation, and studying animals (lower level) and concepts, ecosystems, conservation, and human impact (higher level).</p> <p>3. Secondary ESD covers life sciences, earth sciences, and engineering (lower level) and technology systems, biological evolution, and sustainability awareness on Earth (higher level)</p> <p>4. While NGSS forms the basis for most state standards, some states further emphasize environmental sustainability.</p>

**Table 2 (continued)**

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5 Teacher training in ESD	<p>1. Pre-service teacher education in Australia is accredited, but ESD is not mandatory. Sustainability is included in science and geography, with other subjects depending on institutions or program leaders.</p> <p>2. In-service teacher education and resources are provided by environmental organizations and chapters, and field study centers in various regions.</p>	<p>Professional in-service training in environmental education is provided for interested teachers.</p>	<p>1. Teacher education in ESD is mostly optional, rarely integrated, and varied, with a strong focus on sociocultural aspects.</p> <p>2. In 2020, the Council of Rectors for the Finnish Universities made a pledge on how the universities could actively promote sustainability. Among the theses of the council was that by 2030 all Finnish universities should include a basic course on sustainability. Hitherto, the implementation of sustainability has largely been a voluntary choice of particular institutions and teacher educators.</p>	<p>1. Since 1997, the EDB and EPD have jointly provided professional training on environmental concepts, with development programs (PDP) evolving in focus and activities.</p> <p>2. PDP initiatives are also provided by NGOs.</p> <p>3. Two notable pre-service programs are CUHK's 1.5-unit "Environmental Education" module and HKU's semester-long "Outdoor Environmental Education Learning Project."</p>	<p>1. ESD teacher training for all school levels is incorporated into a mandatory 5 ECTS courses and a 120 ECTS Master's program at the University of Iceland.</p> <p>2. ESD for in-service teachers depends more on individuals' choices than on policy.</p>	<p>Despite recent progress, ESD teacher education remains limited and inconsistent, facing challenges in curriculum alignment, teacher shortages, and comprehensive incorporation.</p>	<p>1. Teacher professional development is strengthened through communities of practice.</p> <p>2. Teachers learn best through inquiry, collaboration, reflection, and practice.</p> <p>3. Geography teacher development emphasizes teacher agency.</p>	<p>ESD in university teacher education is shaped by Higher Education Ordinance and national teacher education frameworks to prepare future teachers to integrate sustainability through interdisciplinary, action-oriented teaching</p>	<p>1. The pre-service teacher program provides integrated instruction on environment, sustainability, SDGs, social justice, and climate change across both required and elective courses.</p> <p>2. In-service teachers must complete 24 hours of EE courses approved by the Ministry of Education or Environment to be certified as environmental teachers.</p>	<p>1. ESD is part of teacher education, professional development, and certification programs, including masters certification.</p> <p>2. Challenges include inconsistent implementation and limited institutional commitment.</p>

**Table 2 (continued)**

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6. ESD in non-formal education	<p>1. ESD-related activities and campaigns.</p> <p>2. Museums, zoos, aquariums, and other venues in each state and territory organize ESD-related activities through directed and free-choice learning.</p>	<p>Non-formal education is available in environmental education NGOs (ecocentres) and conservation institutions such as nature reserves, parks, &amp; museums.</p>	<p>1. The public administration agency coordinates funding calls for sustainability education for all age groups.</p> <p>2. Metsäliitus, a state-owned provider, arranges guided activities (e.g., exhibitions, nature trail tours), trains teachers, and provides online resources, etc.</p> <p>3. Municipal programs on the SDGs are often connected to international partners and frameworks, emphasizing education and citizen involvement.</p> <p>4. The Lutheran Church, universities, and adult education centers organize sustainability courses targeting the public.</p>	<p>1. Since 1999, activities like assemblies, form-teacher periods, and extra-curricular programs have been recognized, later expanding to student-led groups like Green Clubs.</p> <p>2. Two key informal education offerings:</p> <ul style="list-style-type: none"> <li>- EEB cum SDC launched SDAP in 2013 to train students as SD Ambassadors via visits and field trips.</li> <li>- ECC cum EPD launched outreach programs like SEFAPS with camps, exhibitions, drama, visits, and seminars.</li> </ul>	<p>Non-formal education includes nature conservation, environmental protection, and community engagement efforts, but lacks guidance and consistent engagement.</p>	<p>Non-formal education activities, such as sports, museums, and music, incorporate the principles of the SDGs through various initiatives.</p>	<p>Non-formal education activities include community-based initiatives and non-residential camps.</p>	<p>The surrounding society—families, sports clubs, and leisure activities—provides opportunities for non-formal ESD in real life.</p>	<p>1. The Ministry of Environment certifies Environmental Education Facilities to offer non-formal ESD programs emphasizing field learning through internships in nature centers, conservation areas, museums, and rural communities.</p> <p>2. Most renowned museums are ESD-certified, and others actively promote ESD.</p>	<p>ESD is integrated into non-formal settings like nonprofits, NGOs, museums, tech clubs, and summer camps.</p>

**Table 2 (continued)**

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7. Social partnership in ESD implementation	Many environmental organizations collaborate with social partners, such as foundations, trade unions, religious groups, local governments, and community organizations, to sponsor programs and activities.	1. The Eco-Schools Network includes 400 schools (from kindergartens to secondary schools). 2. Partnerships in environmental education are coordinated by the Pavučina network of ecocentres.	The main sustainability education advocates are various interest groups, national and international NGOs, which promote UN principles and other services for teachers and students in both formal and non-formal education.	Schools collaborate with the government, NGOs, and communities to promote sustainability through resources, training, activities, and outreach.	Social partnership involves municipalities, private companies, and business federations (e.g., the Confederation of Icelandic Enterprise) to promote sustainability through independent policies, corporate responsibility, and regulatory initiatives.	1. Sports organizations like the Norwegian Sports Confederation. 2. Cultural institutions, such as museums and the Norwegian Music Council.	1. Social partnerships include government-community collaborations, institutional-educational partnerships, and policy-public interactions. 2. The Green Plan 2030 promotes collaboration among government, industry, educators, youth, and the broader community.	ESD is strengthened through partnerships with public and private sectors, NGOs, and international organizations like the European Union, leveraging funding, expertise, and community engagement.	Social partnerships with NGOs, foundations, associations, civil society, enterprises, and local environmental agencies have been established to implement ESD.	Social partnerships include foundations such as the Smithsonian, U.S. Partnership for ESD, and Google, as well as practitioner-based organizations such as ACTE and ITEEA.

**Table 2 (continued)**

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Features of ESD	<p>1. ESD is influenced by individualism, functionalist, neoliberal political economy.</p> <p>2. ESD has not been formally institutionalized in schools.</p> <p>3. Many schools remain active in ESD despite government inaction.</p> <p>4. Field study centers offer flexible, diverse place-based environmental education outside school constraints, boosting student engagement and supporting ESD.</p>	<p>1. Tradition and high-quality expertise</p> <p>2. Grassroots initiatives and collaborative networks</p> <p>3. A whole-school approach is being gradually introduced</p> <p>4. The role of ESD in supporting regional sustainability transformation.</p>	<p>1. Pretty words instead of execution</p> <p>2. Competitive orientation in efforts to advance sustainability</p> <p>3. Independent teachers and the challenge of high-quality sustainability education</p> <p>4. The limitation of focusing on single-solution approaches</p>	<p>1. Implementing ESD distributively and immersively with multipronged and coordinated collaborations</p> <p>2. The growing importance of ecological security and SDG 16 in ESD</p> <p>3. The multitude of learning supports to the ESD implementation</p>	<p>1. Sustainability as a core pillar of the national curriculum</p> <p>2. The emphasis on environmental education</p> <p>3. Social emphasis of ESD, including democratic views</p> <p>4. Social justice as a necessary priority</p> <p>5. The need for evaluation of ESD practices</p>	<p>1. National commitment to SDG policies</p> <p>2. Holistic approach to sustainability variation through adapted teaching</p> <p>3. Pedagogical adapted teaching</p>	<p>1. Going beyond cognitive outcomes to foster knowing and problem-solving through climate change education</p> <p>2. Beyond cognitive outcomes to cultivating action through climate change education</p> <p>3. Beyond cognitive outcomes to foster values and dispositions for sustainability</p> <p>4. Developing collaborative responsibilities among stakeholders in context</p> <p>5. Embedding social and global awareness in ESD pedagogy</p>	<p>1. Integration of sustainability into the national education curriculum</p> <p>2. Promoting an interdisciplinary and holistic approach</p> <p>3. Promotion of student-centered and participatory learning</p> <p>4. Nature-based education and outdoor learning integration</p> <p>5. Increasing collaboration with society and industry</p>	<p>1. Value-based sustainable education</p> <p>2. Practice-oriented sustainable education</p> <p>3. Sustainable education for economic and social transformation</p> <p>4. Global citizenship-oriented sustainable education</p> <p>5. Sustainable education as the education of "future imagination"</p>	<p>1. Focus on local climate change challenges.</p> <p>2. Incorporation of environmental justice</p> <p>3. Emphasis on experiential and community-based learning</p>



The first prominent trend is increasing emphasis on experiential and action-oriented learning. Countries such as Singapore, Taiwan, the United States, Australia, Iceland, and Sweden are prioritizing pedagogies that promote hands-on and community-based engagement. Singapore has expanded experiential learning to foster values-driven thinking and problem-solving skills. The United States integrates experiential and real-world problem-based learning into climate education. Similarly, Taiwan supports student-led sustainability action plans through community partnerships, with a focus on ecological practices. Australia highlights outdoor learning and education for action, Iceland advances active citizenship through ESD, and Sweden promotes civic participation through experiential sustainability education. Collectively, these initiatives reflect a shift toward experiential and practice-based learning as a cornerstone of ESD implementation.

Second, interdisciplinary and curriculum-integrated approaches have become central to ESD implementation (e.g., TW, SG, HK, FI, NO, SE). For instance, Taiwan and Singapore promote interdisciplinary curriculum design to embed sustainability across subjects, fostering students' understanding of the interconnectedness among environmental, social, and economic systems. In Hong Kong SAR, ESD is primarily delivered through subject-based teaching, reflecting curricular flexibility across K-12 levels. Finland and Norway emphasize cross-disciplinary coherence by integrating ESD within and across subject domains. Sweden likewise adopts interdisciplinary strategies to enhance sustainability literacy and future workforce readiness.

Third, educator professional development is recognized as a vital enabler of ESD implementation (e.g., IS, NO, SG, TW, FI, SE), as well-prepared and continuously supported teachers are essential to the success of sustainability initiatives. Iceland, Norway, and Singapore have reformed teacher education and established professional learning networks to equip educators with the knowledge and tools needed for effective ESD instruction. These reforms include the integration of sustainability into both pre-service and in-service

training programs, ensuring that educators are not only familiar with core ESD principles but are also equipped with practical pedagogical strategies. Similarly, Taiwan has expanded professional development opportunities, emphasizing the importance of teacher expertise and enthusiasm for cultivating students' sustainability competencies. Taken together, these initiatives highlight the importance of continuous professional support to ensure educators are prepared to meet the dynamic challenges of sustainability education.

Fourth, youth engagement and student agency are shaping ESD agendas across several countries (e.g., FI, NO, SE, CZ, TW), with youth-led movements exerting a profound impact on education systems. In Sweden and Norway, youth climate movements, such as Fridays for Future, have raised public awareness and catalyzed policy changes to prioritize sustainability in school curricula. In Finland, growing youth activism has promoted institutional responses, including curriculum reviews and expansion of sustainability-focused programs. The Czech Republic highlights youth-driven interest as a bottom-up force complementing top-down ESD efforts. Taiwan promotes student-led sustainability action plans, enabling students to engage directly in ecological initiatives at both the school and community levels. Collectively, these examples reflect a shift in ESD from viewing students as passive recipients to recognizing them as active agents in sustainability transformation.

Fifth, policy, government, and institutional support have emerged as a foundational element in advancing ESD. Several countries highlight the importance of government-driven strategies and institutional engagement in shaping ESD directions (e.g., CZ, FI, NO, SE, SG, TW). For instance, the Czech Republic emphasizes strong top-down support complemented by grassroots initiatives, reflecting a dual-track approach to policy implementation. Finland and Singapore underscore the institutional collaboration and systemic integration as key to effective practice. Norway points to ongoing institutional pressures to enhance teacher education in line with sustainability goals. In Sweden and Tai-

wan, national coordination, international alignment, and campus-wide practices illustrate efforts to embed ESD more holistically within education systems. These examples suggest that policy leadership and institutional coherence are essential enablers of sustained and systemic ESD implementation.

Together, these five trends—action-oriented learning, interdisciplinary integration, teacher professional development, youth engagement, and institutional support—form the core pillars of ESD operationalization across different national contexts. Figure 3 provides a visual mapping of the countries associated with each of these five trends. Beyond these common patterns, several countries report distinct or localized developments. For instance, Taiwan emphasizes the use of digital tools in environmental education; Sweden and the United States focus on concerns related to environmental justice; and the Czech Republic and Finland link ESD to regional transformation and economic competitiveness. While such trends are not consistently observed across all contexts, they illustrate the growing diversification of ESD practices, shaped by local needs and strategic goals.





**Figure 4** Visual representation of key ESD issues in ten highly competitive countries

First, teacher preparedness and professional development remain persistent challenges in many countries (e.g., AU, FI, TW, IS, NO, SG). A common gap exists in the provision of comprehensive training and sustained support to enable educators to effectively implement ESD. In Australia, sustainability-related teacher education is marked by fragmentation and inconsistent implementation. Finland and Taiwan report a lack of sustainability guidelines in teacher education policy and insufficient resources for integrating ESD into classroom practice. In Iceland and Norway, concerns focus on limited access to professional development opportunities and inadequate instructional materials. Singapore identifies the need to strengthen teacher learning networks and capacity-building mechanisms. Collectively, these findings point out the imperative of embedding sustainability into both pre-service teacher education and in-service professional development frameworks.

Second, curriculum constraints and integration challenges are prevalent across countries. Several nations struggle to embed ESD meaningfully within exist-

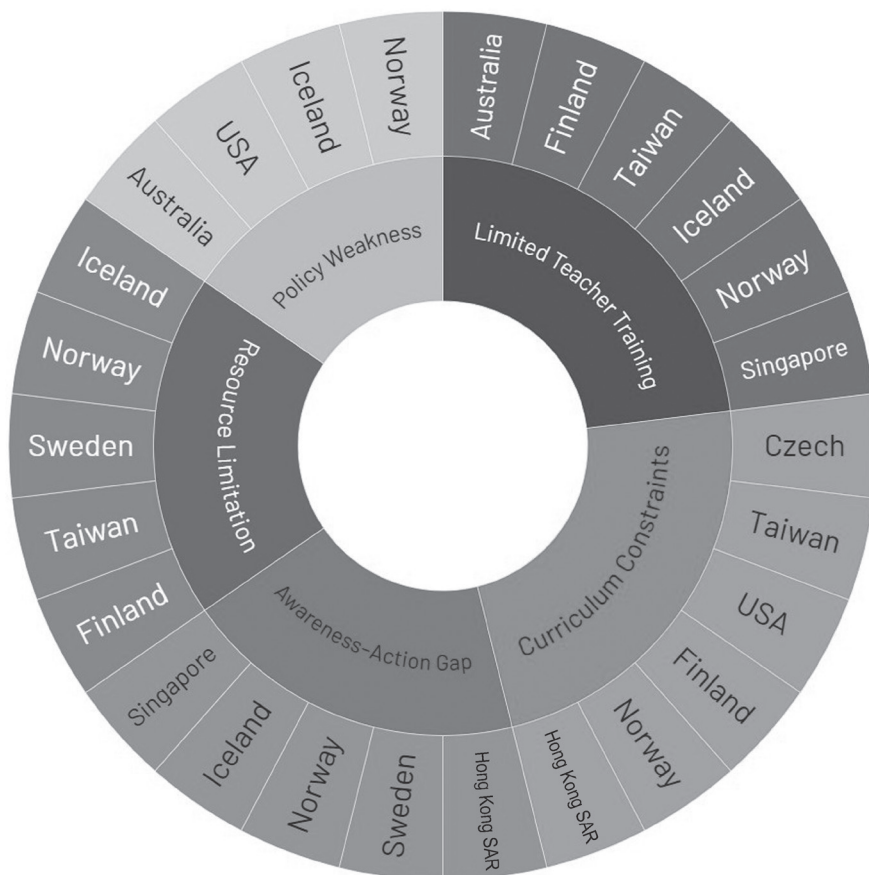
ing curricula, as sustainability education often competes with other academic priorities (e.g., CZ, TW, HK, FI, NO, US). In the Czech Republic, for instance, limited space in discipline-based teacher education programs restricts opportunities to integrate sustainability into core subjects. Similarly, Taiwan and Hong Kong SAR face tensions between ESD goals and traditional academic demands, such as curriculum overload and exam-oriented instruction, often relegating ESD to a secondary concern. In Finland and Norway, fragmented integration across subjects impedes the development of a coherent, interdisciplinary approach. These challenges highlight the need for more flexible curriculum structures, stronger cross-subject alignment, and targeted strategies to foster interdisciplinary teaching that enables students to engage with sustainability from multiple perspectives.

Third, the gap between student awareness and action remains a critical concern (e.g., HK, SE, NO, IS, SG). Although many students express strong awareness of sustainability issues, they rarely take tangible action. In Hong Kong SAR, Sweden, and Norway, students show solid understanding of environmental challenges but often lack active participation. Similarly, in Iceland, strong sustainability values expressed by students do not consistently manifest in their behaviors. Singapore reports rising environmental literacy, yet student involvement in school or community initiatives remains limited. Psychological barriers, such as feelings of helplessness and diminished agency, alongside cultural attitudes toward environmental responsibility, contribute to this disconnect. Consequently, there is growing recognition that awareness alone is insufficient to drive behavioral change. Emphasis is shifting toward empowering students through experiential learning opportunities that foster a deeper sense of ownership and agency in sustainability practices.

Fourth, resource limitations, including financial, human, and material, remain persistent obstacles to effective ESD implementation (e.g., FI, TW, SE, NO, IS). For instance, teachers in Finland often report insufficient time to integrate

sustainability into already crowded curricula. Taiwan and Sweden face financial constraints that hinder investments in innovative pedagogies and restrict students' access to high-quality learning materials. The scarcity of relevant and diverse instructional resources also presents a common challenge. In Norway and Iceland, schools often lack the means to provide experiential learning opportunities and interactive tools essential for fostering deeper engagement with sustainability issues.

Fifth, institutional and policy-level limitations continue to limit systemic progress in ESD across several countries (e.g., AU, US, IS, NO). In Australia and the United States, the absence of consistent political commitment and coherent policy frameworks has resulted in fragmented implementation. Australia lacks a clear national ESD strategy, leaving schools and educators to independently interpret and apply sustainability goals, leading to inconsistent practices and outcomes. In the United States, decentralized education governance produces a patchwork of ESD initiatives that vary significantly across states, hindering the establishment of unified national objectives and consistent evaluation metrics. Similarly, Iceland and Norway face challenges related to decentralized governance and the absence of comprehensive national guidelines, contributing to uneven implementation. These systemic gaps constrain institutional capacity to scale ESD efforts effectively. Advancing ESD in a consistent and meaningful manner requires greater policy coherence and coordination across national and local levels. Figure 5 provides a visual mapping of the countries associated with each of these five issues.



**Figure 5** Country mapping of the five emerging issues in ESD

In addition to the five major challenges, several countries report context-specific issues that further complicate ESD implementation. Taiwan, for instance, highlights the lack of localized ESD indicators to guide and assess progress. Sweden notes limited student participation in curriculum co-design, while Finland raises concerns about the weak alignment between ESD and labor market competencies. These context-dependent concerns underscore the multifaceted nature of embedding sustainability within education systems, and reinforce the need for globally coordinated efforts to build institutional capacity, reform policy, and promote more coherent and impactful ESD practices.

**Table 3** A summary of ESD trends and issues in ten countries

Component	Countries									
	Australia (AU)	Czech Republic (CZ)	Finland (FI)	Hong Kong SAR (HK)	Iceland (IS)	Norway (NO)	Singapore (SG)	Sweden (SE)	Taiwan (TW)	The United States (US)
Trends in ESD	<ol style="list-style-type: none"> <li>1. Awareness and action on climate change</li> <li>2. Policy and practice development for ESD is not a priority</li> <li>3. Decline and delegitimization of effective outdoor education provision as a vehicle for education for sustainability</li> <li>4. Collaboration with Aboriginal and Torres Strait Islander (First Nations) peoples</li> <li>5. Learning for action</li> </ol>	<ol style="list-style-type: none"> <li>1. Strong top-down support for bottom-up initiatives and quality assurance</li> <li>2. Out-of-school learning recognized as an innovative pedagogical approach</li> <li>3. Climate education represents a new strategic priority</li> <li>4. Internationally recognized SDG 12 educational materials with related themes in the context of the SDGs, such as creative education.</li> </ol>	<ol style="list-style-type: none"> <li>1. Possibly an increased top-level interest in ESD</li> <li>2. Increasing collaboration and engagement between institutions and social partnerships</li> <li>3. Challenges in securing funding for sustainability education initiatives</li> <li>4. Forthcoming evaluations and research on the sustainability implementation process</li> <li>5. A possible change in the role of the universities in advancing sustainability education and practices</li> <li>6. An increased interest from below in sustainability driven by youth activism</li> </ol>	<ol style="list-style-type: none"> <li>1. To implement ESD across all K-12 students</li> <li>2. Subject teaching as the main vehicle to implement ESD</li> <li>3. Promoting ESD in line with policies to act on priority areas</li> <li>4. The influences of Chinese cultural background to HK ESD</li> <li>5. Bottom-up complementary efforts by teachers to promote ESD</li> </ol>	<ol style="list-style-type: none"> <li>1. Increased support in ESD implementation through open curriculum guides</li> <li>2. Emphasis on key competency and action competency</li> <li>3. Teacher education in constant development</li> <li>4. No centralized obligatory assessment</li> <li>5. Monitoring of Icelandic schools limited</li> </ol>	<ol style="list-style-type: none"> <li>1. The gradual strengthening of teacher education</li> <li>2. A gap between awareness and action</li> <li>3. The challenges of integrating sustainability across disciplines</li> <li>4. The influence of global climate movements on Norwegian youth</li> <li>5. Uneven teacher competency in sustainability education</li> <li>6. Institutional pressure on teacher education programs</li> <li>7. The shift towards active citizenship in sustainability education</li> </ol>	<ol style="list-style-type: none"> <li>1. Expansion of experiential, action-oriented learning models</li> <li>2. Interdisciplinary curriculum integration</li> <li>3. Strengthening professional learning networks for teachers</li> <li>4. Fostering community-centric sustainability engagement</li> <li>5. Cultivating sustainable identity through values-based education</li> </ol>	<ol style="list-style-type: none"> <li>1. Fridays for Future and the rise of global youth movements for climate action</li> <li>2. Limited personal interest and career motivation in sustainability among Swedish youth</li> <li>3. Call for collaboration to increase interest for the future workforce</li> <li>4. Gender differences in sustainability awareness and school certification</li> <li>5. Gender differences in sustainability awareness increase with age</li> </ol>	<ol style="list-style-type: none"> <li>1. Integrating sustainability into the national curriculum</li> <li>2. Implementing campus sustainability practices</li> <li>3. Applying technology and digital tools</li> <li>4. Conducting student-led action plans</li> <li>5. Promoting teacher professional development</li> </ol>	<ol style="list-style-type: none"> <li>1. Integration of ESD into the curriculum</li> <li>2. Experiential and problem-solving learning opportunities</li> <li>3. Focus on climate education</li> <li>4. Indigenous knowledge and traditional ecological practices</li> <li>5. Emphasis on equity and justice</li> </ol>

**Table 3 (continued)**

Component	Countries									
	Australia (AU)	Czech Republic (CZ)	Finland (FI)	Hong Kong SAR (HK)	Iceland (IS)	Norway (NO)	Singapore (SG)	Sweden (SE)	Taiwan (TW)	The United States (US)
Issues in ESD	<ol style="list-style-type: none"> <li>The governments insufficient commitment to ESD</li> <li>Limited integration of ESD into teacher education and professional development</li> <li>Power struggles between UNESCO and OECD affecting ESD academic leadership</li> <li>Ambiguity surrounding the meaning of ESD</li> <li>Lack of locally determined measures for ESD monitoring and evaluation</li> <li>Crude instrumentalism and homogenization of ESD due to overemphasis on cognitive, socio-emotional, and behavioral learning domains</li> <li>Increased focus on social and cultural sustainability without integration with environmental sustainability</li> <li>School sustainability/nance</li> <li>A whole-school approach is rarely achieved</li> </ol>	<ol style="list-style-type: none"> <li>Voluntary programs affect minority of the population</li> <li>The competitive school environment is a barrier to the majority's engagement</li> <li>Complexity of ESD within discipline-based teacher education programs</li> <li>Lack of space in curricula and limited use of appropriate pedagogical methods</li> <li>ESD professional training is leading to a qualification, but implementation of this qualification remains limited</li> <li>There are challenges in assessing ESD learning outcomes</li> </ol>	<ol style="list-style-type: none"> <li>Schools with competing social aims</li> <li>Teachers are unprepared to act</li> <li>Lack of resources such as time, money, and collaboration for effective sustainability education</li> <li>Limitations of gradual progress</li> <li>Unclear ideas in curriculum development and explanation of transversal competencies</li> <li>Unclear concepts in the curriculum</li> <li>Lack of sustainability guidelines in teacher education policy</li> </ol>	<ol style="list-style-type: none"> <li>Reckoning the priority of EESD to be included in Schools' Major Concerns (MCs)</li> <li>Further demand for professional development and teacher support for ESD implementation</li> <li>The plentiful yet homogeneous non-formal education programs for schools and students</li> <li>The gap between "awareness &amp; attitude" and action in ESD, influenced by psychological and societal barriers</li> <li>STEMaker projects can effectively address the gap between awareness, attitudes, and action in environmental sustainability</li> </ol>	<ol style="list-style-type: none"> <li>The need for attention to SDG teaching material and teacher support</li> <li>The need for a clearer focus on pressing sustainability issues</li> <li>The priority need for access to school self-evaluation tools for ESD</li> <li>The lack of centralized national information</li> <li>The need for relevant resources to address student literacy status</li> </ol>	<ol style="list-style-type: none"> <li>Increasing pessimism and a sense of powerlessness among Norwegian youth</li> <li>Unwilling implementation due to decentralized educational governance</li> <li>Insufficient teacher training in sustainability education</li> <li>Tensions between ecological priorities and economic interests</li> <li>Fragmented integration across subjects</li> <li>Student engagement and action-oriented learning to bridge the gap between awareness and action</li> </ol>	<ol style="list-style-type: none"> <li>Addressing subject matter knowledge</li> <li>Bridging disciplinary boundaries in ESD</li> <li>Developing communities of practice</li> <li>Addressing persistent misconceptions and apathy</li> <li>Bridging knowledge and action in ESD pedagogy</li> </ol>	<ol style="list-style-type: none"> <li>Lack of commitment from students</li> <li>Balancing time constraints with an abundance of instructional resources</li> <li>Challenges in utilizing sustainability education resources</li> <li>The growing recognition of ESD and questions about its real-world impact on youth</li> <li>Gender differences in engagement with ESD</li> <li>Limited personal interest and career motivation in sustainability among Swedish youth</li> <li>A general view that 'it is important but not for me'</li> </ol>	<ol style="list-style-type: none"> <li>Conflict between curriculum demands and pressure for higher education in implementing ESD</li> <li>Insufficient teachers' knowledge and training on sustainable development education</li> <li>Insufficient ESD learning materials</li> <li>Lack of administrative support for ESD implementation</li> <li>Limited societal awareness and support regarding ESD</li> </ol>	<ol style="list-style-type: none"> <li>Inconsistent implementation across states</li> <li>Lack of teacher training and professional development</li> <li>Funding challenges</li> <li>Political and ideological resistance</li> <li>Overcrowded curricula</li> </ol>

## Conclusion

This chapter has examined the implementation of ESD across ten countries, focusing on key components such as schooling systems, policy frameworks, curriculum integration, teacher training, and the role of both formal and non-formal education. The comparative analysis reveals several key patterns and promising practices. Overall, there is a growing international commitment to aligning education with sustainability goals. Many countries have integrated sustainability across subject areas, developed competency-based frameworks, and expanded professional development opportunities for teachers. Non-formal education and community-driven initiatives are gaining prominence, complemented by whole-school approaches and multi-stakeholder partnerships. These developments signal a broader shift toward more holistic, interdisciplinary, and participatory models of sustainability education.

A central concern of this study is the evolving features of ESD, particularly the diverse strategies through which sustainability is embedded across formal and non-formal educational contexts. Rather than treating sustainability as a discrete subject, many systems adopt cross-curricular integration, interdisciplinary and holistic frameworks, and pedagogies that emphasize participation, contextual relevance, and action-oriented learning. Environmental education, values-based approaches, and whole-school strategies also play critical roles in shaping how ESD is enacted.

Building on these developments, several international trends have emerged, including the growth of experiential learning, enhanced youth agency, increased teacher professional development, and strengthened policy and institutional support. Together, these trends reflect a shift toward more inclusive, system-wide approaches to sustainability education. However, persistent challenges remain, including disparities in teacher preparation, curriculum constraints, resource limitations, and fragmented implementation. Addressing both ongo-

ing and emerging barriers will require greater coordination across education levels and stronger partnerships among governments, educators, communities, and civil society to ensure that ESD is coherent, equitable, and responsive to future needs.

Ultimately, while substantial progress has been made in embedding ESD within education systems globally, critical gaps persist, most notably in teacher training, resource allocation, and curriculum coherence. Ensuring the continued relevance and impact of ESD will depend on sustained innovation, robust cross-sector collaboration, and unwavering commitment to sustainability across all levels of education.

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