Education Policy Outlook 2023

EMPOWERING ALL LEARNERS TO GO GREEN

OECD

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BETTER POLICIES FOR BETTER LIVES

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Foreword

The *Education Policy Outlook,* the OECD's analytical observatory of education policy, is a collaborative effort between OECD countries and economies, the OECD Secretariat, and invited organisations, as well as all actors working within participating education systems, to help students achieve their potential.

This report was prepared by members of the Education Policy Outlook Team (Diana Toledo Figueroa [Project Leader], Jonathan James, Christa Rawkins, and Christopher Olivares). Mustafa Saygin also provided analytical contributions and Deborah Nusche provided comments. It was prepared under the responsibility of Paulo Santiago, Head of the Policy Advice and Implementation Division, and Andreas Schleicher, Director for Education and Skills and Special Advisor on Education Policy to the OECD Secretary-General. Ameline Besin provided editorial and administrative support, with valued communications input from Sasha Ramirez-Hughes, Eda Cabbar, Rachel Linden, Duncan Crawford, Kevin Gillespie, Della Shin, and Luisa Constanza.

The preparation of this report was possible thanks to the work undertaken by the Education Policy Outlook (EPO) in its three strands of work—comparative and thematic analysis, country-based work (mainly through the preparation of country policy profiles) and policy dialogue. These act as building blocks to develop, strengthen, and mobilise international knowledge of education policy. The OECD Secretariat is thankful to its EPO National Coordinators and key actors' representative bodies at the OECD—including the Trade Union Advisory Committee (TUAC) and Business at OECD (BIAC)—for their valuable input during the project's activities, which have informed the preparation of this publication.

The Education Policy Outlook comparative reports are the flagship publication of the OECD on education policy. Grounded on extensive research and data analysis, they provide evidence-based insights into international education policy. From 2023, the Education Policy Outlook will also support countries to follow up on the goals established by the ***2022 Declaration on Building Equitable Societies Through Education***. As part of this support, this report continues the Education Policy Outlook's work on responsiveness and resilience since 2020 and provides insights relevant to education actors in 2024 based on priority areas of the *Framework of Responsiveness and Resilience in Education Policy*. The report presents insights from international comparative analysis of relevant and promising policy efforts adopted by participating countries in recent years, predominantly since 2020, to support the transition to greener and fairer societies.

The report also builds on education system's responses to the *Education Policy Outlook National Survey for Comparative Policy Analysis 2023: Empowering All Learners to go Green*, collected mainly between April and August 2023. The 36 education systems participating in this survey are: Australia, Austria, Belgium (Flemish Community, French Community, German-speaking Community), Bulgaria, Chile, Colombia, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Korea, Latvia, Luxembourg, Mexico, the Netherlands, New Zealand, Kazakhstan, Peru, Portugal, Romania, Spain, Sweden, Türkiye and the United Kingdom (England, Northern Ireland and Scotland).

This report was launched at the *Education Policy Reform Dialogues 2023: Building Resilient and Sustainable Societies*, co-hosted with the Ministry of Education and Culture of Finland in the city of Helsinki on 20-21 November 2023. The Education Policy Reform Dialogues, organised annually since 2018, are the leading OECD forum on education policy. Outcomes of the discussions inform the future work of the OECD on education and skills, including the Education Policy Outlook.

Editorial

The commitments outlined in the *2022 OECD Declaration for Building Equitable Societies Through Education* underscore a crucial reality: the imperatives of sustainable and equitable societies are no longer concerns for some distant tomorrow; they are pressing issues for all of us today. For tens of thousands of years, the place of humankind on the planet was a relatively insignificant one. All ancient cultures submitted to the forces of nature. Today, it is the planet and all its species that are dependent on humans for their survival and well-being. As humans, we are now accountable for the well-being and survival of life on earth. Education is key to help us rise to this challenge. It can help us fulfil the balancing act between fostering sustainability, keeping the world we know in balance, and resilience, helping us to live in an increasingly imbalanced world.

For a start, knowledge and skills underpin the green and digital transition. Technological developments are critical to ensure that production and consumption respect planetary boundaries. Investments in green technologies require investing in strong scientific skills of green innovators as well as ancillary skills that ensure the success of large environmental projects – such as leadership and managerial skills. Technology underpins the growth in the service economy and as such, offers growth in employment opportunities for those workers whose existing occupations will be phased out because of changes in production and consumption patterns to meet net zero objectives. Not least, when considering what skills education and training systems should prioritise, artificial intelligence and robotics will most likely play an even bigger role than the green transition in shaping the set of skills individuals will need.

But the role of education goes well beyond that. Education can help us see the bigger picture, make better trade-offs between the present and the future, and between situational values – I will do whatever the current situation allows me to do – and sustainable values that help us align individual and collective well-being. Education also shapes the behaviours that influence political commitments, whether that's financing parties or social activism. It shapes behaviour that impacts local communities, examples are volunteering or community services. It shapes behaviour that influences business practices, such as changes in consumption and lifestyle patterns, personal investment choices or employment choices. And what we do always impacts on others.

Drawing on the insights and goals established in the 2022 Declaration this edition of the *Education Policy Outlook* examines how education policy can empower all learners to go green. It shares analysis and policy experiences of how education systems are working to turn environmental awareness into meaningful and tangible green action, to equip all learners with the skills and experiences required to thrive within the green economy, to understand how the education sector can harness the unique role it can play in this transition. In doing so, this report identifies lessons that draw from successful, innovative practices, and comparative analysis, offering policy pointers to help all learners become the actors of a sustainable future.

Achieving greener, fairer, and better societies has never been more urgent, and education can help make it happen.

Andreas Schleicher

Director for Education and Skills OECD

Special Advisor on Education Policy to the Secretary-General

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Abbreviations and acronyms

AI	Artificial intelligence
BIBB	*Bundesinstitut für Berufsbildung* (Federal Institute for Vocational Education and Training, Germany)
BMBF	*Bundesministerium für Bildung und Forschung* (Federal Ministry of Education and Research, Germany)
CIDEA	*Comités Interinstiucionales de Educación Ambiental* (Inter-Institutional Technical Committees of Environmental Education, Colombia)
DAD	Dynamic Argumentative Delphi
ECEC	Early Childhood Education and Care
EDPC	OECD Education Policy Committee
EQF	European Qualifications Framework
ESD	Education for Sustainable Development
EU	European Union
HEIs	Higher education institutions
ICT	Information and communication technology
IGBE	Improving Gender Balance and Equalities (Scotland)
MEST	Ministry of Education, Science and Technology (Korea)
MYH	*Myndigheten för yrkeshögskolans* (National Agency for Higher Vocational Education, Sweden)
PISA	Programme for International Student Assessment
QVSA	Queensland Virtual STEM Academies (Queensland, Australia)
REIDS	Renewable Energy Integration Demonstrator Singapore
SDGs	Sustainable Development Goals
STEM	Science, Technology, Engineering, and Mathematics
STIP	Science and Technology Internship Program (Canada)
TALIS	Teaching and Learning International Survey
UNDP	United Nations Development Programme
UNFCC	United Nations Framework Convention on Climate Change
UNHCR	United Nations High Commissioner for Refugees
VET	Vocational Education and Training
WHO	World Health Organization
WMO	World Meteorological Organization
YESS	Youth Employment and Skills Strategy (Canada)

Executive summary

Environmental sustainability is a key global megatrend influencing education and training policy in 2024, alongside digitalisation, and equity, inclusion and diversity. There is no inherent trade-off between achieving environmental sustainability and addressing other megatrends. The *Declaration on Building Equitable Societies Through Education* (2022) recognised 'the unique potential' of education 'to build strong foundations for equitable, inclusive, sustainable democratic societies'.

Drawing on the OECD's *Framework of Responsiveness and Resilience in Education Policy* and data for 36 education systems from the *OECD National Survey for Comparative Policy Analysis 2023: Empowering All Learners to go Green* (*EPO Survey 2023*), **three priorities emerge** for policy makers in 2024 to foster greener and fairer societies.

1. Translate learners' environmental awareness into action

Individuals' daily choices can reduce greenhouse gas emissions by 70%. However, many systems are prioritising external factors over learners' internal agency. In the *EPO Survey 2023*, 57% of participating education ministries made encouraging learners to translate environmental awareness into action a top priority, but just 26% focused on developing learners' agency. Education systems are promoting environmental agency through dedicated time and space for active pedagogies, student voice structures, and establishing a culture of collective action.

Some lessons

- Integrate efforts to promote environmental action into formal, pre-existing structures. Changing everyday professional and institutional practice is key. Education systems can incentivise change by integrating related processes for environmental action into existing management, teaching or institutional structures.
- Better clarify and communicate the co-benefits of strengthening environmental agency and engagement. Education systems can build support by emphasising the co-benefits of environmental action for wider outcomes. This requires generating evidence and strategically communicating it to different audiences.
- Expand the scope to nurture environmental action across all education levels and sectors. Education systems should identify where existing school-focused efforts for environmental action can be adapted to include other education levels and sectors. They can develop new efforts tailored to the specific needs of underrepresented parts of the system too.
- Mobilise new cross-sectoral resource streams to foster environmental action at scale. Fostering environmental action requires long-term, resource-intensive efforts. To alleviate education budgets and capitalise on wider expertise, education systems can establish partnerships with and beyond environment ministries.

2. Provide all learners with experiences to help them shape the green economy

Education must go beyond 'green' curricula to support all learners to address real-world problems using diverse disciplines. In the *EPO Survey 2023,* 71% of education ministries prioritised the former; 46% the latter. Some promote transversal competencies through active learning, also focusing on underrepresented groups. Others aim to nurture learning cultures and external partnerships.

Some lessons

- Leverage digital technologies to ensure equal access to practical experiences. Technology can help to provide practical experiences for the green economy in rural or remote areas, such as through online learning for enrichment and work-readiness activities.
- Strengthen coordination and anticipation mechanisms to ensure green skills supply. Addressing skills bottlenecks and ensuring a long-term green supply requires a coordinated strategy. This means working with actors outside education.
- Monitor the impact of green skills interventions on learners' outcomes over time. Education systems can monitor the medium and long-term impact of interventions to generate evidence of what works.
- Engage parents as key partners to challenge stereotypes and misconceptions. Parents and carers are key in supporting learning and nurturing aspirations. Engaging with them as equal partners in learning can help alleviate concerns and challenge misconceptions.
- Strengthen the role of institutional leaders to foster green collaboration and innovation. Leaders need to understand and value the contribution of their institution to the green transition, driving innovation and collaboration within and beyond it. Education systems can offer them dedicated professional learning activities for this.

3. Position education as a strategic sector for the transition to greener societies

Education shapes individuals' behaviours, values, and purpose. It inspires collective action, influences local and global economies, and drives policy agendas. Yet, while 74% of participating education ministries prioritised collaborating with ministries of environment, fewer than 25% reported the same with other key actors (e.g. ministries, industry, business and employers).

Some lessons

- Prioritise elevating the strategic importance of the sector for the transition to greener societies. Policy makers must potentialise education's role in the green transition ensuring high-level political and financial backing to facilitate exchanges with other sectors.
- Align priorities and collaborations by mapping ongoing and desired greening partnerships. Education ministries should map existing and desired collaborations against system-level goals for greater efficiency and impact. With increasing polycrises stemming from climate change, identifying associated priorities is also key.
- Build sectoral capacity to understand the challenges and opportunities of driving transformative change. The education sector must enhance its capacity to comprehend the evidence behind the transition to greener and fairer societies exploring options for training and research and infrastructure, as well as exchanging on knowledge and data.
- Examine which incentives and conditions facilitate collaboration for green transformation. Governments should assess the conditions that hinder or enable education actors' engagement in the transition to greener and fairer societies. This includes revising existing instruments as well as the resources needed.
- Look forward and look backward to ensure broader societal relevance and impact for the green transformation. Enhancing foresight and anticipatory governance mechanisms can help to identify where future collaborations could be most helpful, while evaluating inter-sectoral collaborations can strengthen the relevance and impact of future efforts.

1 Overview

What global changes are expected to drive education in 2024 and for the next few years to come? This chapter provides an overview of key global megatrends (including short-term change and disruption and accelerated longer-term evolutions) influencing education systems in 2024, explaining some of the related implications for the transition towards greener and fairer societies. It will connect these trends to sustainability to explain why reinforcing it through education today is central for societies and economies.

In Brief

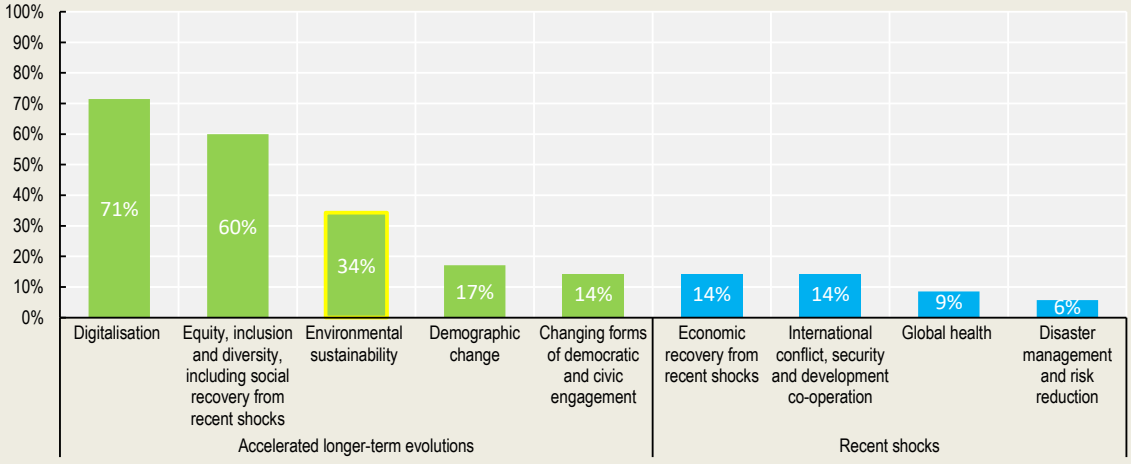
People around the world are already living with the effects of climate change, with global temperatures reaching record levels in 2023 and extreme weather events becoming the 'new normal' (WMO, 2023[1]). The imminent threat that irreversible climate tipping points will soon be crossed calls on individuals, societies and governments to accelerate efforts to reduce carbon emissions and strengthen their resilience to future climate shocks (OECD, 2022[2]; OECD, 2023[3]).

Education and training must prepare people for the social and economic transformations this implies while also responding to the external shocks and longer-term accelerated evolutions that will continue to intersect as they shape the global challenges in 2024 and beyond. **There is no inherent trade-off between achieving environmental sustainability and addressing these megatrends.** Coordinated efforts to strengthen resilience through education and training policy can help policy makers address the different trends affecting the way we live, work and learn as a mutually reinforcing endeavour.

In the *OECD National Survey for Comparative Policy Analysis 2023: Empowering All Learners to go Green (EPO Survey 2023)*, 36 education ministries reported on the extent to which they consider nine global megatrends (including **accelerated longer-term evolutions** and **external shocks**) as a priority for education and training policy in 2024 and for the next 5-15 years, as well as the extent to which their education system was already responding proactively to them in 2023 (see Figure 1.1).

Figure 1.1. Environmental sustainability is among the top three megatrends for education and training policy makers in 2024

Percentage of education ministries identifying a trend as having "very high importance" for education and training policy in 2024



Note: Figure prepared with responses from 35 education systems.
Source: OECD (2023[4]), *Education Policy Outlook National Survey for Comparative Policy Analysis 2023: Empowering All Learners to go Green*.

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Key messages emerge from the analysis of these international megatrends shaping education priorities for 2024 and beyond, for education policy makers to reflect and act upon:

Environmental sustainability is one of three top megatrends that policy makers see as influencing education and training policy, albeit still more for the future than the present. While 46% of participating education ministries reported that environmental sustainability (e.g. climate change and its impacts, transition to net zero and/or a low-carbon economy, sustainable production and consumption) was a priority of very high importance to the short-to-mid-term, only about one-third considered the same for 2024 (34%) or that they were already responding proactively to it to a great extent (38%) in 2023.

Digitalisation stands out as the most important priority for participating education systems, both for today and the future. Some 71% of participating education ministries identified digitalisation as a megatrend of very high importance for education and training policy in 2024, while 77% said it was of very high importance to the short-to-mid-term. The release of ChatGPT in November 2022 and other recent developments in generative artificial intelligence (AI) have drawn attention to the implications of AI for the labour market, but also for the delivery of education and training. This calls on policy makers to ensure that education equips learners with AI-related skills, while being mindful of the environmental impact of these technologies.

Economic recovery was the most important priority related to external shocks for education policy makers. Some 14% of participating education ministries reported that economic recovery from recent shocks (e.g. financial crises, labour market instability, inflation and cost-of-living pressures) was a megatrend of very high importance for 2024 compared to 6% who said the same for disaster management and risk reduction. Despite continuing economic challenges due to inflation and increased debt burdens, governments must persist with targeted investments in education and training to address skills gaps and boost productivity.

Policy makers are currently focused on making their education systems responsive to longer-term trends, but also need to make them resilient to future shocks. The education ministries that participated in the *EPO Survey 2023* gave greater importance to longer-term evolutions such as digitalisation than external shocks such as pandemics and natural disasters. However, as much as promoting responsiveness (about the *important*), building resilience (about the *urgent*) to future shocks, including those exacerbated by climate change, remains vital for education systems' sustainability.

In the same way, education has a crucial role to play in empowering people of all ages and backgrounds for the green transition. The green transition is, above all, an opportunity for economies and societies to rethink and reshape the way they function, so actions taken create a virtuous cycle that brings greater value for the global society over the long-term. However, the knowledge, skills, attitudes, and opportunities people need to shape the green economy and take environmental action today are currently unevenly distributed between population groups, with the most vulnerable often the least empowered to play an active role. If education systems fail to redress this balance, the green transition risks exacerbating existing inequalities in labour market outcomes, and social and democratic participation. Conversely, measures to empower the most vulnerable learners and workers to shape the green transition support the broader aim of building more equitable societies.

Introduction

Populations around the world are already living with the effects of climate change, with global temperatures reaching record levels in 2023 and extreme weather events becoming the 'new normal' (WMO, 2023[1]). The imminent threat that irreversible climate tipping points will soon be crossed calls on individuals, societies and governments to accelerate efforts to reduce carbon emissions and strengthen their resilience to future climate shocks (OECD, 2022[2]; OECD, 2023[3]). Education and training must prepare people for the social and economic transformations this implies while also responding to the external shocks (e.g. economic recovery from recent shocks; international conflict and security) and longer-term accelerated evolutions (e.g. digitalisation, demographic change) that will continue to intersect as they shape the global challenges in 2024 and beyond.

In 2022, governments across the world outlined the vital role that education and training will play in driving the transition towards greener and fairer societies. Through the *Declaration on Building Equitable Societies Through Education*, adopted on 8 December 2022, ministers and representatives of OECD and partner countries recognised 'the unique potential of education starting from early childhood to enable social mobility, reduce inequalities, value diversity and build strong foundations for equitable, inclusive, sustainable democratic societies'. They also outlined their commitment 'to helping learners build skills for a digital, green, inclusive and democratic world that balances the growth of individuals and the economic, social and environmental well-being of societies'. To achieve these goals, the *2022 Declaration* calls on the OECD to support countries 'to foster environmental sustainability through education' and to 'build a new vision for skills development that keeps pace with changes in societies and economies and supports the transition to net zero' (OECD, 2022[5]). As such, this report explores how policy makers can ensure people of all ages and backgrounds acquire the knowledge, skills and attitudes to thrive through and actively shape the transformations needed to adapt to climate change and achieve environmental sustainability.

Indeed, governments face a challenging global context in 2024, and the threat of future disruptions on the horizon means that policy makers must remain focused on climate change mitigation and adaptation while also responding to other short and longer-term priorities. The global economy has shown signs of recovery from shocks such as the COVID-19 pandemic and Russia's full-scale invasion of Ukraine, but many households, businesses, and governments still face economic challenges due to high inflation, stagnant real wages, and increased debt burdens (OECD, 2023[6]; OECD, 2023[7]). While investment in the green economy has the potential to stimulate economic recovery, governments must take steps to ensure their climate policies do not exacerbate existing inequalities and undermine public support for the green agenda. At the same time, the release of ChatGPT in November 2022, and other recent developments in generative artificial intelligence have drawn attention to the implications of trends such as digitalisation for the labour market, but also for the delivery of education and training, and the transition towards greener and fairer societies (Bahroun et al., 2023[8]; OECD, 2023[7]). Coordinated efforts to strengthen resilience through education and training policy can help policy makers address the different trends affecting the way we live, work and learn as a mutually reinforcing endeavour.

This chapter provides an overview of the key global megatrends (including external shocks and disruptions, and disruption and longer-term accelerated evolutions) that will affect the world population in 2024 and in the short-to-mid-term. Drawing on data from the *OECD National Survey for Comparative Policy Analysis 2023: Empowering All Learners to go Green* (*EPO Survey 2023*) and international evidence, the chapter provides an outlook on the importance of these megatrends for participating education ministries for 2024 and the next 5-15 years, and how they connect to the overarching theme of environmental sustainability. Finally, the chapter will make the case for helping learners of all ages, stages and backgrounds to go green in 2024 as means to strengthen their responsiveness and resilience through education policy.

Accelerated trends and recent shocks shape global challenges in 2024 and beyond

What global megatrends matter for education in 2024 and the next few years, and how proactively do education systems consider they are addressing them? Education systems face shocks and disruptions and accelerated longer-term transformations that will influence their capacity to follow up on the goals established by the *2022 Declaration*. Below is a comparative overview of how their priorities come together to help education systems address both what is *urgent* and what is *important*, including on the topic of the transition environmental sustainability.

Achieving environmental sustainability must be a priority today

In the Paris Agreement, signatory countries committed to keep the average global temperature rise this century well below 2°C and as close as possible to 1.5°C above pre-industrial levels. The Paris Agreement has since become the foundation of global action on climate change and respecting it is crucial to avoid crossing potentially disastrous climate tipping points (OECD, 2022[2]; Paris Agreement, 2015[9]). The implementation of countries' subsequent commitments has led to lower global greenhouse gas emissions than projected. However, it is not sufficient—it is estimated that at the current pace, the established climate targets will not meet the Paris goals (OECD, 2022[10]). In 2023, the Northern Hemisphere experienced the hottest month of July on record, with the average global temperature some 0.72°C warmer than the average for 1991-2020 and 1.5°C above the average for 1850-1900. This happened while temperatures around Antarctica and in many South American countries were also well-above average (WMO, 2023[11]; Copernicus Climate Change Service, 2023[12]).

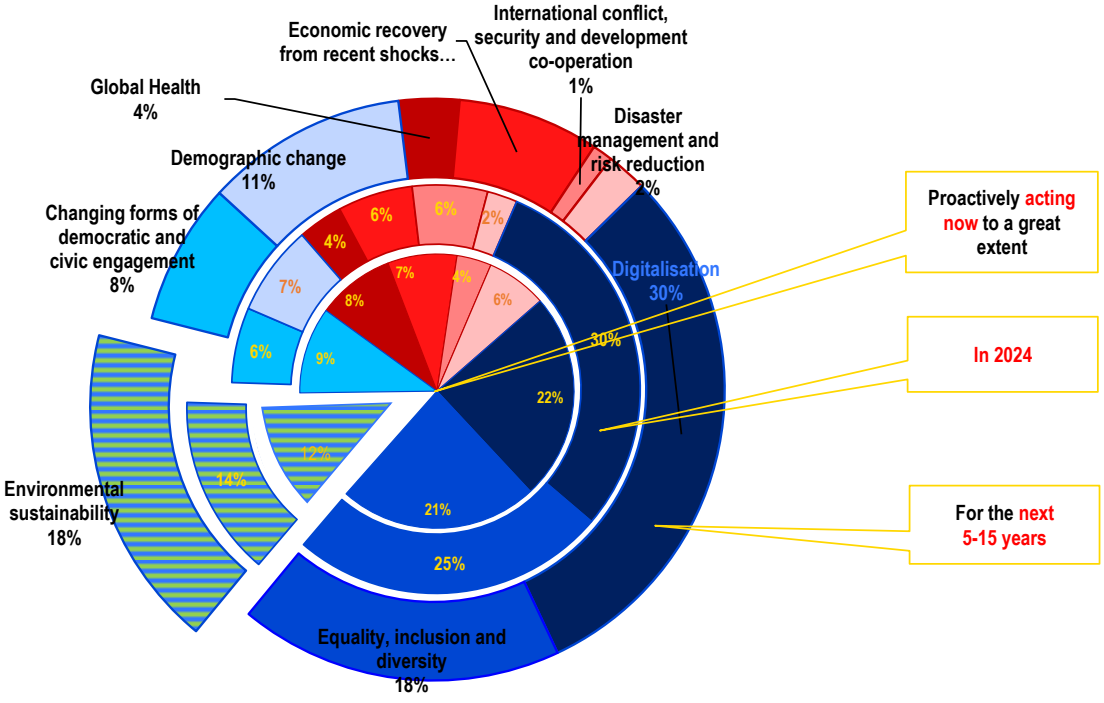
Countries' commitment to fostering environmental sustainability through education in the *2022 Declaration* could therefore not be timelier. Education, training and research have a vital role to play firstly, by supplying the skills for a transition towards a 'low-carbon, resource efficient, and socially inclusive' (or 'green') economy and stimulating the scientific and technological innovations we need to mitigate and adapt to climate change (United Nations Environment Programme, n.d.[13]). Moreover, education can be the engine of the broader societal and behavioural changes required to ensure a resilient transition (OECD, 2023[3]). Climate policies require people to make sacrifices, pose risks to the livelihoods of those working in polluting industries, and often have a disproportionate impact on the most vulnerable. The failure to meet current climate targets suggests that political will and skill need to be further strengthened, while deepening inequalities and the rise of 'Anti-Net Zero' populist movements threaten to further undermine public support for the green agenda (WEF, 2023[14]; Paterson, Wilshire and Tobin, 2023[15]).

Education therefore has a profoundly relevant social role, as it must promote the knowledge, skills, values and mindsets that help people from all backgrounds understand the stakes of the challenges we face and empower them to act. Targeted training measures can also offset some of the distributional impacts of climate policies by ensuring the most vulnerable individuals and communities can thrive through the transition.

Data from the EPO Survey 2023 suggest that policy makers recognise the crucial role of education in driving the necessary transformations for environmental sustainability (see Figure 1.2 and Figure 1.3).

Figure 1.2. Fostering environmental sustainability is a priority for education ministries compared to other global megatrends

Proportion in which education ministries reported each of the nine global megatrends as of 'very high importance' for education and training policy in 2024, for the next 5-15 years, and being proactively acting now 'to a great extent'.



Note: For the list combining accelerated longer-term, and shocks and disruptions, participating education ministries could select only a maximum of three options as of 'very high importance'. Figure prepared with responses from 35 education systems.
Source: (OECD, 2023[4]), *Education Policy Outlook National Survey for Comparative Policy Analysis 2023: Empowering All learners to go Green*.

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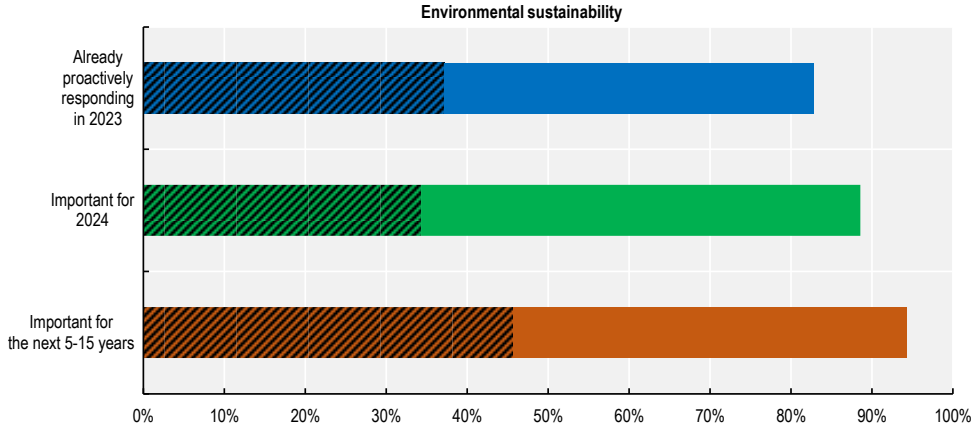
Among these trends, **environmental sustainability** (e.g. climate change and its impacts, transition to net zero and/or a low-carbon economy, sustainable production and consumption) stands out as one of the three megatrends that education systems most often considered as of very high importance. However, responses from participating education ministries also suggest that education systems see environmental sustainability as a priority more for the future than for the present. While 46% of participating education systems reported that environmental sustainability was a priority of very high importance for the short-to-mid-term, only about one-third considered the same for 2024 (34%) or that they were already responding proactively to it to a great extent (38%) in 2023. The **Flemish Community of Belgium**, the **French Community of Belgium**, **Colombia**, **Türkiye**, and **Scotland (United Kingdom)** were exceptions to this trend, who considered to be proactively responding to environmental sustainability to a great extent in 2023 *and* that this was a megatrend of very high importance for 2024 and the short-to-mid-term.

Figure 1.3. Ensuring environmental sustainability is expected to become more important in the future, with room to do more

Percentage of education ministries reporting the megatrend as of 'high' or 'very high importance' in 2024 and the next 5-15 years, and of education ministries reporting that they are already proactively responding in 2023



Note: For '2024' and 'next 5-15 years': the bars show 'high importance' (plain colour) and 'very high importance' (stripes); 'Already proactively responding': the bars show 'to a moderate extent' (plain colour') and 'to a great extent' (stripes). Figure prepared with responses from 35 education systems.
Source: OECD (2023[4]), *Education Policy Outlook National Survey for Comparative Policy Analysis 2023: Empowering All Learners to go Green*

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When asked about the implications of one of the megatrends, about one-quarter (27.8%) of participating education ministries mentioned environmental sustainability. **France, Korea**, **Luxembourg**, **Mexico and Spain**, among others, emphasised the need to promote environmental awareness across the curriculum in school or higher education, and integrating environmental issues with social and economic topics. Comments from **Austria**, the **Flemish Community of Belgium** and **Romania** focused on the need to increase the supply of skills for the green economy and to promote technological innovation.

Adapting to climate change and ensuring environmental sustainability stands out as the most significant challenge facing humanity in the short and long-term. However, recent experiences underline the importance of staying focused on this challenge at the same time as responding to other priorities brought about by both longer-term accelerated evolutions (e.g. digitalisation, demographic change) and external shocks and disruptions (e.g. COVID-19 and other pandemics, international conflict such as the war in Ukraine) that have implications for 2024 and beyond (OECD, 2023[3]).

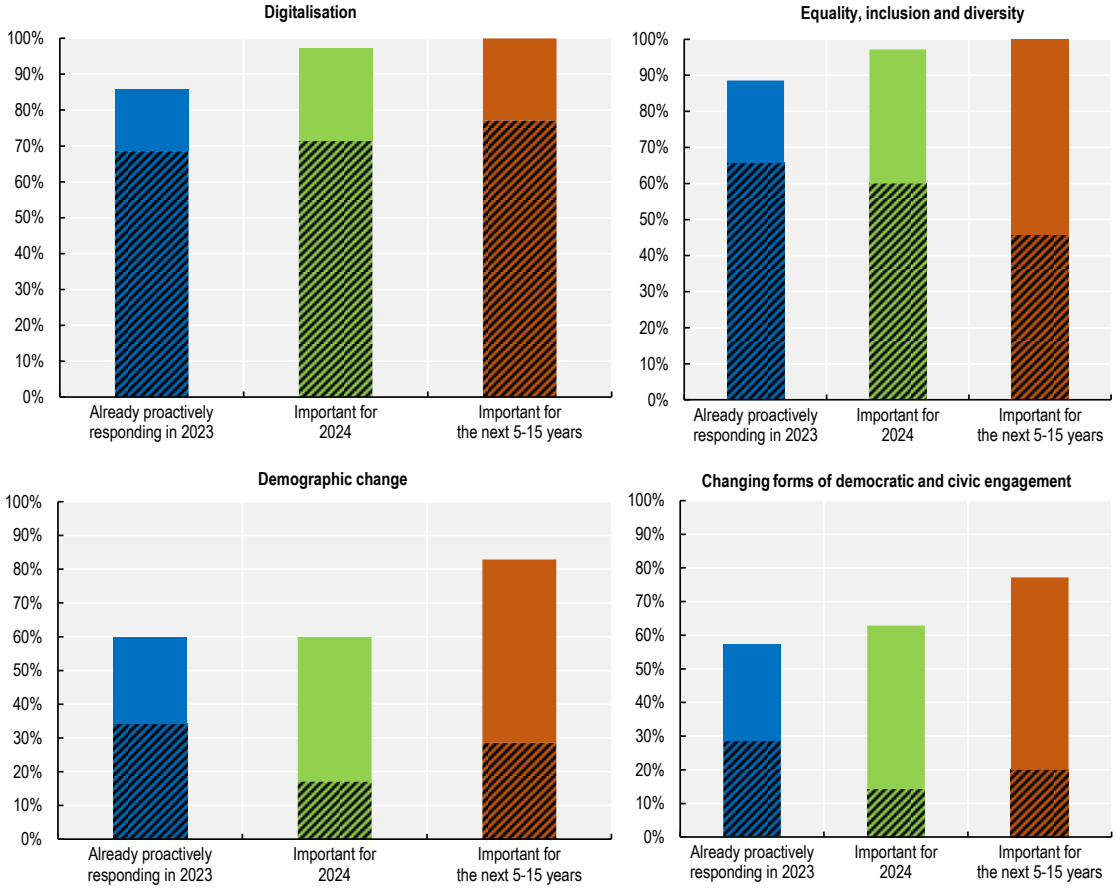
Importantly, governments must ensure that addressing the challenges and opportunities that these global megatrends might bring does not divert resources or attention from the climate crisis. This requires coordinated action to build resilience in individuals, communities and societies, with education and training playing a central role (WEF, 2023[14]).

Building environmental sustainability will require education and training policy to catch up with other accelerated longer-term evolutions

Accelerated longer-term evolutions are expected to continue shaping education and training in the coming years, including efforts of societies to move towards greener and fairer societies. In the *EPO Survey 2023*, accelerated longer-term trends included digitalisation; equality, inclusion and diversity; changing forms of democratic and civic engagement, and demographic change (Figure 1.4).

Figure 1.4. Among accelerated longer-term evolutions, digitalisation and equity will remain key

Percentage of participating education ministries reporting that the following shocks and disruptions are of 'high' or 'very high importance' and of participating education ministries reporting that they are proactively responding in 2023



Note: For '2024' and 'next 5-15 years': the bars show 'high importance' (plain colour) and 'very high importance' (stripes); For '2023: the bars show 'to a moderate extent' (plain colour') and 'to a great extent' (stripes). Figure prepared with responses from 35 education systems.
Source: OECD (2023[4]), *Education Policy Outlook National Survey for Comparative Policy Analysis 2023: Empowering All Learners to go Green*.

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Managing digitalisation is the top priority for participating education systems, both for the shorter term and moving forward, with varied levels of preparedness

Comparing these trends, **digitalisation** stands out as a key priority for education systems in the short and medium-term, as well as the challenges they are already responding to. All participating education ministries identified digitalisation as a megatrend of either very high or high importance (77% and 23% respectively) for education and training policy in the mid-to-long-term (i.e. 5-15 years), and 97% said it was of very high or high importance (71% and 26%) for 2024. This emphasis may reflect efforts to build on the advances in digital education that emerged in many countries during the COVID-19 pandemic. Indeed, some 88% of participating education ministries indicated that they were already responding proactively to digitalisation to a moderate or high extent, indicating that this is an established priority.

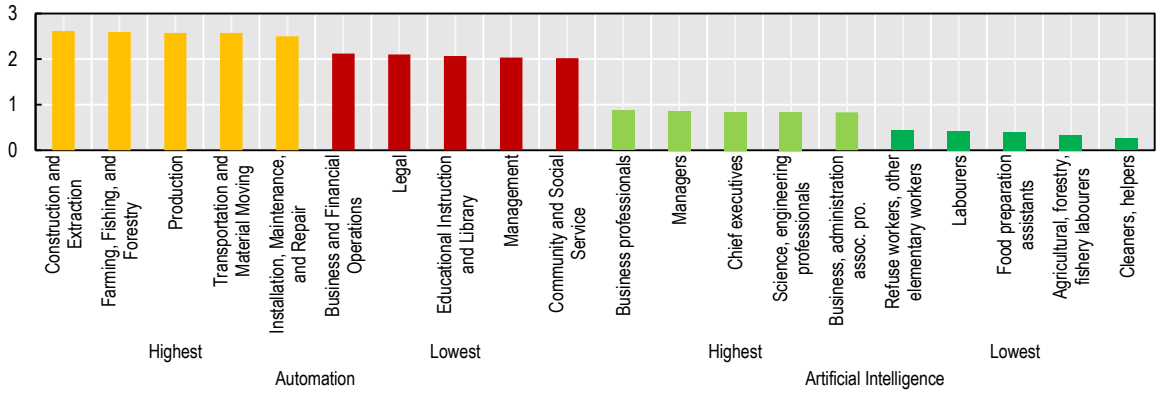
In addition, the past year has seen significant advances in generative artificial intelligence, notably with the release of ChatGPT in November 2022. Recent OECD analysis has found that ChatGPT now outperforms average student performance in reading and science across OECD countries and, more importantly, is advancing at a pace compared to a predominantly stagnant student performance over the last two decades (OECD, 2023[16]). The accessibility of such tools, the increasing range of tasks they can perform and the unprecedented speed at which they are developing have drawn governments' attention to the benefits and risks of AI technologies for economies and societies, but also for education itself.

Recent OECD evidence finds little negative employment effects due to generative AI to date but warns that the range of occupations at risk of automation may grow as AI increasingly performs more of the non-routine, cognitive tasks associated with highly paid jobs that currently require a post-secondary education (OECD, 2023[7]). Accounting for generative AI, one study finds that the occupations at the highest risk of automation account for 27% of employment on average across the OECD countries in the sample (Lassébie and Quintini, 2022[17]). While advances in AI may increasingly place high-skill occupations at risk of automation, however, available evidence suggests that low and middle skilled remain the most at risk. As AI technologies advance exponentially and play an increasing role in different employment sectors, policy makers must also take steps to ensure that education and training pathways equip learners with the skills they need to interact with these technologies and to develop and maintain them.

However, the OECD has found that few national AI strategies in OECD countries include concrete actions to develop these skills and some 40% of employers surveyed by the OECD in 2022 identified a lack of skills as a key barrier to the adaption of AI technologies. The OECD recommends strengthening basic digital skills and AI literacy through secondary education while addressing more specialised AI skills in vocational and higher education and incentivising employers to provide training (OECD, 2023[7]). Furthermore, as AI continues to evolve as part of the digitalisation wave, societies will need to remain mindful of managing the environmental impact of these technologies (see Figure 1.5 and Box 1.1).

Figure 1.5. Automation and AI are expected to affect professions differently

The occupations facing the highest and lowest risk of automation are different from those with the highest and lowest exposure to artificial intelligence



Notes: Occupations are SOC-2 digit (2018). For the occupations facing the highest and lowest risk of automation, the results are based on a survey of experts who evaluated the degree of automatability for 98 skills and abilities. The scale is 0-5 for all occupations. For the occupations with the highest and lowest exposure to artificial intelligence, the y-axis measures the relative exposure to AI scaled such that the minimum is zero and the maximum is five. Figure prepared with responses from 35 education systems.

Source: OECD (2023[7]), *OECD Employment Outlook 2023: Artificial Intelligence and the Labour Market*, OECD Publishing, Paris, https://doi.org/10.1787/08785bba-en.

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Box 1.1 Generative AI: managing educational opportunities and environmental cost

As education policymakers respond to interconnecting global megatrends, an important question needs exploring in 2024: how can education take advantage of the innovation potential of generative AI while being socially *and environmentally* responsible?

What could generative AI mean for education and training?

A recent systematic review has found that generative AI could support students' learning through providing simple explanations of complex concepts or modelling exemplar responses to learning tasks, facilitating students' understanding. It could also support teaching through helping with lesson planning, providing personalised feedback and support or conducting rapid assessments. Finally, there is also scope to enhance teacher training: GPTeach uses ChatGPT to simulate student responses to learning prompts allowing trainee teachers to practice teaching outside the typical practicum (Bahroun et al., 2023[8])

Nevertheless, education must also consider potential negative implications of generative AI, including the challenge to traditional evaluation, assessment and qualification systems, the threat to academic integrity and the shift in skills requirements for today's learners. Moreover, wider concerns regarding privacy and data governance, algorithmic bias and protection of democratic rights and values take on particular meaning in education, especially with regards to non-adult learners.

What is the environmental cost of generative AI?

Beyond the implications for education itself, generative AI comes with a considerable, and thus far somewhat hidden, environmental cost. Recent research reveals the potential scale of generative AI's environmental impact. Generative AI has a considerable carbon footprint.

Energy demand is particularly intensive in the initial training phase; researchers have estimated that developing a technology like Chat GPT-4 or Google PaLM could generate the same amount of CO2 as the average adult would over 60 years. Yet, emissions from training a generative AI model may account for just 10% of its total emissions as ongoing inference processing has a further energy cost. The production of hardware and cloud data centre capabilities also contributes to the total carbon footprint (Kumar and Davenport, 2023[18]). Finally, cooling requirements mean generative AI also consume enormous amounts of water: recent research estimates a single conversation with ChatGPT requires the equivalent of half a litre of water (Li et al., 2023[19]).

The opportunities that artificial intelligence offers education and broader society can be undoubtfully revolutionary. Moving forward, governments will need to assess how to make good and responsible use of it, including in terms of carbon footprint.

Source : Bahroun, Z. et al. (2023[8]), "Transforming Education: A Comprehensive Review of Generative Artificial Intelligence in Educational Settings through Bibliometric and Content Analysis", *Sustainability*, Vol. 15/17, p. 12983, https://doi.org/10.3390/su151712983; Bender, E. et al. (2021[20]), "On the Dangers of Stochastic Parrots", *Proceedings of the 2021 ACM Conference on Fairness, Accountability, and Transparency*, https://doi.org/10.1145/3442188.3445922; Kumar, A. and T. Davenport (2023[18]), *How to make generative AI cleaner*, https://hbr.org/2023/07/how-to-make-generative-ai-greener; Li, P. et al. (2023[19]), *Making AI Less "Thirsty": Uncovering and Addressing the Secret Water Footprint of AI Models*, Cornell University, https://arxiv.org/abs/2304.03271.

Strengthening equity, inclusion and diversity remains a top priority as well for education systems, particularly for the shorter term

In the *EPO Survey 2023*, virtually all participating education ministries identified **equality, inclusion and diversity** (including social recovery from recent shocks) as of very high or high importance for 2024 and for the mid-to-long-term. Some 91% of participating education ministries said they were already responding proactively to this challenge in 2023, suggesting that this may be a more established priority than digitalisation. Compared to digitalisation, however, a smaller proportion of participating education systems identified equality, inclusion, and diversity as a megatrend of very high importance for 2024 (60%) and for the next 5-15 years (46%). This may suggest that although equality, inclusion and diversity may be a more established priority for education systems, many see digitalisation as a more significant priority for the years to come. Recent geopolitical shocks and the ongoing impact of the COVID-19 pandemic have contributed to a cost-of-living crisis that has weighed heavily on low-income households. This seems to justify policy makers' continued concern for promoting equity in education. Recent rises in inflation mean that despite an increase in nominal hourly wages between the first quarter of 2022 and the first quarter of 2023, real wages fell by 3.8% on average across the 34 OECD countries with available data and stood at 2.2% below their pre-pandemic levels at the end of 2022 (OECD, 2023[7]). Since lower income households tend to spend a higher proportion of their income on food an energy, they have been disproportionately affected by the recent squeeze on purchasing power (OECD, 2023[7]).

With the prospect of inflation continuing into 2024 and beyond, and households beginning to experience the impact of interest rate rises implemented since early 2022, the risk that recent shocks will exacerbate existing equalities persists (OECD, 2023[6]; WEF, 2023[14]; ILO, 2023[21]). Although investment in education can help to reduce inequality, many governments will be facing increasing debt burdens as interest rates continue to rise, making it all the more important to target resources towards the learners who will benefit the most (OECD, 2022[22]; OECD, 2023[6]).

Demographic change is expected to significantly gain relevance over the mid-term

Although to a lesser extent, **demographic change** (e.g. ageing societies, declining birth rates, migration patterns) remains an important priority for some education systems. Some 60% of participating education ministries indicated it as a megatrend of very high or high importance for 2024, and a larger proportion (83%) considered this for the short-to-mid-term. Some 62% said they were proactively responding to demographic change to at least a moderate extent in 2023. Implications identified by education ministries for their education system include the impact of a declining school-aged population on staffing requirements, an ageing teacher workforce, or the need to attract new entrants to the profession. Other implications identified refer to the arrival of refugees from Ukraine since 2022, which has made the schooling of refugee children a key priority for some education systems.

Certainly, the continued risk of large-scale involuntary migration related to conflict and climate change means that many countries will face the challenge of integrating newly arrived populations into their education systems while also responding to ongoing demographic changes (WEF, 2023[14]). As of August 2023, the United Nations High Commissioner for Refugees (UNHCR) had recorded some 6.2 million refugees from Ukraine globally, with some 5.8 million recorded in European countries (UNHCR, 2023[23]). Across OECD countries, the number of new asylum applications remained below pre-COVID levels in 2021, but above any figure before 2015 (OECD, 2022[24]). Recent reports by the World Economic Forum and the European Parliament point to the risk of increased involuntary migration in the short- and medium-term, with geopolitical tensions, resource scarcity, and climate change as key drivers (WEF, 2023[14]; European Parliamentary Research Service, 2023[25]).

This underlines the importance of ensuring that education and training systems can provide migrants and refugees of different ages and backgrounds with learning opportunities that meet their needs. This includes as well ensuring adequate resources and equipping teaching staff with the skills they need to teach in

diverse classrooms. While future migration flows are likely to affect countries differently, addressing the fiscal pressures associated with an ageing population and falling birth rates remains a challenge across the OECD. On average across OECD countries, the share of the population aged 65 and above increased from 9% in 1960 to 17.6% in 2021 and is projected to reach 20.65 by 2030 (OECD, 2023[26]; OECD, 2021[27]). As many workers will remain in the labour market for longer than previous generations, education needs to help them to learn, unlearn and relearn throughout their lives (OECD, 2022[28]) .

Changing forms of democratic and civic engagement is seen as important moving forward, but with less current policy action

In a similar vein, while most participating education ministries indicated that **changing forms of democratic and civic engagement** (e.g. political or social polarisation, declining trust, populism, mis- and disinformation or digital activism) were an important concern for the future, fewer considered to be already actively responding to this trend. Some 77% identified this as a megatrend of very high or high importance (20% and 57% respectively) for the short-to-mid-term, while fewer (63%) said this was a trend of very high or high importance (14% and 49% respectively) for 2024. Moreover, only 59% said they were proactively responding to this trend to a great (29%) or moderate (29%) extent in 2023. As was the case for demographic change, changing forms of democratic and civic engagement appears as an important priority on the horizon for many education systems, but one that is not currently driving reform in all cases.

Yet, this is a topic that greatly matters today, particularly among those facing economic distress and youth. Data from the 2021 OECD Survey on Drivers of Trust in Public Institutions underscore the relationship between economic vulnerability and people's trust in government. On average across the countries surveyed, only 34.6% of respondents who reported financial concerns indicated that they trusted their government, compared to 51.2% of those with fewer financial worries. Younger people were also less likely to trust their government; some 36.9% of 18-29 year-olds on average reported that they trusted their government compared to 45.9% of people over 50. At the same time, some 53.4% of those who were confident in their own ability to participate in politics had trust in their national government, compared to 31.5% of those with low confidence in their ability to participate (OECD, 2022[29]). Going forward to 2024, a continued cost-of-living crisis risks further fuelling mistrust and polarisation.

Education can play a key role in strengthening citizenship, by showing learners how they can affect decision making within their institutions and communities as well as at the national level. The evolving climate crisis shines light on the ways in which people of all ages are engaging in politics, both through established institutions and through emerging mechanisms (see Box 1.2).

Box 1.2. The climate crisis and civic or political engagement

As the urgency of the climate change crisis increases, civic or political engagement channels emerge that include institutional structures for participation in environmental matters, environmental litigation, environmental activism, but also "climate backlash". Understanding their motivations, mechanisms, needs, and outcomes is important for policy makers. This can enable a more efficient and better-informed collaboration towards advancing the transition towards greener and fairer societies.

- Institutional structures for participation in environmental matters have emerged internationally and nationally for young people over the last decade. Since 2011, YOUNGO has provided representation for young people (up to 35 years) and youth organisations as an official constituency of the United Nations Framework Convention on Climate Change. In Germany, YoupaN (2017), the national youth panel supporting the implementation of the National Action Plan Education for Sustainable Development (ESD) sponsored by the Federal Ministry for

Education and Research, represents youth on each of the six national ESD platforms and provides financial support to selected youth-led projects.

- At the same time, environmental litigation efforts are increasing internationally and often have an important youth presence. By 2023, over 30 cases had been brought by and on behalf of people younger than 25, internationally. Cases typically focus on the specific vulnerability of young people to climate harm and insufficient efforts by those in power to implement mitigation and adaptation measures. Recent analysis of climate litigation globally finds that around 55% of cases have had a favourable interim or final decision (Setzer and Higham, 2023[30]).
- The last five years have also seen a surge in environmental activism across the world. This includes youth-led initiatives. For example, by 2023, the #FridaysForFuture movement (2018), inspired by Greta Thunberg's protests in Sweden, has mobilised young climate strikers in over 200 countries. The movement calls for global adherence to the Paris Agreement and for global warming to be kept under 1.5°C. Extinction Rebellion, which includes an autonomous youth wing for activists under 30, has also grown internationally in this time. These movements rely on digital tools and social media to organise and use new forms of digital activism.
- Finally, there is a so-called climate backlash fuelling (and fuelled by) new forms of political engagement. For example, in 2018-19, France's Yellow Vest movement saw sustained nationwide and often violent protest in opposition to a planned carbon tax initiative. Research indicates that social media was crucial in the emergence and maintenance for the movement, allowing activists to coordinate but also to exchange information, and to shape the identity of the cause (Morselli et al., 2023[31]). In some countries, climate backlash and populist politics are increasingly entwined as, to varying degrees, populist movements promote ideas of climate scepticism and climate conservatism. As an increasingly adversarial tone emerges around climate change in some countries, disinformation abounds (Lewandowsky, 2021[32]).

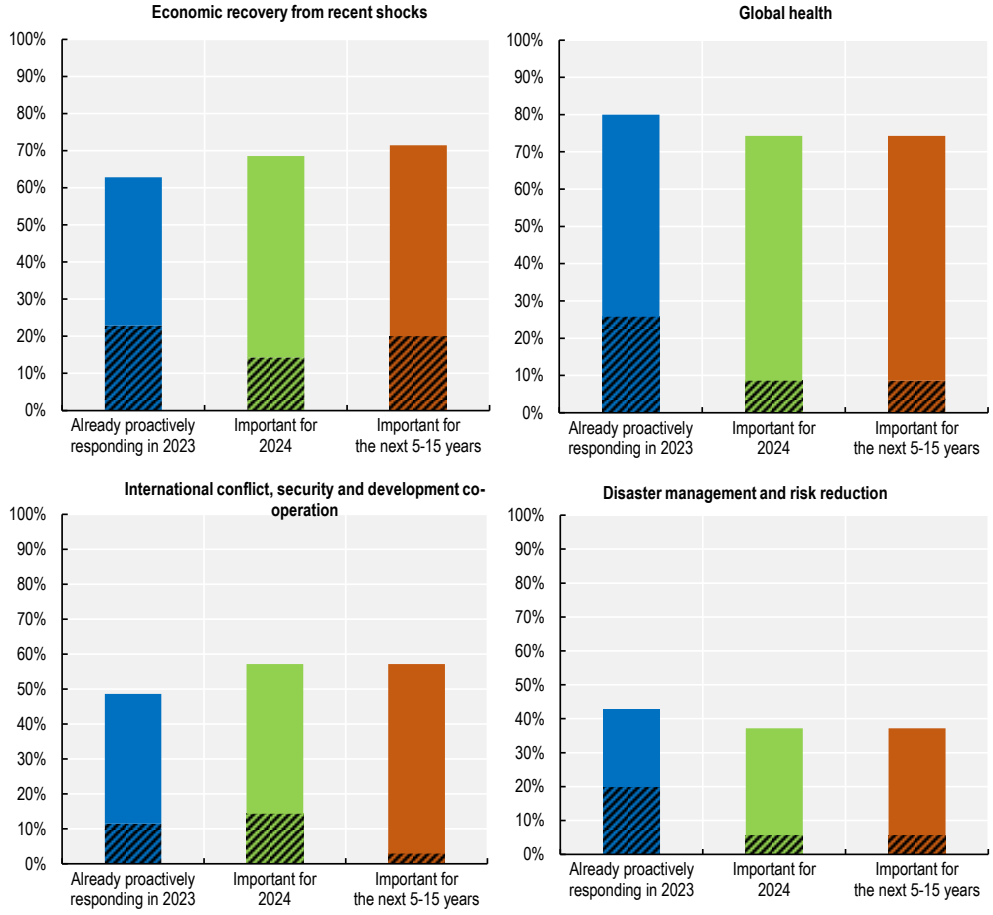
Source: Lewandowsky, S. (2021[32]), "Climate Change Disinformation and How to Combat It", Annual Review of Public Health, Vol. 42/1, pp. 1-21, https://doi.org/10.1146/annurev-publhealth-090419-102409; Morselli, D. et al. (2023[31]), Digital Traces of Collective Identities: The Case of the Yellow Vests in South-East France, https://files.osf.io/v1/resources/uams7/providers/osfstorage/62a6f7abf79aac128a5a1009?action=download&direct&version=1 (accessed on 14 August 2023); Setzer, J. and C. Higham (2023[30]), Global trends in climate litigation: 2023 snapshot, https://www.lse.ac.uk/granthaminstitute/wp-content/uploads/2023/06/Global_trends_in_climate_change_litigation_2023_snapshot.pdf (accessed on 14 August 2023.

But recent shocks will continue to pose a challenge for societies in 2024 and beyond

Of the recent shocks identified by the *EPO Survey 2023*, economic recovery from recent shocks (e.g. financial crises, labour market instability, inflation and cost-of-living pressures) and global health (e.g. global pandemics, well-being agenda) emerge as key priorities for participating education ministries and are therefore likely to continue driving policy reform for them, along with other megatrends (see Figure 1.6).

Figure 1.6. Among shock-related megatrends, economic recovery and global health will remain key

Percentage of participating education ministries reporting that the following shocks and disruptions are of 'high' or 'very high importance' and of participating education ministries reporting that they are proactively responding in 2023



Note: For the list combining accelerated longer-term and shocks and disruptions, participating education ministries could select only a maximum of three options as of 'very high importance'. For '2024' and 'next 5-15 years': the bars show 'high importance' (plain colour) and 'very high importance' (stripes); 'Already proactively responding': the bars show 'moderately' (plain colour') or 'to a great extent' (stripes). Figure prepared with responses from 35 education systems.

Source: OECD (2023[4]), *Education Policy Outlook National Survey for Comparative Policy Analysis 2023: Empowering All Learners to go Green*.

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Economic recovery remains modest and fragile, and skills shortages and lower productivity and population ageing may slow it further down

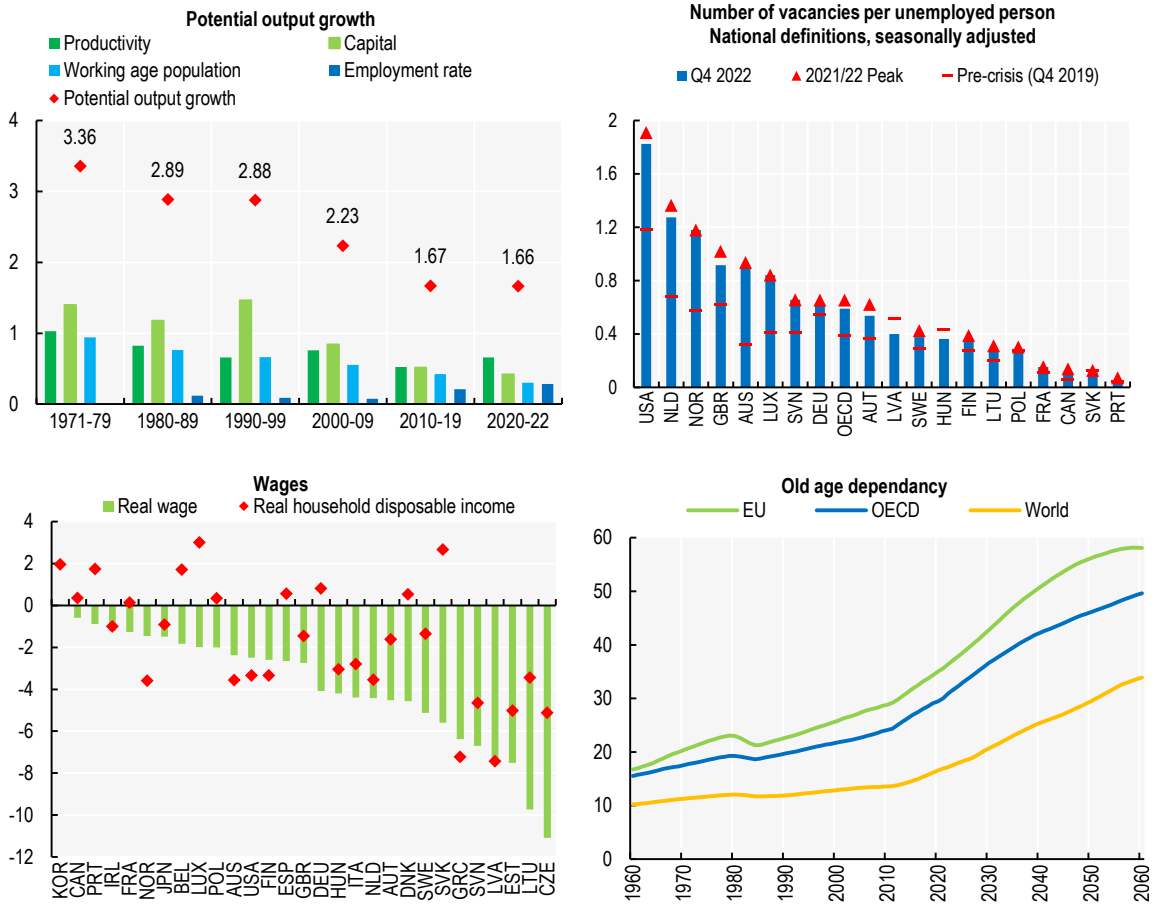
Participating education systems placed significant importance on **economic recovery from recent shocks**, with 69% reporting it of very high or high importance for 2024 (14% and 54% respectively) and a slightly larger share (71%) indicating it was of very high or high importance (20% and 51% respectively) for the short-to-mid-term (i.e. 5-15 years). Yet, fewer (65%) reported that they were proactively responding to this challenge to a great or moderate extent (24% and 41% respectively) in 2023. This may reflect the relatively more favourable economic conditions the world has seen in 2023, with a slight fall in energy and food prices and the easing of supply bottlenecks (OECD, 2023[6]).

While the global economy is showing signs of a recovery from recent shocks, this recovery remains modest and somewhat fragile, with implications for learners and education systems. The OECD projects global GDP to increase by 2.7% in 2023 and by 2.9% in 2024, but these projections remain below pre-pandemic levels. With the tightening of monetary policy since 2022 beginning to bite, governments, businesses, and households across the world will be facing higher debt burdens in 2024 and the risk of continued inflation persists (OECD, 2023[6]; WEF, 2023[14]).

Labour markets also remain tight. On average across the 19 OECD countries with available data, the number of vacancies per unemployed person has decreased from its 2021 peak but was significantly higher than before the COVID-19 crisis (OECD, 2023[7]). Several countries and employment sectors risk facing shortages of qualified labour in the years to come (OECD, 2023[7]; ILO, 2023[21]). Although governments across the world will be facing constrained economic circumstances in 2024 and beyond, targeted investments in education and training will be needed to address longstanding challenges such as skills bottlenecks, sluggish productivity growth, and population ageing (see Figure 1.7).

Governments can optimise these investments by targeting priority sectors—such as those related to the green economy—and focusing re- and upskilling efforts on groups with low employment (e.g. young people, older workers, women, minorities, low-skilled workers) (OECD, 2023[6]; ILO, 2023[21]; OECD, 2022[28]).

Figure 1.7. Economic recovery risks facing some bottlenecks due to lower productivity and incentives, with increased disadvantage



Sources: OECD (2023[6]), *Economic Outlook, Volume 2023 Issue 1*, No. 113, OECD Publishing, Paris, https://doi.org/10.1787/ce188438-en; OECD (2023[7]), *OECD Employment Outlook 2023: Artificial Intelligence and the Labour Market*, OECD Publishing, Paris, https://doi.org/10.1787/08785bba-en.

StatLink https://stat.link/bkup0z

Global health has been an area of extensive action that made the end of the pandemic possible but, moving forward, climate change will require it to adopt a new angle

Participating education ministries see the importance of **global health** as remaining stable in 2024 and the years to come, with 74% of participating education systems indicating that this was a megatrend of either very high or high importance for education and training policy in 2024 (9% and 66% respectively), and the same proportion reporting that it was of very high or high importance for the short-to-mid-term. Similarly, some 82% indicated that their education system was already proactively responding to global health to a great or moderate extent (26% and 56% respectively) in 2023. When asked to describe the implications of one of the megatrends for their education system, few education ministries cited priorities relating to global health, although several related the impact of the COVID-19 pandemic to other trends such as digitalisation, equity, and early school leaving. Only 1 of the 36 participating education ministries referred to the potential impact of future pandemics on education, suggesting this may be a blind spot among policy makers.

Indeed, although 2023 saw the World Health Organization (WHO) declare that COVID-19 is no longer public health emergency of international concern, the organisation warns of its lasting effects on mental health and the increasing risk of future pandemics (WHO, 2023[33]). The European Union has also identified a decline in mental health among young people as one of 15 key risks facing member states in the coming years, citing COVID-19 alongside drivers such as the Ukraine conflict, a poor economic outlook and climate anxiety (European Parliamentary Research Service, 2023[25]). Approaching this challenge with an equity lens will also be important: alongside emerging research into climate anxiety, the literature also projects that climate change will aggravate existing mental health risk factors, disproportionately impacting the disadvantaged and the vulnerable (Gislason, Kennedy and Witham, 2021[34]).

Data from the 2021/22 round of the WHO's Health Behaviour in School-Aged Children survey paint a somewhat mixed picture of the impact of COVID-19 on young people. While 30% of adolescents on average across the countries in the survey reported that the pandemic had a negative effect on their mental health and well-being, 32% reported a positive impact. However, this data masks differences between countries, regions and population groups. For example, girls reported higher levels of negative impacts compared to boys, and the same happened for 15-year-olds compared to 11-year-olds. The WHO recommends that countries continue to monitor the impact of the pandemic on mental health and well-being and use evidence to tailor support to the needs of different groups (WHO, 2023[33])

Countries can support young people's resilience to future health crises by strengthening protective environments in education institutions, families and among peers (WHO, 2023[33]). In addition, to combat climate despair specifically, research highlights a need to generate a sense of hope among young people. This can be fostered through strengthening their sense of agency and understanding of ways to impact change and is also important in promoting pro-environmental behaviour (see Chapter 3) (Stevenson and Peterson, 2015[35]).

International conflict, security and development co-operation challenges will continue to require some education systems to urgently support populations from all ages and backgrounds

Aspects related to **international conflict, security and development co-operation** also emerge as important priorities for the future among education systems, even if fewer were proactively responding to this trend in 2023. Some 57% of participating education systems reported that this was a megatrend of very high or high importance (14% and 43% respectively) for 2024 and the same proportion said it was of very high or high importance (3% and 54% respectively) for the short-to-mid-term. However, only half (50%) said they were already proactively responding to international conflict, security and development

co-operation to a great (12%) or moderate (38%) extent in 2023. This may reflect the fact that international conflict and security issues affect different countries in different ways.

Indeed, the education systems that reported that this was a trend of very high importance for 2024 and/or that they were responding to this trend to a great extent in 2023 (**Estonia, Germany, Ireland, Latvia, Romania, and Türkiye**) are close to conflict zones such as Syria and Ukraine and had welcomed large numbers of refugees. The fact that most education systems see this as an important priority for the future points to their awareness of the risk of further conflict on the horizon, as well as the risk that ongoing conflicts pose to the global economy.

The OECD has warned that the aggravation or spread of the conflict could lead to another spike in food and energy prices and a subsequent increase in inflation (OECD, 2023[6]). The World Economic Forum's Global Risks Report 2023 projects that future interstate confrontation will be mostly economic in nature, but other sources point to the risks posed by continued geopolitical tension between the USA and China, with some predicting a slowing of trade between China and an increasing number of Western democracies in the period 2023–2027 (WEF, 2023[14]; Economist Intelligence Unit, 2023[36]; European Parliamentary Research Service, 2023[37]). These geopolitical risks have implications for the global economic outlook, and the prospect of military conflict leading to the displacement of peoples means that integrating refugees of different ages and backgrounds will remain a priority for education systems.

More recently, a war started in Israel and the Gaza Strip on 7 October 2023. Beyond the immense human loss, implications of the conflict for the region and the global economy were still unclear at the moment of preparing this report. Early considerations refer to possible effects on the price of commodities, including energy prices, with a potential further increase in oil prices.

Disaster management and risk reduction appear of importance to fewer education systems, but climate change is likely to increase its relevance to others

Compared to the other recent shocks and longer-term accelerated evolutions identified by the OECD, **disaster management and risk reduction** received less attention as a priority for education and training. Only 37% of participating education systems reported that this was a megatrend of very high or high importance (6% and 31% respectively) for 2024, while the same share said it was of very high or high importance (6% and 31%) for the mid-to-long-term. Some 21% said they were proactively responding to this trend to a great extent in 2023, however, suggesting this is an urgent priority for a significant minority of education systems. As was the case for international conflict, security and development co-operation, these responses may reflect countries' varying experiences of disasters in recent years and their sense of vulnerability to future events. Education systems that reported this were proactively responding to this trend in 2023 include **Türkiye** and **Chile**, who have recent experiences of devasting earthquakes.

However, in a context where climate change is contributing to more frequent extreme weather events across the globe, preparing for future disasters must remain an important priority for *all* education systems. In 2023, populations around the world once again faced heatwaves and heavy rainfall, with experts from the World Meteorological Organization (WMO) declaring that such extreme weather events are 'the new normal' (WMO, 2023[1]). WMO figures indicate that the number of disasters has increased by a factor of 5 over a period of 50 years; while 711 disasters were recorded in the period 1970-1979, some 3 536 were recorded in 2000-2009.

Reported economic losses due to weather, climate, and water extremes have also increased from USD 49 million on average per day during the decade 1970-1979 to USD 383 in 2010-2019 (WMO, 2021[38]). OECD foresight scenarios for the period 2030-2050 also envisage a world where most citizens will have experienced at least one severe weather event as the planet crosses multiple climate tipping points (OECD, Forthcoming[39]). Climate disasters threaten to disrupt education delivery in similar ways to the COVID-19 but pose additional risks to infrastructure such as educational buildings. This calls on policy

makers to strengthen emergency planning and resilience at system-level and within institutions by ensuring that professionals can adapt to change and addressing vulnerabilities highlighted during the pandemic.

Making the case for helping learners of all ages, stages and backgrounds to go green in 2024

Policy makers must act now to empower individuals of all ages and backgrounds to shape a low-carbon, resource efficient economy and take informed action in their homes, communities, and as national and global citizens. There is no trade-off between addressing the biggest challenge facing people and the planet, and responding to other external shocks and long-term evolutions, especially since these will only become increasingly interdependent.

Transitions to greener and fairer societies can help address other ongoing challenges

In the *2022 Declaration*, ministers and representatives of OECD countries recognised 'the unique potential of education starting from early childhood to enable social mobility, reduce inequalities, [and] value diversity'. They also outlined their commitment 'to empowering all learners, with a focus on the most vulnerable in our societies, to develop the knowledge, skills, attitudes and values to fulfil their potential and contribute to the economic and social well-being of their societies'. Promoting a transition towards greener and fairer societies can help education systems realise this potential. However, the knowledge, skills, attitudes, and opportunities people need to **shape the green economy** and **take environmental action today** are currently unevenly distributed between population groups, with the most vulnerable often the least empowered to play an active role.

In PISA 2018, the share of students displaying pro-environmental attitudes, which were a good predictor of environmental action, was 23 percentage points higher among socio-economically advantaged students than among disadvantaged students. These findings are especially concerning given that while disadvantaged students are at greater environmental risk than their advantaged counterparts, they are currently less well equipped to take action to mitigate these risks (OECD, 2022[40]).

OECD analysis also suggests that the share of green-task jobs (jobs involving at least 10% of tasks that support environmental goals) varies significantly between regions within countries. On average across OECD countries with available data, there is a 7 percentage point difference in the share of green-task jobs between the top and bottom regions, with capital regions often having the highest share (OECD, 2023[41]). Workers with higher levels of education seem to have benefitted most from green labour market opportunities while those with lower attainment are more likely to work in polluting jobs and are at greater risk of displacement as economies transition. Like those threatened by other trends such as automation, people working in polluting industries are also less likely to participate in education and training (OECD, 2023[41]; McGrath and Powell, 2016[42]; OECD/Cedefop, 2015[43]; Ranworth, Wykes and Bass, 2014[44]).

Furthermore, in many countries, the workforce in key sectors such as science and engineering does not reflect the diversity of the population. Groups such as girls and women, minorities, and young people from disadvantaged backgrounds are less likely to pursue studies or careers in these fields (Goos et al., 2020[45]; LaForce et al., 2016[46]; Bowser and Cid, 2021[47]; Wolfe and Riggs, 2017[48]; Marginson et al., 2013[49]). In the Programme for International Student Assessment (PISA) 2018, for example, only 14.3% of girls on average across OECD countries who had attained a high-level proficiency in mathematics or science (PISA proficiency Level 5 or 6) and a Level 2 of proficiency in all three core PISA subjects (reading, mathematics and science) reported that they expected to work as science or engineering professionals at the age of 30, compared to 26.3% of boys (OECD, 2019[50]).

If education systems fail to redress this balance, the green transition risks exacerbating existing inequalities in labour market outcomes, and social and democratic participation. Conversely, measures to empower all

learners and workers across their lifecycles to shape the green transition support the broader aim of building greener and fairer societies.

Supporting environmental sustainability requires education systems to move beyond curriculum in 2024

Data from PISA 2018 point to a need to strengthen learners' scientific knowledge of environmental issues and their related skills, notably their understanding of climate mitigation and adaptation measures. For example, although some 70% of 15-year-olds on average across the 26 countries with available data were able to correctly identify that reducing greenhouse gases is a long-term solution to climate change, some 40% misrecognised building sea defences such as dams and sea walls as a long-term response. Addressing short-term skills gaps and the long-term needs of the green economy will also require governments to introduce new courses and review existing content at all education levels.

In the same way, data from the *EPO 2023 Survey* also indicate that education systems recognise the need for further action in the area of curriculum. Some 71% of participating education ministries reported that adapting the curriculum/training offer to equip learners with key knowledge, skills and attitudes for the green economy and/or environmental awareness and environmental action was considered a priority for attention 'to a great extent' in the next five years (2024-2028). When asked to indicate which areas of the curriculum and training offer were key priorities, the largest share of participating education systems reported that improving/innovating science, technology, engineering and mathematics (STEM) education (e.g. increasing the focus on the interactions between ecological systems and social systems) (80%) and introducing/strengthening the teaching of sustainability issues as a cross-curricular subject (76%) were priorities 'to a great extent' for the next years (2024-2028).

International evidence suggests that most school curricula around the world include environmental and climate change education, and that higher education institutions are increasingly looking into environmental sustainability through specialised courses or cross-curricular themes (see Box 1.3). Comprehensive curriculum frameworks can promote the scientific and environmental knowledge and skills learners will need to act in their professional and personal lives, and in the public and political sphere. Ensuring that initial education curricula define the goals to empower learners to thrive in the green economy and nurture environmental action is a key step towards achieving environmental sustainability, but it is by no means the only step required.

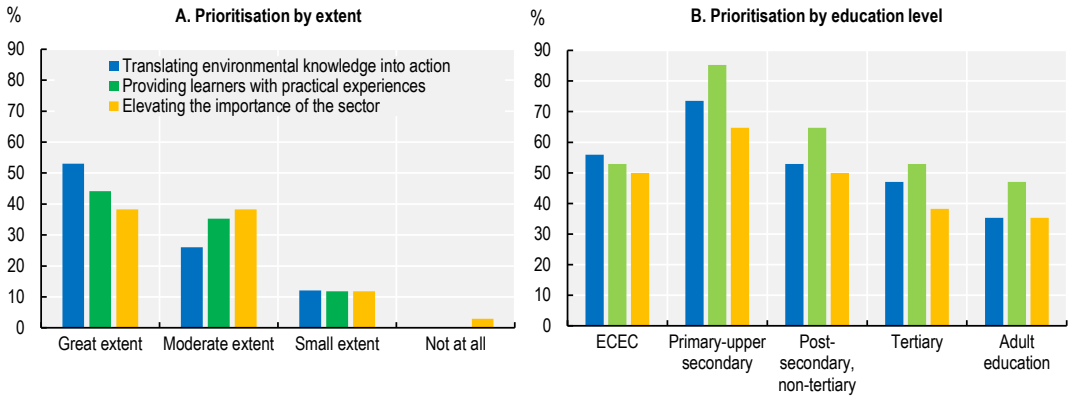
A key message that emerges from the evidence on environmental knowledge and attitudes and areas such as STEM is that *how* learners learn may be more important than *what* they learn. This means that simply embedding more 'green' content or introducing new 'green' courses is not enough to ensure learning translates into action. In PISA 2018, the difference in the share of environmentally enthusiastic students who attended schools where the curriculum addressed climate change compared to those who did not (2.3 percentage points) was smaller than might be expected. Since climate education was almost universal among the schools in PISA, the variation in pro-environmental attitudes may be better explained by differences in the way curricula are implemented within and between countries. The literature points to a need to promote transformative teaching and learning experiences that equip learners with the competencies they need to face a complex an uncertain future (OECD, 2022[40]).

On this note, some 83% of participating education ministries reported in the *EPO 2023 Survey* that providing learners with practical experiences that help them apply and further develop key knowledge, skills and attributes for the green economy is considered a policy priority to a great or moderate extent (46% and 37%, respectively) for the period 2024-2028. The same share of education ministries reported that encouraging learners to translate environmental awareness into action today was a priority at least to a moderate extent, although a larger proportion (57%) indicated that this was a priority to a great extent.

While some 80% of education ministries participating in the survey indicated that elevating the importance of the education sector in governmental efforts to transition to greener and fairer societies is considered a policy priority to at least a moderate extent, fewer than half (43%) gave it the highest priority level. Taken together, these responses suggest that although policy makers recognise the important role that *learners* will play in the transition towards greener and fairer societies, they still need to give more consideration to the role of *the education sector* in driving the necessary transformations. Elevating the importance of the sector is critical to enable policy makers to effectively move from policy design to policy impact (see Figure 1.8).

Figure 1.8. Education systems tend to value learner-centred priorities and prioritise, with a focus on school-aged learners in the transition towards greener and fairer societies

Percentage of participating education systems reporting key policy areas as priorities for the next 5 years, by extent and education level



Note: Figure prepared with responses from 35 education systems.
Source: OECD (2023[4]), *Education Policy Outlook National Survey for Comparative Policy Analysis 2023: Empowering All Learners to go Green*.

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In the same way, education systems need to go beyond a schools-based focus to provide greater support to individuals in post-secondary non-tertiary, tertiary and adult education. Upskilling and re-skilling the adult population to address skills bottlenecks in sectors related to the green economy is essential in achieving environmental sustainability, but also fairer societies.

In the *2022 Declaration*, education ministers from OECD member and partner countries called on governments to go beyond embedding environmental sustainability in the curriculum, and to strengthen student agency to act on environmental challenges adopting a lifelong learning perspective. This report supports policy makers in providing learners with the *experiences* that will help them achieve this.

Education thus has a crucial role to play in empowering people of all ages and backgrounds for the green transition in 2024

The *2022 Declaration* recognises the "unique potential" of education to contribute to establishing the foundations of the social and economic transformations that countries and economies seek to achieve. In 2024, and in the context of the global megatrends that are most preoccupying education policy makers, this includes building greener and fairer societies, as well as thriving digital and sustainable economies.

With its broad and comprehensive reach from the earliest age, the education sector is a key enabler for transformative change in this direction.

Across countries, as mentioned above, education systems have undertaken remarkable efforts in embedding green content in their curriculum frameworks. The aim of this report is therefore to support education systems to move beyond curriculum into making learning content impactful in the lives of people, their communities and at systemic level overall, for greener and fairer societies. For this reason, curriculum reforms as such are not part of the scope of analysis, but rather, the report focuses on related efforts to bring it to life.

Education systems need to seek to empower groups of all ages, including disadvantaged students, girls, migrants, refugees and indigenous learners to become agents of change in their own communities and beyond (see Chapter 2 – Translating learners' environmental awareness into action). Furthermore, as part of the many ways in which education can contribute to these transformations, education and training systems have conducted assessments of how processes such as the decarbonisation of the economy will affect different population groups and used these to target initiatives at those at risk of being left behind. Other interventions combine active learning experiences with mentoring or careers activities to encourage people from underrepresented groups to key sectors, often starting with the youngest learners (see Chapter 3 – Providing all learners with experiences to help them shape the green economy). The benefits of these measures go beyond the immediate impact on the green economy. For example, creating a more diverse STEM workforce can help to eliminate cognitive biases in these fields and ensure that innovations meet the needs of different groups equally.

However, as well as supporting learners to have agency in their own experiences of the transition to greener and fairer societies and in those of their communities, the education sector itself must be empowered to deliver on its strategic importance for transformative change. Education actors need the political will and skill to collect powerful evidence, to support the right audiences to engage with that evidence, and to collaborate with them and others to action the evidence for strategic change (see Chapter 4 – Positioning education as a strategic sector for the transition to greener societies).

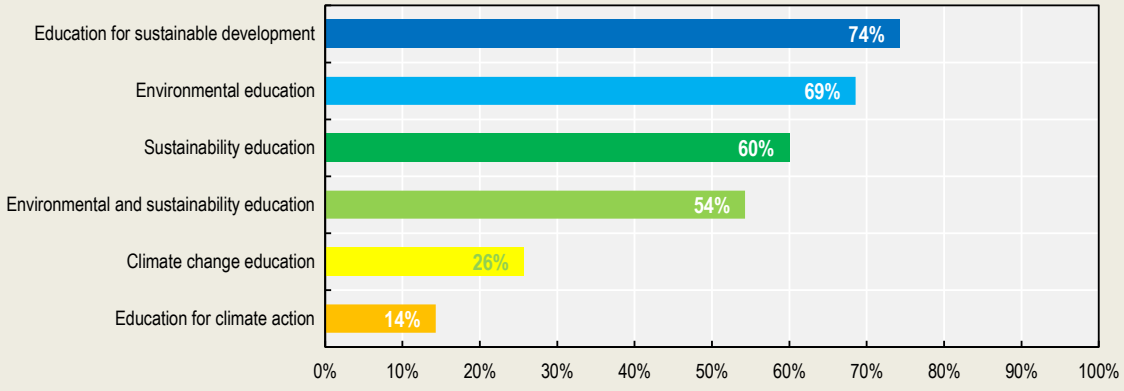
This report uses the terms 'education for sustainable development' and 'transition towards greener and fairer societies' to encompass efforts to equip learners of all ages and backgrounds with key knowledge, skills, and attitudes for the **green economy** and for individual and collective **environmental action**. Following the United Nations Environment Programme definition, the report understands the green economy as 'one that is low in carbon, resource efficient, and socially inclusive' (United Nations Environment Programme, n.d.[13]). Environmental action involves people exercising their agency to act for a better environment in the public or private sphere (OECD, 2022[51]). It often requires scientific knowledge and pro-environmental attitudes (OECD, 2022[40]) (see Box 1.3).

Box 1.3. Speaking a common language to build greener and fairer societies

National governments, international organisations, and education researchers have used a wide range of terms to describe efforts to promote greener and fairer societies through education. International organisations such as UNESCO and the OECD have used the term **education for sustainable development**, and data from the *EPO Survey 2023* indicate that this is one of the most used terms among education systems (UNESCO, n.d.[52]). Some 74% of participating education systems indicated that they used 'education for sustainable development' to refer to 'education policies that support the development of 'green' knowledge, skills, attitudes, and actions'. Education for sustainable development is generally understood to encompass broader social themes such as human rights and equity as well as those directly related to environmental sustainability (see **Error! Reference source not found.**).

In the agenda for the Meeting of the OECD Education Policy Committee (EDPC) at Ministerial Level, education for sustainable development was defined as 'learning and educational activities that aim to empower individuals to become the central agents fostering sustainable development along dimensions such as sustainable production and consumption, greener net-zero economy, social cohesion, inter- and intra-generational equity and human rights'. Other terms commonly used by education systems imply a more explicit focus on environmental issues. These include 'environmental education', reported by 69% of education ministries in the EPO Survey 2023, which refers to 'green' education policies discussed in this report, and 'climate change education', reported by 26% of participating education systems, and 'education for climate action', reported by 14% of them.

Figure 1.9. How education systems refer to education policies that support green objectives



Note: Data are ranked according to the share of education ministries reporting the use of that term. Figure prepared with responses from 35 education systems.
Source: OECD (2023[4]), *Education Policy Outlook National Survey for Comparative Policy Analysis 2023: Empowering All Learners to go Green.*

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Empowering learners to go green also means empowering them to be responsive and resilient

Current and future disruptions related to the climate crisis, and the need to ensure environmental sustainability in the long-term underline the importance of responsiveness and resilience in education. Resilience relates to the capacity to plan and prepare for, absorb, withstand recover from and adapt to

disruptions such as the extreme weather events experienced by populations across the world in 2023. Responsiveness refers to the capacity of education systems to meet the needs of increasingly diverse populations of learners and to equip them with the knowledge and skills to thrive in a changing world.

Education needs to strengthen responsiveness and resilience at the learner, broader learning environment and system levels to support the urgently needed transition towards greener and fairer societies. Drawing on elements of the *Framework for Responsiveness and Resilience in Education Policy* (OECD, 2021[53]), this report shows how education and training can nurture learners' agency and capacity to impact their own lives and their communities, as well as how the education sector can strengthen its own role as a cross-sectoral player:

- Resilient learners: Resilient learners can thrive through the social and economic transformations that this transition will bring, but also have the agency and capacity to shape these transformations. Policy makers can promote learner resilience by fostering learner agency and co-agency, encouraging learners' engagement and voice, and strengthening targeted supports for the most vulnerable.
- Resilient broader learning contexts: At broader learning environments level, the transition to greener and fairer societies will require teachers and other education staff to take on new roles, develop new skills, and to draw on resources beyond their institution. Education policy can strengthen the resilience of education staff by supporting their professional learning and collaboration. Policy makers can also nurture collaborations with parents and local community, and with partners with expertise in the green economy and environmental action.
- Resilient system: Resilient education systems play an active role in shaping a strategic vision for the green economy and sustainable development and help to achieve this vision by ensuring the supply of skills needed. This involves education policy makers collaborating with other sectors to define, implement and monitor climate change mitigation and adaption strategies and to ensure education pathways meeting the changing needs of economies and societies.

About the Education Policy Outlook series and this report

The Education Policy Outlook comparative reports are the flagship publication of the OECD on education policy. Grounded on extensive research and data analysis, they provide evidence-based insights into international education policy. From 2023, the Education Policy Outlook will also support countries to follow up on the goals established by the 2022 Declaration on Building Equitable Societies Through Education (OECD, 2022[5]).

As part of this support, this report continues the Education Policy Outlook's work on resilience and responsiveness since 2020 and provides insights relevant to education actors in 2024 based on priority areas of the *Framework of Responsiveness and Resilience in Education Policy*. The report presents insights from international comparative analysis of relevant and promising policy efforts adopted by participating countries in recent years, predominantly since 2020, to support the transition to a green and fair society.

The report also builds on education system's responses to the *Education Policy Outlook National Survey for Comparative Policy Analysis 2023: Empowering All Learners to go Green*, collected mainly between April and August 2023. The 36 education systems participating in this survey are: Australia, Austria, Belgium (Flemish Community, French Community, German-speaking Community), Bulgaria, Chile, Colombia, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Korea, Latvia, Luxembourg, Mexico, The Netherlands, New Zealand, Kazakhstan, Peru, Portugal, Romania, Spain, Sweden, Türkiye and the United Kingdom (England, Northern Ireland and Scotland).

By exploring the strengths and challenges of associated policy processes, this report analyses how education policy makers can support this transition against, and in response to, the emerging global

context. The report is intended as a resource for all people working in education policy, whether they be policy makers themselves or those working in education and training institutions, and their representative bodies. Besides this chapter presenting the overview of emerging global megatrends relevant to education systems in 2024 and for the next few years, three additional chapters complete this analysis:

- Chapter 2 –Translating learners' environmental awareness into action
- Chapter 3 – Providing all learners with experiences to help them shape the green economy
- Chapter 4 – Positioning education as a strategic sector for the transition to greener societies

References

Bahroun, Z. et al. (2023), "Transforming Education: A Comprehensive Review of Generative Artificial Intelligence in Educational Settings through Bibliometric and Content Analysis", *Sustainability*, Vol. 15/17, p. 12983, https://doi.org/10.3390/su151712983. [8]

Bender, E. et al. (2021), "On the Dangers of Stochastic Parrots", *Proceedings of the 2021 ACM Conference on Fairness, Accountability, and Transparency*, https://doi.org/10.1145/3442188.3445922. [20]

Bowser, G. and C. Cid (2021), "Developing the ecological scientist mindset among underrepresented students in ecology fields", *Ecological Applications*, Vol. 31/6, https://doi.org/10.1002/eap.2348. [47]

Copernicus Climate Change Service (2023), *July 2023: Global air and ocean temperatures reach new record highs*, https://climate.copernicus.eu/july-2023-global-air-and-ocean-temperatures-reach-new-record-highs#:~:text=%E2%80%9C2023%20is%20currently%20the%20third,%C2%B0C%20above%20preindustrial%20levels. (accessed on 31 August 2023). [12]

Economist Intelligence Unit (2023), *Top Global Risk Scenarios*, Economist Intelligence, https://www.eiu.com/n/campaigns/global-risk-scenarios-april-2023/ (accessed on 22 August 2023). [36]

European Parliamentary Research Service (2023), *Future Shocks 2023: Anticipating and weathering the next storms*, European Parliamentary Research Service, https://www.europarl.europa.eu/RegData/etudes/STUD/2023/751428/EPRS_STU(2023)751428_EN.pdf (accessed on 16 August 2023`). [25]

European Parliamentary Research Service (2023), *Peace and Security in 2023: Overview of EU action and outlook for the future*, European Parliamentary Research Service, https://www.europarl.europa.eu/RegData/etudes/STUD/2023/751419/EPRS_STU(2023)751419_EN.pdf (accessed on 22 August 2023). [37]

Gislason, M., A. Kennedy and S. Witham (2021), "The Interplay between Social and Ecological Determinants of Mental Health for Children and Youth in the Climate Crisis", *International Journal of Environmental Research and Public Health*, Vol. 18/9, p. 4573, https://doi.org/10.3390/ijerph18094573. [34]

Goos, M. et al. (2020), *Department of EducationReview of Literature to Identify a Set of Effective Interventions for Addressing Gender Balance in STEM in Early Years, Primary and Post-Primary Education Settings*, Deparment of Education of Ireland, https://www.gov.ie/pdf/?file=https://assets.gov.ie/96986/f05f7b2f-e175-442e-85e9-4a2264391843.pdf#page=null (accessed on 2023 May 12). [45]

ILO (2023), *World Employment and Social Outlook: Trends 2023*, International Labour Organization, https://doi.org/10.54394/sncp1637. [21]

Kumar, A. and T. Davenport (2023), *How to make generative AI cleaner*, https://hbr.org/2023/07/how-to-make-generative-ai-greener (accessed on 5 September 2023). [18]

LaForce, M. et al. (2016), "The eight essential elements of inclusive STEM high schools", *International Journal of STEM Education*, Vol. 3/1, https://doi.org/10.1186/s40594-016-0054-z. [46]

Lassébie, J. and G. Quintini (2022), "What skills and abilities can automation technologies replicate and what does it mean for workers?: New evidence", *OECD Social, Employment and Migration Working Papers*, No. 282, OECD Publishing, Paris, https://doi.org/10.1787/646aad77-en. [17]

Lewandowsky, S. (2021), "Climate Change Disinformation and How to Combat It", *Annual Review of Public Health*, Vol. 42/1, pp. 1-21, https://doi.org/10.1146/annurev-publhealth-090419-102409. [32]

Li, P. et al. (2023), *Making AI Less "Thirsty": Uncovering and Addressing the Secret Water Footprint of AI Models*, Cornell University, https://arxiv.org/abs/2304.03271 (accessed on 5 September 2023). [19]

Marginson, S. et al. (2013), *STEM: Country Comparisons - International comparisons of science, technology, engineering and mathematics (STEM) education*, Australian Council of Learned Academies, https://acola.org/wp-content/uploads/2018/12/saf02-stem-country-comparisons.pdf (accessed on 15 May 2023). [49]

McGrath, S. and L. Powell (2016), "Skills for sustainable development: Transforming vocational education and training beyond 2015", *International Journal of Educational Development*, Vol. 50, pp. 12-19, https://doi.org/10.1016/j.ijedudev.2016.05.006. [42]

Morselli, D. et al. (2023), *Digital Traces of Collective Identities: The Case of the Yellow Vests in South-East France*, https://files.osf.io/v1/resources/uams7/providers/osfstorage/62a6f7abf79aac128a5a1009?action=download&direct&version=1 (accessed on 14 August 2023). [31]

OECD (2023), *Education Policy Outlook National Survey for Comparative Policy Analysis 2023: Empowering All Learners to go Green*. [4]

OECD (2023), *Historical population (database)*, https://stats.oecd.org/ (accessed on 16 August 2023). [26]

OECD (2023), *Job Creation and Local Economic Development 2023: Bridging the Great Green Divide*, OECD Publishing, Paris, https://doi.org/10.1787/21db61c1-en. [41]

OECD (2023), *Net Zero+: Climate and Economic Resilience in a Changing World*, OECD Publishing, Paris, https://doi.org/10.1787/da477dda-en. [3]

OECD (2023), *OECD Economic Outlook, Volume 2023 Issue 1*, OECD Publishing, Paris, https://doi.org/10.1787/ce188438-en. [6]

OECD (2023), *OECD Employment Outlook 2023: Artificial Intelligence and the Labour Market*, OECD Publishing, Paris, https://doi.org/10.1787/08785bba-en. [7]

OECD (2023), "Putting AI to the test: How does the performance of GPT and 15-year-old students in PISA compare?", *OECD Education Spotlights*, No. 6, OECD Publishing, Paris, https://doi.org/10.1787/2c297e0b-en. [16]

OECD (2022), *Are Students Ready to Take on Environmental Challenges?*, PISA, OECD Publishing, Paris, https://doi.org/10.1787/8abe655c-en. [40]

OECD (2022), *Building Trust to Reinforce Democracy: Main Findings from the 2021 OECD Survey on Drivers of Trust in Public Institutions*, Building Trust in Public Institutions, OECD Publishing, Paris, https://doi.org/10.1787/b407f99c-en. [29]

OECD (2022), *Climate Tipping Points: Insights for Effective Policy Action*, OECD Publishing, Paris, https://doi.org/10.1787/abc5a69e-en. [2]

OECD (2022), *Declaration on Building Equitable Societies Through Education, OECD/LEGAL/0485*, https://legalinstruments.oecd.org/en/instruments/OECD-LEGAL-0485. [5]

OECD (2022), *Education Policy Outlook 2022: Transforming Pathways for Lifelong Learners*, OECD Publishing, Paris, https://doi.org/10.1787/c77c7a97-en. [28]

OECD (2022), *International Migration Outlook 2022*, OECD Publishing, Paris, https://doi.org/10.1787/30fe16d2-en. [24]

OECD (2022), "Teaching for climate action"*, Teaching in Focus*, No. 44, OECD Publishing, Paris, https://doi.org/10.1787/d3a72e77-en. [51]

OECD (2022), *The Climate Action Monitor 2022: Helping Countries Advance Towards Net Zero*, OECD Publishing, Paris, https://doi.org/10.1787/43730392-en. [10]

OECD (2022), *Trends Shaping Education 2022*, OECD Publishing, Paris, https://doi.org/10.1787/6ae8771a-en. [22]

OECD (2021), *Education Policy Outlook 2021: Shaping Responsive and Resilient Education in a Changing World*, OECD Publishing, Paris, https://doi.org/10.1787/75e40a16-en. [53]

OECD (2021), *Health at a Glance 2021: OECD Indicators*, OECD Publishing, Paris, https://doi.org/10.1787/ae3016b9-en. [27]

OECD (2019), *PISA 2018 Results (Volume III): What School Life Means for Students' Lives*, PISA, OECD Publishing, Paris, https://doi.org/10.1787/acd78851-en. [50]

OECD (Forthcoming), *A strategic foresight toolkit for resilient public policy*, OECD Publishing. [39]

OECD/Cedefop (2015), *Green skills and innovation for inclusive growth*, OECD Publishing, Paris, https://doi.org/10.1787/9789264239296-en. [43]

Paris Agreement (2015), *15 December 2015, United Nations Treaty Collection Certified True Copies (CTCs) of Multilateral Treaties Deposited with the Secretary-General Chapter XXVII.7.d*, https://treaties.un.org/pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXVII-7-d&chapter=27 (accessed on 1 October 2023). [9]

Paterson, M., S. Wilshire and P. Tobin (2023), "The Rise of Anti-Net Zero Populism in the UK: Comparing Rhetorical Strategies for Climate Policy Dismantling", *Journal of Comparative Policy Analysis: Research and Practice*, pp. 1-19, https://doi.org/10.1080/13876988.2023.2242799. [15]

Ranworth, K., S. Wykes and S. Bass (2014), *Securing social justice in green economies: A review and ten considerations for policymakers*, IIED, https://www.iied.org/sites/default/files/pdfs/migrate/16578IIED.pdf (accessed on 12 May 2023). [44]

Setzer, J. and C. Higham (2023), *Global trends in climate litigation: 2023 snapshot*, https://www.lse.ac.uk/granthaminstitute/wp-content/uploads/2023/06/Global_trends_in_climate_change_litigation_2023_snapshot.pdf (accessed on 14 August 2023). [30]

Stevenson, K. and N. Peterson (2015), "Motivating Action through Fostering Climate Change Hope and Concern and Avoiding Despair among Adolescents", *Sustainability*, Vol. 8/1, p. 6, https://doi.org/10.3390/su8010006. [35]

UNESCO (n.d.), *Education for sustainable development*, https://www.unesco.org/en/education-sustainable-development (accessed on 11 September 2023). [52]

UNHCR (2023), *Ukraine Refugee Situation*, https://data2.unhcr.org/en/situations/ukraine (accessed on 16 August 2023). [23]

United Nations Environment Programme (n.d.), *Green economy*, https://www.unep.org/pt-br/node/23750 (accessed on 31 July 2023). [13]

WEF (2023), *The Global Risks Report 2023*, World Economic Forum, https://www.weforum.org/reports/global-risks-report-2023/ (accessed on 7 August 2023). [14]

WHO (2023), *Coping through crisis: COVID-19 pandemic experiences and adolescent mental health and well-being in the WHO European Region. Impact of the COVID-19 pandemic on young people's health and well-being from the findings of the HBSC survey round 2021/2022*, World Health Organization Regional Office for Europe, https://www.who.int/europe/publications/i/item/WHO-EURO-2023-7680-47447-69735#:~:text=Thirty%20per%20cent%20of%20adolescents,and%2033%25%20reported%20positive%20impacts. (accessed on 18 August 2023). [33]

WMO (2023), *Extreme weather is the "new norm"*, https://public.wmo.int/en/media/news/extreme-weather-new-norm (accessed on 22 August 2023). [1]

WMO (2023), *July 2023 confirmed as hottest month on record*, https://public.wmo.int/en/media/news/july-2023-confirmed-hottest-month-record (accessed on 31 August 2023). [11]

WMO (2021), *WMO Atlas of Mortality and Economic Losses from Weather, Climate, and Water Extremes (1970 - 2019)*, https://library.wmo.int/index.php?lvl=notice_display&id=21930#.YS9CMNMzZBx (accessed on 22 August 2023). [38]

Wolfe, B. and E. Riggs (2017), "Macrosystem Analysis of Programs and Strategies to Increase Underrepresented Populations in the Geosciences", *Journal of Geoscience Education*, Vol. 65/4, pp. 577-593, https://doi.org/10.5408/17-256.1. [48]

2 Translating learners' environmental awareness into action

Today's education systems have tremendous potential to foster the cultural change and resilience required to tackle the climate crisis at scale. The OECD Declaration on Building Equitable Societies (2022) includes a commitment to support countries to foster environmental sustainability through education. Yet, policy efforts have typically focused on top-down, curriculum-oriented approaches over bottom-up efforts that empower all learners to take action. This chapter explores recent and promising or impactful policy efforts to foster environmental agency and engagement among all learners, and to empower educators and education institutions to nurture a culture of collective environmental action. Drawn from this analysis, the chapter presents emerging policy lessons to support policy makers to translate learners' environmental awareness into action in 2024 and beyond.

In Brief

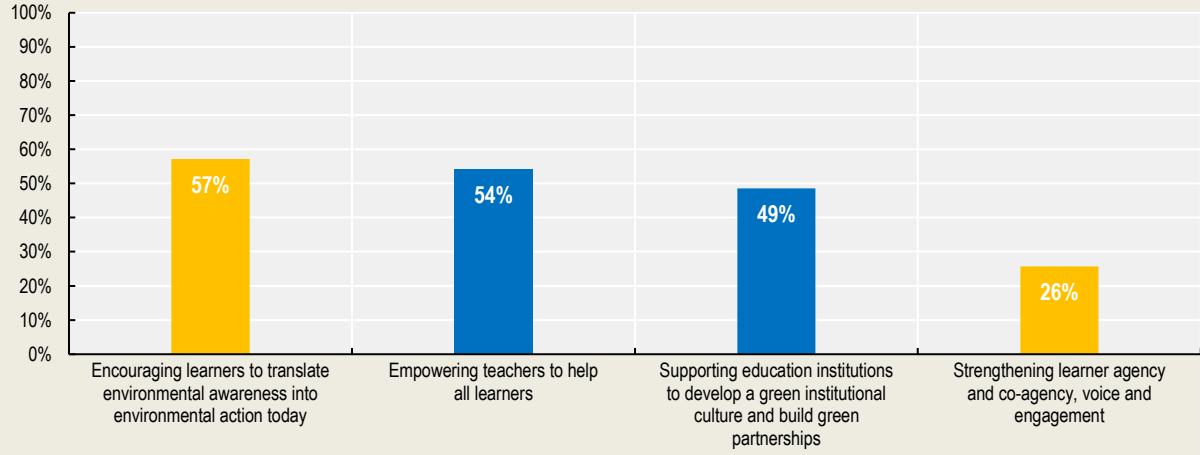
Translating learners' environmental awareness into action

In 2024, education systems have a key role to play in bringing about climate mitigation and adaptation at scale. Changing individuals' daily choices could reduce greenhouse gas emissions by up to 70% (IPCC, 2023[1]). Meanwhile, constructive environmental activism, such as litigation, petitioning, lobbying, boycotting, striking and protesting, can pressure governments to enact wider structural transformation. However, in 2018, only one-third of OECD students were environmentally active (i.e. engaged in three or more of five environmental actions included in the Programme for International Student Assessment (PISA) 2018 survey) (OECD, 2022[2]).

There is political will to foster environmental action via education but systems are prioritising efforts to create the external conditions for action over learners' internal capacity and drive. In the Education Policy Outlook's *National Survey for Comparative Policy Analysis 2023: Empowering All Learners to go Green* (EPO Survey 2023), 57% of participating education systems reported that **encouraging learners to translate environmental awareness into action** is a priority "to a great extent". However, they more commonly prioritise efforts that support educators (54%) and institutions (49%) over those that aim to develop all learners' agency and engagement (26%) (see Figure 2.1).

Figure 2.1. Fewer education systems prioritise learner-centred efforts for the transition to greener and fairer societies

Share of education systems that report prioritising policy areas "to a great extent" for the next five years



Note: Figure prepared with responses from 35 education systems.
Source: OECD (2023[3]), *Education Policy Outlook National Survey for Comparative Policy Analysis 2023: Empowering All Learners to go Green*.

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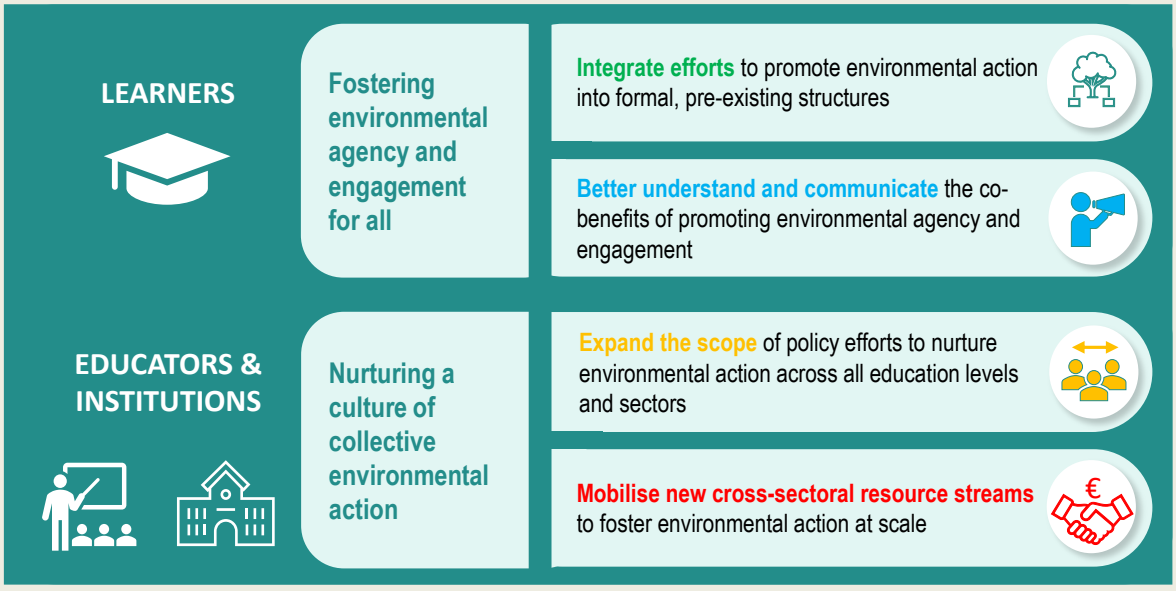
This chapter explores recent **relevant policy efforts** across participating education systems, predominantly since 2020, to foster environmental action.

- **For learners**: Education systems are promoting environmental agency and engagement by dedicating time within formal learning programmes for active pedagogies on environmental matters or establishing physical spaces for authentic environmental learning outdoors. Some education systems are establishing formal structures and processes for students to participate and have a voice in environmental matters within the education system. This includes developing targeted initiatives to respond to learners' diverse needs, experiences and capacities to engage in environmental action.
- **For educators and institutions**: Policy efforts targeting educators and broader learning contexts seek to nurture a culture of collective action. This includes providing high-quality professional learning that brings together experts from different disciplines and establishing dedicated competence frameworks to empower teachers to reflect on their own related strengths and professional development needs. In addition, policy makers are encouraging, facilitating or incentivising participation in institutional networks for environmental education and developing quality assurance or monitoring and evaluation measures that support the greening of institutional operations or the promotion of collective environmental action.

Analysis of these and other related policy efforts points to **some emerging lessons** that can help governments translate learners' environmental awareness into action in 2024 (see Infographic 2.1). For learners specifically, these call on policy makers to ensure that formal and pre-established structures promote environmental action as an ex-ante condition for success, while ensuring a shared understanding of the co-benefits of strengthening environmental agency and engagement. For educators and institutions, the lessons encourage policy makers to expand the scope of ongoing efforts to nurture a culture of collective environmental action at every education level and sector. It is also important to foster environmental action at scale by identifying new collaborative resource streams that can deliver value-for-money in a context of economic pressure and the foundations for broader societal transformation for the longer-term.

Infographic 2.1. Translating all learners' environmental awareness into action in 2024

Relevant policy efforts and lessons to support education systems



Introduction

It is now irrefutable that human action has caused the current climate crisis. The challenge facing societies today is therefore not straightforwardly economic or political but, above all, cultural. Policies stimulating a change in lifestyles, consumption patterns and public support for environmental policy can help drive large-scale transformational action from the ground up. These efforts cannot be limited to inspiring individual action today. They must also build people's resilience, ensuring they remain proactive and engaged even as climate change disrupts their daily lives.

As highlighted in other chapters in this report, education has tremendous potential to drive cultural change and foster individual resilience, at scale. Building the knowledge, skills, attitudes and values required to empower learners to contribute positively to society is the guiding task of education. Education can also nurture resilient learners by building their agency and co-agency to identify and capitalise on opportunities given to them by the system and create their own (OECD, 2021[4]). Meanwhile, the reach of today's education systems across ages and social groups makes them crucial in ensuring that all learners—including the most vulnerable—are empowered to act in the face of environmental disruption.

There is political will to foster greater environmental action via education. The OECD Declaration on Building Equitable Societies Through Education includes a commitment to support countries to foster environmental sustainability through education (OECD, 2022[5]). In related discussions, Ministers emphasised the need to go beyond curricula reform to focus on strengthening students' agency, empowering them to act on sustainability challenges and engage in environmentally friendly day-to-day actions (OECD, 2022[6]).

However, responses to the *EPO Survey 2023* indicate that education systems are more focused on creating the external conditions for action over fostering learners' internal capacity and drive to act. Over half (57%) of participating education systems reported translating learners' environmental awareness into

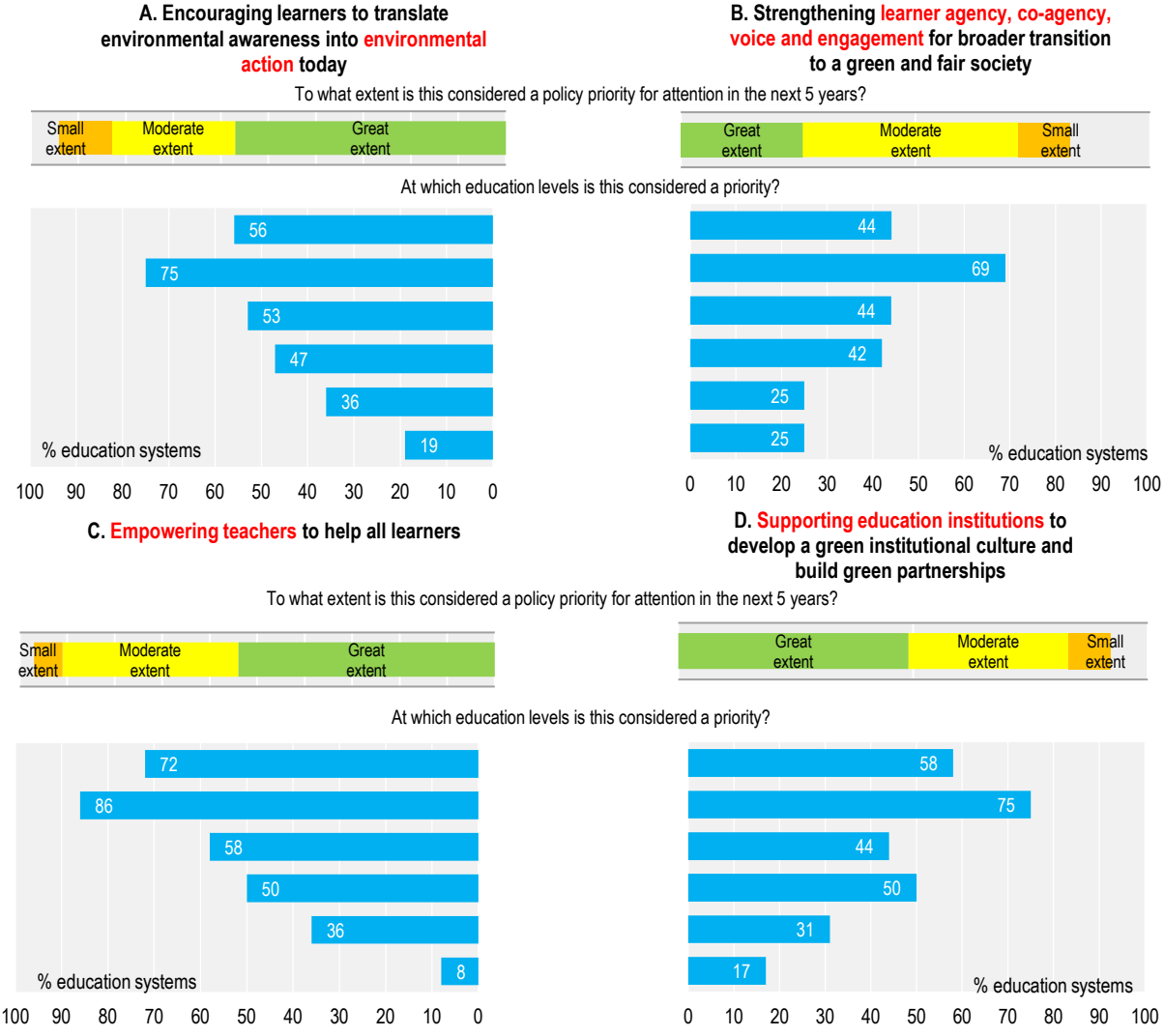
action to be a priority for policy attention in the next five years “to a great extent”. Similar shares reported the same for empowering teachers (54%) and supporting institutions (49%). Nevertheless, a much smaller share (26%) prioritise strengthening learner agency, co-agency, voice and engagement to this level (see Figure 2.2).

When asked to identify the education levels for which these four policy areas (environmental action, agency and voice, teachers, institutions) are a priority, all were reported as prioritised in primary to upper secondary education by around 70% or more of participating education systems. However, while an important share of education systems also identify the policy areas as priorities in early childhood education and care (ECEC), the share decreases considerably as learners’ age increases beyond schooling.

Recognising the urgent need and political will for climate mitigation and adaptation at scale, this chapter explores the ways in which education policymakers can help empower all learners to translate environmental awareness (i.e. understanding of environmental change and its effect on economic and social stability) into environmental action. Building on existing international work on curriculum analysis (see OECD (2020[7]) and UNESCO (2021[8])), the chapter looks beyond curricular design and content to focus on policy efforts that support curricular implementation and directly facilitate individual behaviours, constructive engagement and collective action in favour of a green and fair society.

Figure 2.2. Education priorities for the transition to greener and fairer societies differ by policy area and education level

Education systems' reports of the extent of prioritisation by policy area and by education level



Note: Figure prepared with responses from 35 education systems.
Source: OECD (2023[3]), *Education Policy Outlook National Survey for Comparative Policy Analysis 2023: Empowering All Learners to go Green.*

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The chapter considers two key areas of associated policy efforts:

Combining policy mechanisms and targeted programmes to foster agency and engagement among all learners. This involves measures to create space and structures for all learners to practice their agency and voice, as well as targeted programmes that respond to their diverse experiences.

Empowering educators and institutions to nurture a culture of collective environmental action. This includes initiatives that support educators and institutions to implement action-oriented environmental learning and to model sustainable behaviours.

For each policy area, this chapter analyses relevant policy initiatives, principally across OECD education systems. This analysis informs policy lessons that can guide policy makers' short- and medium- term efforts in 2024 and the following years to advance the agenda set out in the Declaration on Building Equitable Societies Through Education.

Formal mechanisms plus targeted programmes can foster environmental agency and engagement among all learners

Shifting individual behaviours and choices will profoundly advance the drive to a more sustainable future. Efforts to change households' daily choices could reduce greenhouse gas emissions by up to 70% (IPCC, 2023[1]). Meanwhile, lowering energy demand, material consumption, and emissions-intensive food consumption have been shown to positively influence other aspects of sustainable development and facilitate acceptance of large-scale greening measures (Thøgersen and Noblet, 2012[9]; OECD, 2019[10]; IPCC, 2023[1]).

Alongside behavioural change, constructive engagement in environmental activism, such as litigation, petitioning, lobbying, boycotting, striking and protesting, can pressure governments to enact wider structural transformation. Previous studies find positive relationships at country level between the development of a thriving environmental civil society and lower environmental degradation or reliance on carbon emissions (Schofer and Hironaka, 2005[11]; Grant, Jorgenson and Longhofer, 2018[12]). Activism has also been key in pressuring governments around the world to create environmental laws and regulations, as well as the bodies charged with implementing them (Longhofer et al., 2016[13]).

As part of the urgent transition towards greener and fairer societies, public policy must therefore stimulate behavioural change in the private sphere and support constructive engagement in the public sphere. Children and young people cannot be forgotten in these efforts. From an ethical view, the disproportionately negative impact of climate change on younger generations for both their present development and future well-being mean their voices must be heard. From a pragmatic stance, research indicates it is easier to shape attitudes and behaviour in childhood and that pro-environmental youth behaviours can positively influence older generations (Lawson et al., 2018[14]). Therefore, inspiring action among children and young people not only serves to renew ways of thinking, skills and values in favour of longer-term ecological reconstruction, it is also an essential part of the adaptation and mitigation efforts required today.

Education is uniquely placed to equip younger generations to act for greener and fairer societies. However, while promoting environmental action is a key goal of frameworks for education for sustainable development, policy makers have neglected action-oriented efforts in favour of knowledge development. A systematic review of related literature (1993-2014) identified that education systems tend to adopt top-down approaches focused on scientific knowledge and curriculum as opposed to bottom-up efforts emphasising learner participation and empowerment (Rousell and Cutter-Mackenzie-Knowles, 2019[15]).

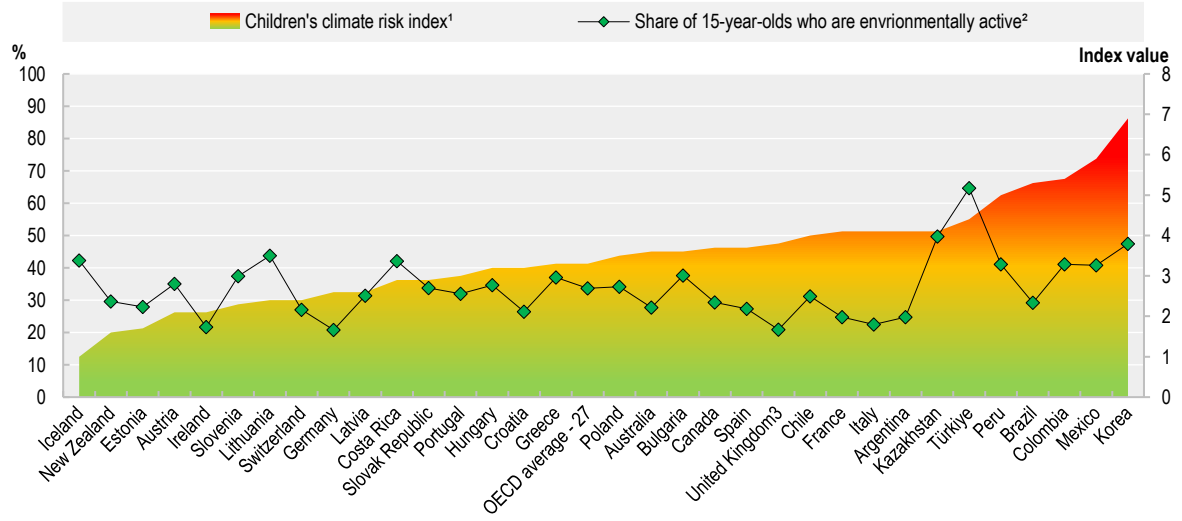
Yet knowledge does not predict action. In the Programme for International Student Assessment (PISA) 2018, a considerable share of strong science-performers did not report engaging in any of the pro-environmental behaviours included in the survey (e.g. reducing energy use in the home or choosing certain products for ethical or environmental reasons). Only one-third of OECD students were environmentally active (i.e. engaged in three or more of the five actions included in the survey) in 2018 (OECD, 2022[2]). As shown in Figure 2.3, even in countries where the level of climate risk to children is comparatively high, the share of environmentally active students rarely reaches 50%.

Part of the challenge for education is that promoting greater environmental action requires developing complex transversal competencies, attitudes and values within learners (See also Chapter 3). Indeed, as reported in OECD (OECD, 2023[16]), individuals' attitudes and dispositions are more powerful drivers of engagement in environmentally sustainable behaviours than their knowledge and skills. In the literature,

three internal factors are repeatedly found to influence environmental action: agency (i.e. belief in having influence over one's own actions and circumstances); self-efficacy (i.e. belief in a personal capacity to achieve a goal); and constructive hope (i.e. the ability to simultaneously understand the gravity of the challenge while seeing the possibility of progress).

Figure 2.3. A minority of 15-year-olds in the OECD are environmentally active, including in countries where the climate risk to children is highest

Share of environmentally active students and countries' level of children's climate risk



Notes: Only countries with available data are shown. 1. The Children's Climate Risk Index ranks countries based on how vulnerable children are to environmental stresses and extreme weather events. 2. Environmentally active 15-year-olds are those who reported participating in three or more actions in favour of the environment as included in the PISA 2018 survey. For further information, see source material. 3. For the share of 15-year-olds who are environmentally active, data refer to Scotland only.

Source: UNICEF, (2021[17]) *The Climate Crisis is a Child Rights Crisis: Introducing the Children's Climate Risk Index,* New York, United Nations Children's Fund (UNICEF) https://www.unicef.org/media/105376/file/UNICEF-climate-crisis-child-rights-crisis.pdf (accessed on 14 August 2023); OECD (2022[2]), *Are Students Ready to Take on Environmental Challenges?*, PISA, OECD Publishing, Paris, https://doi.org/10.1787/8abe655c-en.

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Although fostering these internal factors is complex, the co-benefits of doing so makes the effort worthwhile. Fostering learners' self-efficacy can positively impact cognitive learning outcomes: in most countries and economies in PISA 2018, students with a greater general sense of efficacy showed stronger reading performance, even after accounting for socioeconomic characteristics (OECD, 2019[18]). Meanwhile, strengthening learners' sense of agency and engagement can improve the democratic health of societies strengthening representative democracy and enhancing trust in institutions (OECD, 2022[19]). Finally, as levels of eco-anxiety and eco-despair rise among younger generations, education policy that fosters agency, engagement and voice can promote learners' resilience, helping them to plan and prepare for, absorb, withstand, recover from and adapt to adverse events and disruptions (see Chapter 1) (OECD, 2021[4]).

The transformative potential of empowering learners to engage in environmental action can only be realised if efforts respond effectively to the specific needs of learners with different characteristics. This includes age: the younger learners are, the more effort required to overcome the constraints imposed by widespread assumptions that youth are politically disinterested and civically disengaged (Earl, Maher and Elliott, 2017[20]; Osler and Starkey, 2003[21]). Policy must also take socio-economic status into account. In PISA 2018, internal factors shown to support action (i.e. agency and self-efficacy) are consistently less prevalent among disadvantaged students than advantaged students (OECD, 2020[22]; OECD, 2019[18]). Gender also carries complexities: while boys are shown to be less environmentally engaged than girls, young women may particularly suffer from societal assumptions which sees activist identity as typically older and less feminine (Gordon, 2008[23]; Taft, 2014[24]). Finally, a learner-centred approach would also consider the unique strategic value learners from indigenous and other traditional communities offer as sources of traditional knowledge to help mitigate and adapt to climate change (Correa, 2019[25]).

Selected recent policy efforts

This section explores ways in which education policy across OECD education systems and beyond is supporting all learners to translate environmental knowledge into action. This includes efforts to introduce formal mechanisms that help create the conditions for teaching and learning to strengthen agency and engagement among all learners. Recognising the specific challenges for certain groups of students, it also explores related targeted efforts that seek to support disadvantaged or vulnerable learners specifically. Lessons learned show the need to better understand and communicate the co-benefits of promoting environmental agency and engagement, as well as to integrate efforts into formal, pre-existing structures to promote environmental action.

Establishing time, space and structures for learners to practice agency and engagement

Many OECD education systems have embedded agency and action in recent curricular reforms (OECD, 2020[7]). To support educators and institutions to implement these curricular goals in their everyday work with learners, some systems have introduced further policy efforts. These include formal mechanisms that create time or space within the formal learning programme for learners to practice their agency and co-agency. It also includes initiatives that establish structures for learners to have a formal voice in environmental matters.

Dedicated time and space for active or authentic learning

Education can empower learners to engage in pro-environmental behaviours and collective action by giving them active learning experiences in authentic contexts. Research indicates that across all education levels active learning pedagogies (i.e. supporting learners to take responsibility for their own learning process, make decisions and self-regulate) have a large effect on environmental education outcomes compared to traditional learning approaches (Arik and Yilmaz, 2020[26]). Meanwhile authentic experiences which engage learners in real-world tasks, expose them to multiple perspectives and provide time for reflection share many characteristics with effective environmental education (Bowers and Creamer, 2020[27]) (see also Chapter 3).

Decisions regarding pedagogies and teaching activities are generally under teachers' and schools' responsibilities. However, some formal mechanisms are available to policy makers to promote certain approaches. While curricular reforms can offer a high-level promotion, emphasis on active and authentic learning may not always materialise in school-level implementation efforts. Some education systems are therefore dedicating specific time within the school year to promote active pedagogies in relation to environmental education; this ranges from regular timetabled learning in **Greece** to shorter duration and non-mandatory (but heavily incentivised) initiatives in **Hungary** and **Romania**.

In 2022, **Greece** introduced the National Curriculum for Environment and Education for Sustainable Development for Pre-primary, Primary and Lower Secondary Education. The key aim is to educate environmentally aware students, capable of making decisions and participating in actions on environmental issues and problems. The new curriculum highlights teaching strategies such as problem solving, case studies, research, simulations, experiments, field studies and project-based learning (Government of Greece, 2022[28]). A year prior to the curricular reform, **Greece** introduced 21st Century Skills Labs modules in all kindergartens, primary and lower secondary schools. These provide dedicated time within the curriculum through which students can engage with the types of pedagogies and content set out in the new curriculum and valued across curricular areas. One of four key themes is "I take care of the environment" in which programmes include ecology, climate change and global and local natural and cultural heritage. As part of the mandatory curriculum, students spend time each week working on student-centred activities relating to the chosen theme. Analysis of implementation of the Labs indicates that students feel positively towards the content and methodology and feel they improve their active participation in learning. For teachers, the Labs help students to become more active in their group and to devote personal time to the investigation, preparation and enactment of the actions they decide upon. Nevertheless, teachers also raised implementation challenges, principally having adequate time and material resources to prepare and conduct the Labs (Greek Institute of Education Policy, 2022[29]).

In **Hungary**, the annual *Sustainability Thematic Week* (2016) aims to help schools and teachers to enhance their work on sustainability by improving active learning through inquiry activities, project work, co-operation with other organisations and experts and community action. Although not mandatory, the initiative has wide reach: around half of the schools in Hungary participated in 2022. Since 2020, organisers have collected qualitative data from teachers and students on the implementation and impact of this week. In 2022, participating students reported stronger pro-environmental behaviour than non-participants and believed to a greater extent in their ability to protect the environment. Identified success factors include building partnerships with external actors either by bringing them into schools or having students visit them (Kristóf et al., 2022[30]).

Romania has introduced a similar initiative: the *Green Week programme* (2022). An accompanying digital platform provides comprehensive guidance and teaching resources to schools to support implementation (Romanian Ministry of Education, 2023[31]). The Green Week builds on the *Different School: To know more, to be better* initiative (2011) in which all pre-schools to upper secondary schools in Romania are required to undertake five consecutive days of extracurricular learning activities that aim to develop students' socio-emotional skills or 21st century competences, including sustainability competence. The activities must be innovative, transdisciplinary, experiential and/or designed in a participatory manner with students and the wider school community (Vasile, Andries, 2022[32]). The Green Week and the Different School activities can only be combined in special circumstances meaning many schools will now have two weeks a year of action-oriented educational activities that bring together the school and wider community.

Alongside creating time to engage in active learning opportunities, education systems are establishing dedicated spaces for authentic environmental learning. The **Czech Republic**, **England (United Kingdom), Luxembourg** and the **French Community of Belgium** are promoting outdoor education. In the **Czech Republic**, recent research among lower secondary students indicates that the exploration of complex ecological topics through outdoor education is particularly impactful in developing students' pro-environmental behaviours. This includes both off-site experiences (e.g. one-day trips or residential environmental education programmes) and on-site experiences (e.g. active attendance in school Eco-clubs) (Kroufek and Činčera, 2021[33]). In response, the government is expanding financial support for outdoor education. The Czech Republic announced an increased *Subsidy for environmental education centres* (2022) aimed at investing in facilities for climate change teaching programmes for school students and teachers. This will help strengthen and expand the Czech Republic's network of Eco-centres. Although such subsidies have existed before, in 2022, the overall fund is larger and centres can apply for bigger amounts than previously (Ministry of Environment of Czechia, 2023[34]).

In **England** (United Kingdom), the *National Education Nature Park* project (2022), led by the Natural History Museum and partner organisations, with funding from the Department for Education, will work with the education sector to establish a network of outdoor spaces in education settings across England, managed by learners. Through digital mapping tools and teaching resources, children and young people, supported by their teachers and schools, will map, manage and enhance land across the education estate, with the aim of creating a single virtual nature park across the country. In this way, the project aims to both increase engagement with nature for learners across all education levels and improve the biodiversity of the education estate (Department for Education of England, 2022[35]). The project launched with 40 pathfinder schools in 2022 and has now started to roll out to all settings. The project is a key action within England's *Sustainability and climate change: a strategy for the education and children's services systems* (2022). Although implementation is nascent, analysis of the framing of the strategy has identified some initial strengths, such as cross-government collaboration and action-orientation, and potential challenges, including ensuring enough support for teachers and schools (Dunlop and Rushton, 2022[36]).

Similarly, **Luxembourg**'s *Learning Gardens* (2020) initiative aims to establish an active network of education settings with outdoor learning spaces. As of 2023, the project includes 40 "learning gardens" across Luxembourg in schools, early childhood education and care (ECEC) settings, children's homes and non-formal education settings. Members of the network benefit from professional support, which includes both continuous training and didactic and educational material. Those wishing to take part also receive support and guidance. The programme is the result of a recommendation that emerged during a national constructive dialogue with young people in 2019 on the issue of climate change (Ministry of National Education, Children and Youth of Luxembourg, 2023[37]).

In the **French Community of Belgium**, through the Action Programme 2021-2024 (2021), which is part of the ongoing co-operation agreement between Wallonia-Brussels Federation, the Brussels Region and the Walloon Region relating to Education for the Environment, Nature and Sustainable Development, government actors have committed to strengthening outdoor education to reconnect students with nature and the environment. This will include efforts to legitimise the concept of outdoor education by disseminating related information and guidance in circulars for school leaders, supporting initial teacher training and professional development in outdoor pedagogies, enhancing the support offered to schools by environmental education associations and proposing new responsibilities for the Inspectorate to evaluate outdoor learning offered by schools (Wallonia-Brussels Federation, the Brussels Region and Wallonia, 2021[38]).

Formal structures and processes for learners to actively engage in environmental matters

By creating structures that encourage young people to actively engage in a constructive manner with environmental matters, education can support them to fulfil their role as agents of change in climate change adaptation. At the same time, student voice and engagement activities strengthen broader learner and system resilience (OECD, 2021[4]). While some systems have been strengthening student voice and engagement mechanisms in general, others have put this at the heart of environmental education efforts.

Some countries, such as **Chile** and **Italy** have introduced efforts which seek alignment between civic and environmental education. In **Italy**, education for sustainable development and environmental education form one of three pillars of the new Civic Education curriculum (2019), a cross-curricular teaching area from ECEC to upper secondary education. Planned implementation actions include the appointment of a civic education coordinator for each class and each school. By embedding environmental learning in civic education, the reform puts students' active participation at its core. In 2020, survey responses from school leaders and students indicate that the vast majority—97% and 93% respectively—consider the new subject a priority and recognise its value (UNESCO, 2021[39]). However, initial implementation analysis indicates that the teaching method most commonly used in civic education remains frontal lessons and this approach is increasingly common with age (Reported in *EPO Survey 2023*).

In **Chile,** environmental education has been embedded in the curriculum through two new compulsory subject areas at upper secondary level, Citizenship Education and Sciences for Citizenship (2019). The former aims to equip learners with the knowledge, skills and attitudes for active participation in a society oriented towards the common good and sustainable development; the latter encourages students to use scientific knowledge, skills and attitudes to make informed decisions and propose solutions to problems affecting them and the world they live in (Chilean Ministry of Environment, 2020[40]). At the same time and supporting implementation, all education institutions from ECEC to upper secondary must prepare a Citizen Training Plan (2016) which details measures to foster citizenship values and knowledge among learners, including aspects related to sustainable development, awareness of the climate crisis and establishing and developing initiatives in the community (Ministry of Education of Chile, 2022[41]). The Ministry provides guidelines, exemplar material and, on request, support for the development of the plan).

Beyond curricular implementation, some countries, such as **France**, the **Netherlands, Peru** and **Portugal** are working to embed formal participation mechanisms on environmental matters within the education system. Since 2019/20, **France**'s *Eco-delegates* (2019) initiative has sought to ensure that each class in lower and upper secondary education elects a class eco-delegate. From 2020/21 this was expanded to include the last two years of primary school meaning that in any academic year, there are around 250 000 eco-delegates across France. Eco-delegates are expected to raise environmental awareness among all students, develop concrete projects which contribute to their learning and that of their peers, and support the wider ecological transition of the school. Research conducted in 2021 found that participating students of all ages strengthen key skills such as communication and collaboration. It also found that eco-delegates and their supervisors seek greater alignment and continuity in actions across education levels to build more ambitious projects with higher impact. Furthermore, both groups seek more training but in a flexible model that does not add to workload (Bois et al., 2021[42]). From this, the government identified three key priorities for future efforts: integrating the eco-delegate model into school evaluation, teacher training and student assessment processes; strengthening the network of eco-delegates and supporting them to self-assess their impact; and, enhancing partnerships with other organisations (Poirson, 2021[43]).

Initiatives to formalise student participation are also evident in higher education. For example, university *Green Offices* (2010) originated in the **Netherlands** and, as of 2022, exist in almost every major Dutch university as well as over 40 other countries (UNECE, 2022[44]). Part of the institutional architecture, these are generally student-led sustainability platforms for students and staff and are characterised by the high-level of responsibility they afford to students (Green Office Movement, n.d.[45]). The Offices run activities such as organising sustainability events, providing advice and support to students and staff wanting to undertake sustainable projects, undertaking initiatives to "green" university operations and designing new sustainability-focused courses. Key to their success is the fact that they empower students to lead on sustainability and are formally supported by management, typically through dedicated financial and human resources, office space and a clear mandate (Filho et al., 2019[46]). In the Netherlands, these Offices are also members of the Students for Tomorrow network organisation which consists of 43 student-led member organisations who want to make higher education more sustainable. The network carries out several high-profile ongoing projects in the Netherlands such as SustainaBul (2012), a sustainability ranking for higher education institutions (HEIs) and the Sustainable Studies website (2022) which provides an overview of all tertiary courses related to sustainability in the Netherland.

Peru is appointing a cohort of School Environmental Champions (3-18 year-olds) and Youth Environmental Champions (2018). These are children and young people enrolled in school or studying in a professional or technical post-school pathway, who show an interest in environmental action and can commit to strengthening the active participation of their school or the wider community in sustainable development. The Champions work with the municipality to help identify local solutions to environmental challenges and support environmental education initiatives across the community. Their specific role must be clearly outlined in each municipality's annual work plan and schools or the municipality must commit to providing training and ongoing support for the Champions (Ministry of Environment of Peru, 2021[47]). Wider analysis

of implementation of the National Environmental Education Plan (2017) at municipal level indicates that while there has been a good level of uptake (68% of municipalities) implementation efforts can lack coherence (Alarcon Castro, 2022[48]).

Finally, as part of **Portugal**'s Schools Participatory Budget (2017), which sees secondary school students formulate and vote on proposals for using an earmarked share of school improvement funding (OECD, 2021[4]), many schools propose and vote for pro-environmental initiatives such as greening outdoor spaces and introducing energy saving measures or environmentally friendly transportation. In addition, some municipalities have specifically encouraged environmental action through the Budget. For example, in 2023, all proposals in the municipality of Guimaraes must address the theme of outdoor spaces and combine initiatives that cover culture, education and sustainability (Município Guimarães, 2023[49]). In this way, the Budget is helping to support implementation of the municipality's Environmental Education and Awareness Programme.

Developing targeted initiatives that respond to learners' diverse needs and experiences

Data from PISA 2018 and international policy evidence highlight that disadvantaged students are less likely to participate in pro-environmental actions, and have a lower sense of self-efficacy and agency in global matters than their advantaged peers (OECD, 2020[22]; OECD, 2022[2]). At the same time, the diverse cultural experiences of students mean they come to environmental matters with different knowledge, skills and attitudes. Policies to promote learners' environmental action therefore need to compensate for asymmetries and respond to the cultural differences between learners.

Some countries such as **Italy, Germany, Costa Rica** and **Chile** are developing or supporting programmes that provide opportunities for specific groups of students to develop environmental agency through engaging in active or authentic learning. **Italy** has recently committed to a *nationwide expansion of the UPSHIFT programme* (2022), an initiative of the United Nations Children's Fund through which young people, particularly those from disadvantaged, migrant or refugee backgrounds develop 21st century skills. In 2021, the Ministry of Education and Merit announced aims to promote the programme in lower secondary schools through its integration into the Civic Education curriculum area and in upper secondary schools through the Pathways for Soft Skills and Orientation curriculum area. Participating schools are selected according to various indicators of disadvantage (i.e. school dropout rate, share of students with a migrant background and student performance) (Ministry of Education and Merit, 2023[50]).

Initially implemented in 2018, the programme supports vulnerable and at-risk young people to become agents of change in their communities, by analysing local problems and identifying solutions in the form of products or services with a social impact. UPSHIFT is based on active teaching and learning methods as well as design-thinking approaches. Although not explicitly focused on environmental projects, many of the student-led initiatives have addressed environmental or climate challenges. For example, proposals have included the development of a robot to clean up micro- and macro-plastics from port areas and a digital application that encourages the use of renewable energy. Evaluations indicate that school students participating in UPSHIFT in Italy perceive an increase in several competencies such as collaboration, critical thinking and problem solving, as well as an improved sense of agency, self-confidence and emotional regulation (Lui and Crisp, 2019[51]).

In **Hamburg (Germany)**, from 2019, the state government has financed environmental education programmes tailored to the needs of specific groups including refugee learners and those with migrant or low socio-economic background. The programmes target school-age learners, principally as part of extracurricular activities. The earmarked funds have grown out of experiences supporting the integration of refugees, in which, through the Hamburg Integration Fund, associations working in environmental education were encouraged to develop programmes specifically for refugees. Following the success of these experiences, in 2019, Hamburg increased funding and widened the target groups (Hamburg Department for Environment and Energy, 2019[52]).

Costa Rica's Liberty Park (2007) is a 32-hectare space for human development and social inclusion in an area inhabited by socio-economically disadvantaged and at-risk populations. It seeks to improve the quality of life in surrounding communities through economic, social and environmental development. The activities and services it offers target children and young people, women and the elderly. The Park's Center for Environmental Management and Education offers various education programmes to promote responsible and sustainable environmental management within the Park and in the surrounding communities. In 2021, 2 450 people participated in environmental programmes, mostly in direct capacity-building initiatives (Parque la Libertad, 2021[53]). In 2023, the Park opened a Center for Innovation and Creative Economy to promote innovation and creativity in children and youth and entrepreneurship across all ages. An earlier evaluation of the first 5 years of activities found that the Park works mostly with young people (71%) and of these, the majority are women (61%); many have not completed secondary education with an important share not completing primary education. The Park was perceived to have a strong positive influence on environmental protection practices such as planting plants and trees, separating waste and recycling and saving water and on the development of competencies such as teamwork, leadership, creative thinking, and self-efficacy (Ministry of National Planning and Economy of Costa Rica, 2016[54]).

A group of young female volunteers in **Chile** established the Climate Academy (2021), aiming to strengthen girls' capacity to implement environmental solutions. The Academy is a free, virtual four-month training and mentoring programme for 12-25 year-olds across Latin America and the Caribbean. Under the direction of the Tremendas foundation and in partnership with numerous universities, civil society organisations and private companies, the Academy promotes environmental learning through dynamic pedagogies such as group reflection and conflict resolution, and project- and enquiry-based learning. Students are encouraged and supported to design collaborative adaptation and mitigation projects in their homes and communities. The Academy records students' initiatives on a digital platform and identifies the carbon reduction impact of each one. In the first edition, 49 social impact projects and 500 individual actions were implemented in 16 Latin American countries by 600 participants, resulting in a reduction of over 8 tons of carbon emissions (Cognuck González and Sánchez, 2022[55]).

Other countries, including **Mexico** and **New Zealand** are working to better integrate young people from indigenous communities, and their knowledge and values, in environmental education efforts. The founding principles of **New Zealand**'s Enviroschools initiative (see below) draw heavily on Māori traditions and cultures, a feature that is seen as a leading strength. In addition, the Pūtātara programme (2020) a teaching and learning resource for students in lower secondary school is centred on three Māori concepts: *Tūrangawaewae* - Understanding where I stand; *Kaitiakitanga* - Caring for people and place; and, *Whakapuāwai* - Flourishing ever forward (New Zealand Ministry of Education, 2020[56]). The resource has been praised for its emphasis on the link between inquiry and action and the focus on place-based solutions, which is in the Māori tradition. However, its impact may be limited until there is a clearer inclusion of climate-change education within the New Zealand curriculum (Eames et al., 2020[57]). New Zealand is currently updating the national curriculum, including efforts to strengthen learning related to climate change. This aims to equip learners to be part of and contribute to an equitable transition to a low-emissions society.

Mexico's redesign and expansion of the Intercultural Universities programme (2023) includes the establishment of 2 indigenous universities and 1 dependency bringing the total to 17 a total of 13. Although not exclusively for indigenous learners, these institutions are in predominantly indigenous regions and seek to train people committed to local and regional development. Likewise, while the main aim of Intercultural Universities is to increase higher education enrolment and completion among disadvantaged and marginalised communities, there is a clear orientation towards teaching and research that promotes the value and protection of the natural environment and its responsible use (Perales Franco and McCowan, 2020[58]). In 2023, Mexico also developed and implemented two new career paths for these institutions: Agroecology and community management, and traditional food, cultural gastronomy and nutrition. Analyses of the programme prior to 2023 indicate that the universities have been successful in raising

participation in higher education among indigenous communities and in facilitating intercultural exchange. However, there is scope to do more to establish the universities as engines of local and regional development (Schmelkes, 2013[59]).

Policy lessons for fostering environmental agency and engagement among all learners

Recent data and analysis from these and other policy experiences to strengthen all learners' environmental agency and engagement offer emerging lessons to help guide education systems' efforts in 2024.

Better understand and communicate the co-benefits of promoting environmental agency and engagement to help build support for these efforts, particularly when targeting students with specific needs and experiences

Today's education systems and the people within them face competing and ever-changing pressures. Therefore, to have impact, any effort to promote learners' environmental action will need to build strong political and sectoral support by convincing a wide range of stakeholders of their specific added value. Emphasising the co-benefits of these policy efforts for wider educational, social and environmental outcomes could be useful in this regard.

- In PISA 2018, on average across OECD countries, a one unit increase in the index of self-efficacy was associated with a 7-point increase in reading scores, reaching up to 15 points in some countries (OECD, 2019[18]). The same increase in self-efficacy is associated with a 0.38 increase in the number of environmental actions students take, reaching over 0.5 in some countries (on a scale of 0-5) (OECD, 2020[22]).
- To build greater political and sectoral support for implementation, in 2024, policymakers can generate better evidence regarding the various benefits of action-oriented policy efforts for students and their communities, as well as disseminating findings in ways tailored to different audiences.
- The policies analysed for this section reveal important co-benefits beyond positive environmental impact and capacity to increase learner agency. In France, eco-delegates of all ages strengthen their 21st century competencies such as communication and collaboration. In Portugal, the introduction of the Schools Participatory Budget has increased students' engagement in school life and their sense of belonging (OECD, 2023[60]). Co-benefits may be particularly strong for vulnerable or disadvantaged students. In Hamburg (Germany) the action-oriented environmental programmes have been seen to be particularly valuable in supporting the social integration of refugees. Meanwhile, in Italy, the UPSHIFT programme has had a valuable impact on participants' socio-emotional skills including self-regulation and self-confidence.

Empowered educators and broader learning contexts can nurture a culture of collective environmental action

Limiting global warming to 1.5°C and avoiding irreversible climate tipping points requires reducing net emissions of greenhouse gases by 43% by 2030 compared to 2019 levels, reaching NetZero by 2050 (IEA, 2022[61]). The scale of the challenge necessitates a whole-of-society effort. This must include educators and educational institutions, not only to drive behavioural and lifestyle changes among learners but also to stimulate collective action and model the transition to greener operations at scale.

As shown in Chapter 4, several cross-sectoral strategies point to the role of education in the transition towards greener and fairer societies, including "greening" how education itself is delivered. In the United States, schools are among the largest public sector energy consumers. They have the country's biggest mass transit fleet, cover two million acres of land, and serve over seven billion meals annually (K12 Climate Action Commission, 2021[62]). In the United Kingdom, the tertiary education sector alone has been

estimated to have a total carbon footprint of 18.1 MtCO2e, equivalent to around 5.5% of the country's CO2 emissions in 2022 (Royal Anniversary Trust, 2023[63]; Department for Energy Security and Net Zero of the United Kingdom, 2023[64]).

As carbon foot-printing improves, so too do methods to assess the nuances of climate-related risks. It is increasingly clear that climate change is at once global in scale and inherently local in nature. Recent OECD analysis highlights the extent to which exposure to interconnected climate-related hazards varies depending on the location of people and assets. For example, among OECD members, the share of local population exposed to river flooding can differ by up to 70 percentage points between subnational regions within a single country (Maes et al., 2022[65]). Mitigation and adaptation efforts designed and realised at community level are therefore essential.

The scale of education's potential contribution to the drive to NetZero, and the local nature of climate-related disruptions highlight the need to foster a culture of environmental action not only within individual learners—as explored in the first half of this chapter—but also within each education institution and the community partnerships that make up the broader learning context. These endeavours are mutually reinforcing. A contextual culture oriented towards collective environmental action is likely to accelerate individual behaviour change: research has identified a tendency among people to act only when peers are seen to be acting in the same direction (Dubois et al., 2019[66]). In addition, engaging in collective action, as part of intergenerational and transdisciplinary groups, can empower learners to effect enduring change in a variety of ways and on different scales (White et al., 2023[67]).

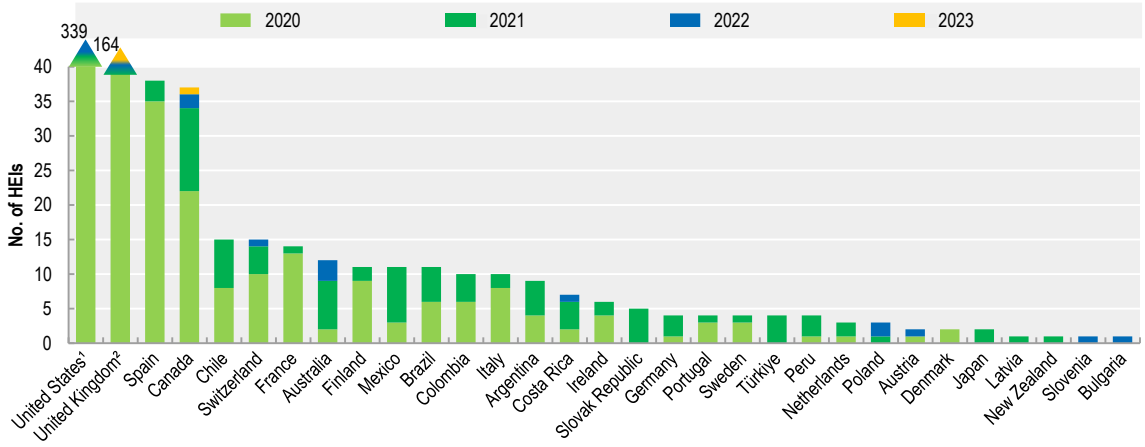
Moreover, there are several wider co-benefits to stimulating collective action. Involvement in community programmes strengthens learners' educational and political engagement, fosters interpersonal skills, social and civic networks and enhances the relationships between learners, schools and their communities (OECD, 2023[60]). Channelling collective action through educators and education institutions ensures these experiences are conscious learning opportunities, capable of enhancing an individual's capacity for critical thinking, empathy, collaboration and communication (White et al., 2023[67]). These co-benefits are important as when environmental action helps address wider societal challenges, there is potential for an accelerated and transformational impact on climate change mitigation and adaptation (OECD, 2019[10]).

Collective environmental action in education institutions and communities is also crucial in building system resilience. The OECD's *Framework for Resilience and Responsiveness in Education Policy* defines resilient broader learning environments as those in which education settings convene a wide range of actors to advance their work. In this way, outward facing educators and institutions that build partnerships and seek learning opportunities beyond classrooms make systems capable of ensuring greater continuity during moments of disruption and innovation (OECD, 2021[4]). Collective environmental action at institutional and community level can also help dismantle the prevailing deficit model where youth view adults as extractive forces and adults view youth as victims lacking agency. Instead, by building a sense of collective efficacy together, young and old learners can envisage a more positive, and hopeful way forward (White et al., 2023[67]). In an age of growing distrust and mental health concerns among young people, this is particularly valuable.

Transforming today's educators and broader learning contexts to embody a culture of environmental collective action that extends into the local community and beyond will require considerable policy efforts. In 2024, in a context of growing external and internal pressures on public funds, policy makers will need to make a convincing case for investing resources in efforts to reduce emissions and embed more sustainable operations across the vast public education estate. More is also required to convince HEIs and other private education actors of their role. As Figure 2.4Figure 2.4. illustrates, although a large total number of institutions in OECD Member and Accession countries have signed up to the United Nation's Race to Zero alliance, institutions from certain countries dominate and the pace of registration is falling annually.

Figure 2.4. Among higher education institutions (HEIs), momentum to reduce emissions is falling

The number of HEIs signing up to the UN's Race to Zero initiative, by country and year



Note: 1. Values for the United States are: 2020, 332 institutions; 2021, 5 institutions; 2022, 2 institutions. 2. Values for the United Kingdom are: 2020, 41 institutions; 2021, 99 institutions; 2022, 16 institutions; 2023, 8 institutions. Countries are shown in descending order by total number of participating institutions. OECD Member and Accession countries with no participating institutions are not shown.
Source: UNFCCC (2023[68]), *Race to Zero*, https://climatechampions.unfccc.int/join-the-race/whos-in/ (accessed on 14 August 2023).

StatLink https://stat.link/3vtso5

Moreover, educators will need further support to enhance their capacity to promote environmental learning through collective initiatives, to strengthen collaboration with environmental education actors beyond schools and to find the confidence and resources to take their teaching outside of the classroom. Here again, data suggests this will require a transformation in current practices. In a recent cross-country survey, in most of the participating OECD countries, around 50% of teachers reported valuing collaboration and being encouraged to collaborate. However, the share of those reporting actual engagement in active collaboration rarely reached 20% (Economist Impact, 2022[69]). In a context of growing disruption and change, the concept of connective professionalism, whereby the work of education professionals is more relational, interdependent, process-centred and networked is gaining traction but is not yet being put into action (McGrath, 2023[70]).

Selected recent policy efforts

While the analysis in the first half of this chapter explored ways in which policy can support learners to translate environmental knowledge into action by developing the internal factors required to act, the following policy analysis explores the approaches education systems are taking to establish external conditions conducive to environmental action. This includes efforts to empower teachers and other educators to promote environmental action through professional learning and collaboration, and measures to establish action-oriented cultures in education institutions and broader learning contexts. Lessons learned from the policies analysed refer to the policy makers' need to broaden the scope of actors engaged to nurture collective environmental action, as well as to mobilise new cross-sectoral resource streams to reach a critical mass of learners.

Developing professional supports that help educators implement active environmental learning

Educators—both formal educators working in institutions and non-formal educators in community organisations—are key to ensuring all learners can access effective environmental education that encourages them to take action. Education systems are seeking to support educators by providing high-quality professional learning that brings together experts from different disciplines, and developing dedicated competence frameworks to empower teachers to reflect on their strengths and needs.

High-quality, interdisciplinary professional learning for educators

According to previous OECD evidence, four characteristics of effective professional learning for teachers are: 1) a content focus that helps teachers strengthen their classroom practice; 2) active learning and collaborative methods; 3) a school-embedded approach that grounds learning in the teacher's everyday working context; and, 4) a sustained duration that allows time for implementation and reflection (OECD, 2020[71]). Policy analysis undertaken for this report reveals that alongside these aspects, high-quality professional development for environmental learning also draws on the expertise of actors from different disciplines and beyond education.

Professional development programmes which are of sustained duration, allow for active learning and reflection cycles and leverage specialist content from other professionals exist in some education systems, either with financial support from the government, as in **Finland** and the **United States**, or run by a government body as in the **Flemish Community of Belgium**. In **Finland**, the *Transformer 2030 programme* (2018-23) is a one-semester training programme for teachers, coordinated by Fingo, an umbrella body for civil society organisations. The programme includes a preliminary assignment, three in-person training days and the implementation of a school-based project. The training days combine theory with different sustainability practices and are delivered in collaboration with researchers and informal education organisations (OKKA Foundation, 2022[72]).

At higher education level, in the **Flemish Community of Belgium**, the Sustainable Education Hub—the centre of expertise on sustainability education for the Flemish government - runs a *support programme for HEIs* in which it accompanies teaching staff, management and students to embed sustainability and sustainability competences in curricula. Support can range from ad hoc advice to ongoing accompaniment during the development and implementation of a change process (Sustainable Education Hub, n.d.[73]). Completed programmes include a design process with Artevelde University College in which the Sustainable Education Hub facilitated a problem-framing workshop followed by a 4-day design sprint to co-develop measures to incorporate sustainability education in teaching and learning and develop a detailed implementation plan. Other projects have focused on supporting teacher education departments, wider faculty and students to explore and better understand sustainability challenges and competencies in order to embed them in their work.

In **Maryland** and **Delaware (United States)**, annual *Climate Change Academies* (2012), support a cohort of teachers to develop inquiry-driven teaching content to use with students. The model has developed over time from a 5-day intensive residential course combined with in-person follow up to more frequent sessions (in-person and online), shorter in duration and more focused on modelling pedagogies and teaching activities. Moreover, in response to teachers' demands to integrate student-action elements, the Academies have increasingly emphasised mitigation approaches, and local and regional adaptation challenges (Drewes, Rogers and Petrone, 2020[74]). The Academies are a legacy initiative of the Maryland and Delaware Climate Change Education, Assessment and Research program (MADE-CLEAR, 2012-18), which aimed to provide high-quality professional development in climate change education. Funded by a one-off award from the National Science Foundation, the programme developed in-person and online training, scientifically accurate resources, and online content. The activities were designed and

implemented by a community of climate scientists, teacher educators and teachers, and led by two HEIs (Drewes, Rogers and Petrone, 2020[74]).

Alongside these intensive training programmes, education systems including **Chile**, **Austria** and **Colorado (United States)**, are working to promote professional learning for environmental education through collaborative networks and learning communities. These may be targeted towards formal educators specifically, or bring together formal, non-formal and informal actors in the environmental education space.

In **Chile**, the *Network of Environmental Educators* of the *Environmental Interschool* programme (2022) aims to provide educators from various education contexts with a space to discuss, collaborate and co-create. The Network meets regularly online to work on key topics in small groups organised geographically. In the first year, topics included outdoor education, addressing COP27 and the Sustainable Development Goals through environmental education, and networking. In 2022, 379 educators joined the network; by 2023, it had 590 members. The Network hopes to continue expanding and strengthening the collaborative work by territory including by establishing joint face-to-face projects (Interescolar Ambiental, 2022[75]). The professional network is part of the wider Environmental Interschool initiative (2019), which offers a digital platform and mobile application with a range of free resources and activities. The initiative has received recognition for its innovative approaches including a national award for innovation in education (2020).

The *Network for Greening Schools* (ÖKOLOG, 2001) is **Austria**'s largest network for schools and the environment and is a leading example of common efforts across countries to stimulate a green institutional culture (see below). In Austria's case, the network approach has been found to play a particularly important role in empowering teachers and school leadership teams to develop environmental education practices and in offering them a useful source of information and experience for peer learning. By 2018, analysis of the initiative found that participation in ÖKOLOG facilitated an increased consideration of sustainability issues, a change in pedagogies to more research- or project-based, collaborative and exploratory teaching and, within students, greater creativity, self-reflection and problem solving competences (Swatek and Rauch, 2020[76]). The national network is coordinated by the Federal Ministry of Education, Science and Research and the Institute for Teaching and School Development at the Alpen-Adria-Universität Klagenfurt. Within each region, a team of representatives from the school board, teacher training college, teacher cohort and other relevant actors offers needs-oriented support across a regional network including information and resources or training opportunities to participating schools. In 2023, around 15% of all schools in the country are members as well as 13 teacher training colleges (ÖKOLOG, n.d.[77]).

In **Colorado (United States)**, four *Regional Environmental Education Leadership Councils* (2012) work to build and support an active network of diverse actors to help implement the Environmental Literacy Plan (2012, updated 2022). As of 2022, Councils are expected to establish annual goals and tangible methods for evaluating those goals (Colorado Department of Education, 2021[78]). The Councils are made up of representatives from formal and non-formal education, agriculture, energy, forestry, tourism, and recreation and culture. In 2017, the regional councils created a five-year implementation plan to scale efforts to reach more districts and involve additional partners in outreach and support to teachers. Since then, to better meet these localised needs, Council members have been working to identify and develop local environmental learning champions among educators. By 2019, champions existed in 30 of Colorado's 178 school districts. Amongst other activities, the Councils run professional development for teachers, networking opportunities between non-formal providers and teachers and knowledge sharing initiatives (North American Association for Environmental Education, 2019[79]).

Dedicated practical frameworks to guide teachers' professional learning and teaching

Finally, a small number of recent efforts indicate that some education systems, including **Austria, Hungary** and the **Flemish Community of Belgium** are working to develop practical tools that help teachers embed environmental education in their professional development. **Austria** launched the *Competency Compass for Environmental Education for Sustainable Development* (2019) to enhance support for educators to

improve their related skills and competencies and make them more visible. In this way, the Compass supports the implementation of the new primary and lower secondary curricula (2023) and the Basic decree for environmental education for sustainable development (2014), which include environmental education. The Compass, a digital tool, allows teachers to self-assess their acquired competences in environmental education, supporting them to reflect on their practices and identify professional development needs, as well as providing the basis for an evidence portfolio. It also supports teacher educators and trainers by providing a framework for course curricula (Austrian Federal Ministry of Education, Science and Research, 2022[80]). Based on the pilot implementation phase (2019-22), Austria has developed examples of essential pedagogies and practical activities that help promote environmental education in schools. A final version of the compass was published in 2022. However, implementation will require further nuancing by teacher profile and route into the profession to make up for existing asymmetries (Hobusch and Froehlich, 2021[81]).

Similarly, **Hungary** has defined *Education for Sustainability Competences* (2018) for teachers. The competences are operationalised via standards and indicators across all levels of education and for all stages of career progression. Hungary has integrated these into the wider competence portfolio for educators and into teacher evaluation processes. Teachers are therefore expected to regularly collect evidence of their integration of the competences in their daily work. Hungarian teachers generally reacted positively to the introduction of the competences and, since 2018, almost 35 000 teachers have been evaluated against the education for sustainability criteria. Analysis of this initiative identifies that locating specific competences for environmental education within a career progression process has been a means to raising motivation for developing related knowledge, skills and attitudes and embedding related processes and content in teaching for all subjects (Réti, Lippai and Nemes, 2022[82]). Pre-existing efforts to promote education for sustainable development in Hungary, through a clear policy framework and wide-reaching whole-school initiatives (see below) also ensured a conducive implementation environment for the policy (Tilbury and Mulà, 2023[83]).

In **Belgium (Flemish Community)** the Sustainable Education Hub has introduced a *Rubric for Sustainability Competencies* (2022) to support higher education educators to better develop these in their students. Designed principally for teacher educators, the initiative includes an interactive tool allowing educators to self-assess the extent to which each of the six sustainability competencies and their underlying criteria are included in their course curriculum. Each category has a description of what must be visible in the teaching-learning situation to justify the choice of that category (absent, limited presence, sufficient or maximum). Based on the teachers' categorisation, they receive feedback on what they are doing and feedforward on how to make their work more effective (Janssen and Vleeschouwer, 2022[84]). The initiative responds to findings of a system analysis of sustainability in Flemish higher education. This project identified that one way to enhance the integration of sustainability in teaching and learning was to embed a clearer and more concrete understanding of the sustainable competencies that higher education needs to develop in students (Deleye, van Poeck and Block, 2017[85]).

Nurturing action-oriented institutional cultures through networks and quality-management processes

A whole-school approach is at the heart of many strategic frameworks to support environmental education at national and international level. It is about ensuring education institutions make a daily commitment to sustainable development through what students learn, how the school operates and connections between the school and community actors. By modelling responsible living, engaging learners in decision making and involving them in meaningful local and global projects, this promotes environmental action among learners (Tilbury and Galvin, 2022[86]). However, institutional change of this nature is not easy. To support education institutions to develop a culture oriented to environmental action, education systems are promoting institutional networks and adjusting quality-management processes.

Institutional networks to nurture a holistic approach to culture change

To support education institutions in these endeavours, the most common approach across systems is to encourage, facilitate or incentivise participation in international or national institutional networks for environmental education. Common features of such networks include criteria to become a member, with different membership levels depending on breadth and depth of engagement, technical support from central or regional network coordinators and efforts to share good practices across the network. The following analysis offers insights from both well-established and emerging network initiatives.

In **Hungary**, the *Green Kindergarten Network* (2006) is one of the few examples of a dedicated network for ECEC settings, which are more commonly included in the school networks. Coordinated by the Ministry of Energy and the Ministry of National Resources, it covers almost 25% of kindergartens nationally. Recent efforts to expand and strengthen the network include extending the mentoring system between settings, increasing related accredited teacher training opportunities and enhancing supporting pedagogical resources. An evaluation of environmental education in Hungary in 2019 noted a steady rise in the number of participating settings in the Network. Identified strengths include the tiered system by which longer-serving members of the Network who demonstrate deeper and broader engagement with the criteria can become "retaining" or "permanent" green kindergartens. These settings are expected to contribute to knowledge-mobilisation efforts, peer mentoring and training across the network. The evaluation recommended emphasising the related pedagogical work of settings further and building a new system to incentivise participation (Hungarian Environmental Education Association, 2019[87]). Hungary's recent efforts to embed education for sustainability competences in educators' career pathways (see above) could indirectly support these endeavours.

The *Enviroschools Programme* (1993) in **New Zealand**, emphasises action-learning and cultural responsiveness, and is notable for drawing strongly on indigenous perspectives from Māori communities. In 2022, over one-third of schools in New Zealand were involved and the programme continues to grow (New Zealand Ministry of Education, 2022[88]). It is run by the Toimata Foundation with financial support from the Ministry for the Environment and other government and civil society actors. In 2021, two new funding streams have brought new action-learning opportunities to the participating schools. The Earthwise Action Fund is available to support existing and emerging local initiatives that help to nurture the environment and people in sustainable ways. In addition, funding from the One Billion Trees initiative is allocated to regional networks to support recovery efforts from recent natural disasters (Enviroschools, n.d.[89]). The Enviroschools Programme has been evaluated several times. Identified strengths include the positive influence on school interactions with families and the wider community, as well as more sustainable practices in the school and related content in teaching and learning. For learners, participation in the Programme is seen to enhance citizenship, environmental and social skills, and engagement in learning (Eames and Mardon, 2020[90]).

The *Eco-Schools programme* is perhaps the largest international institutional network, covering 74 countries. The founding principle of the Eco-Schools programme is a student-led, bottom-up approach to increase student ownership for improving the environmental and social impact of their school. With over 90% of schools participating as of 2022, **Wales (United Kingdom)** has one of the highest participation rates in the world (Byrne et al., 2023[91]). Since 2011, the programme has been managed by Keep Wales Tidy, a charity that received central funding from the government. The Welsh government increased funding for the programme from 2020; however, given the recent cost-of-living crisis, growing scale of the environmental challenge and the disruptions to the management and expansion of the network during the COVID-19 pandemic, the government commissioned a further review in 2022 to explore future funding options for the programme. Among other strengths, the review emphasised the importance of the local, individualised support offered to schools and the strong collaborative relationships between the in school Coordinators and the Officers representing the network.

In other education systems, similar initiatives have a strong focus on greening school operations to enhance efficiencies, model sustainable living to students and contribute to strategic commitments to reduce emissions. In **Korea**, the Ministry launched the *Carbon Neutral Schools initiative* (2021) in collaboration with six related ministries, including the Ministry of Environment, the Ministry of Agriculture, Food and Rural Affairs, the Ministry of Oceans and Fisheries, the Korea Forest Service, and the Korea Meteorological Administration. Schools (and ECEC settings from 2022) participate as "pilot institutions" (the majority), "priority institutions" (receiving extra resources and support, particularly with infrastructure adaptations) or, from among those who have previously participated, "leading institutions" tasked with supporting new participants and initiating knowledge sharing. Each of the Ministries involved supports the schools through programmes relevant to their sectoral expertise. For example, the Ministry of Environment runs climate and environmental education help desks, and the Korea Meteorological Administration offers climate change science professional development and experiential learning opportunities. The initiative is still young, but the number of participating schools is growing quickly (Korean Ministry of Education, 2022[92]).

Around 55% of schools in **Victoria (Australia)**, participate in *Resource Smart Schools* (2008). This is a free programme offered by Sustainability Victoria (the State Department for Environment) which seeks to support schools to embed sustainability in "everything they do", particularly operations. Some recent measures to strengthen the programme include launching an online portal through which schools can engage in training and access resources, such as an online sustainability framework and an Environmental Management System (Sustainability Victoria, 2022[93]). Since 2008, it is estimated that participation in the programme has led schools to save over AUD 41 million and more than 118 000 tonnes of greenhouse gas emissions (Sustainability Victoria, 2023[94]).

In the **Flemish Community of Belgium**, *MOS Flanders* (2002), a partnership between the Flemish government, the Flemish provinces and the Flemish Community Commission, runs the Eco-Schools programme and other related initiatives. As of 2023, MOS Flanders supports around half of Flemish schools to adopt a whole-school approach to sustainability education offering customised guidance, training and networking on greening school operations and promoting environmental learning. In place since 2002, recent work has a strong emphasis on greening school spaces both to provide more scope for outdoor learning and to foster greater environmental affection among students. This is partly a response to evaluation findings that while a strong positive impact on environmental knowledge in primary and secondary education was being observed in MOS schools as compared to non-MOS schools, only a small positive impact was being observed on environmental behaviour and affection and this was only among primary students. The evaluation made several recommendations to enhance the work of MOS including shifting the focus from building cognitive skills and knowledge to fostering affective values and behaviours, embedding more green spaces at schools, increasing outdoor learning and encouraging extensive student participation in order to build a greater sense of student ownership of environmental care at the school (Boeveÿde Pauw and Van Petegem, 2013[95]).

Quality-management processes to formalise efforts to shift institutional culture

Alongside institutional network approaches, some education systems, including **France, Scotland (United Kingdom)** and **Austria** are developing quality assurance and monitoring and evaluation measures to be used at institution level to incentivise or support the development of a culture of collective environmental action.

In 2013, **France** launched the *E3D quality label* to formally recognise education institutions adopting a whole-school approach to sustainable development. In 2020, this initiative was strengthened as part of wider efforts to advance education for sustainable development. New measures include awarding labels to networks or groups of institutions within the same territory, including those that cover multiple education levels or sectors or those that are specific to a certain type of school such as priority education institutions (i.e. those serving socio-economically disadvantaged communities). This group label comes with additional

criteria for collaborative structures such as preparing a collaborative diagnostic report and establishing a regional oversight body (French Ministry of National Education and Youth, 2020[96]). By 2022, around 17% of pre-primary to upper secondary schools in both the general and technical or professional sector in France have an E3D label at one of three levels (commitment, deepening and expertise). The label is assigned by the regional education authority (Eduscol, 2023[97]).

Through a collaborative partnership among universities, government agencies, and civil society organisations, **Scotland (United Kingdom)** has developed a flexible six-step *Framework for Monitoring and Evaluating Education for Sustainable Development in Higher Education* (2023) (White et al., 2023[98]). The Framework aims to help institutions map their efforts, assess their quality and depth and evaluate impact. To accompany the framework, institutions can access a handbook and capacity-building workshops. The initiative responds to recognition that while several universities were monitoring their integration of sustainable development, they were largely assessing indicators of activity rather than more qualitative output-oriented measures such as the competencies developed or the impact. The framework is very recent but the participatory way in which it has been developed, with universities themselves leading the initiative can help create the conditions for effective buy-in.

In **Austria**, from 2019, sustainability is a central topic in the *higher education performance agreements* that public universities must establish with the Federal Ministry of Education, Science and Research. Already present in the agreements for 2016-18, the emphasis was strengthened in the more recent round of agreements to outline more specific objectives and actions including which of the Sustainable Development Goals (SDGs) the universities commit to addressing and how. The UniNetz network (2019) was established to foster peer support among universities to deliver on these commitments. This supports the implementation of the All-Austrian University Development Plan 2019-24, which also prioritises efforts to advance the implementation of the SDGs throughout the higher education system (Austrian Federal Ministry of Education, Science and Research, n.d.[99]).

Policy lessons for empowering educators and broader learning contexts

Analysis of these and other policy experiences that aim to nurture a culture of collective environmental action offer emerging lessons. These can help guide education systems' efforts to empower educators and broader learning contexts in the transition to greener and fairer societies in 2024 and beyond.

Expand the scope of policy efforts to nurture collective environmental action across all education levels and sectors, being responsive to their specific needs

The evermore immediate threat of climate crisis requires mobilising all learners and institutions across the entire education system. However, as seen in this chapter, the school sector consistently dominates both policy agendas and policy actions when it comes to promoting collective environmental action.

- In the EPO Survey 2023, education systems were asked to identify for which education levels promoting environmental and sustainability education (or equivalent) is a priority. While nearly all (94%) reported it as a priority for primary to upper secondary education, it was identified as a priority for ECEC by only 78% of systems, for post-secondary by 64%, for tertiary by 61% and for adult education by just 50%.
- To have transformative impact in 2024, education policy makers should seek to support institutions at all levels of the education system to promote collective environmental action. This will require exploring the experiences of educators at different levels and in different sectors to understand their specific needs, adapt ongoing initiatives to respond to them, and develop tailored policy efforts for currently underrepresented levels or sectors.
- School-level initiatives dominate the policies identified for this chapter although there are valuable examples from higher education too. While some policy efforts cover multiple education levels, particularly ECEC and schools, a one-size-fits-all approach may not always suffice. Evaluations of

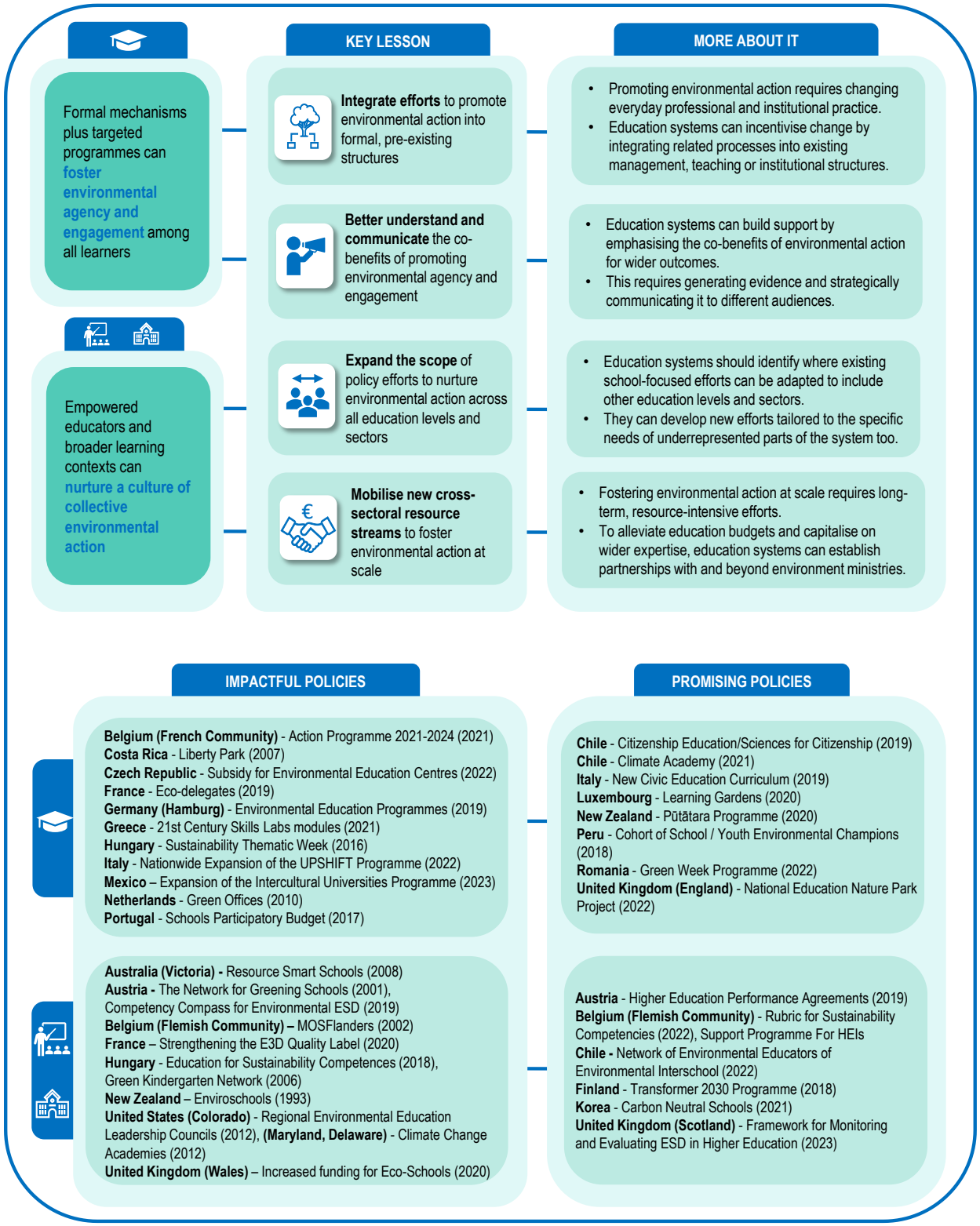
policies in New Zealand and France emphasise that even within school education there are important differences in implementing a whole-school approach to environmental education in upper secondary schools, where the assessment demands and separation between disciplines are greater, as compared to primary schools (Education Gazette of New Zealand, 2022[100]; Gough, Lee and Tsang, 2020[101]; Badier et al., 2022[102]). Moreover, experiences from the Flemish Community of Belgium indicate that efforts can have very different impacts on primary and secondary level students in terms of environmental behaviours and attitudes (Boeveÿde Pauw and Van Petegem, 2013[95]).

- Mobilise new cross-sectoral resource streams to reach a critical mass of learners and foster environmental action at scale
- The policies analysed in this section are of a promising or impactful nature but very few reach a critical mass of institutions, educators, or students. Yet the education sector will only have a transformative impact on climate mitigation and adaptation by fostering environmental action among learners at scale.
- In the EPO Survey 2023, participants were asked about the extent to which the Ministry of Education (or equivalent) collaborates with other actors on matters related to the transition to a green and fair society. While 72% reported collaborating “to a great extent” with the ministry of environment (or equivalent), collaboration with other key actors who could offer valuable resources or expertise appears less developed. For example, much smaller shares reported collaborating “to a great extent” with civil society actors (31%) and industry, business and employers (9%) (See Chapter 4).
- In 2024, to alleviate stretched education budgets and increase the scale of policy efforts, education systems can identify opportunities for partnerships with other actors (including other ministries, but also civil society or the private sector) to deliver mutual benefit and capitalise on wider expertise.
- Time and resources are necessary to help instill a culture of collective environmental action among educators and institutions. Evaluations of the policies analysed in this section commonly identify their sustained duration as a key strength allowing time for reflection, evaluation and improvement (e.g. in Maryland and Delaware (United States)). Moreover, strong relationships built up over time are considered particularly important in creating thriving institutional and professional networks (e.g. in Wales (United Kingdom) and in Austria). This inherent need for time means high-quality policy efforts to foster environmental action are expensive and require broad institutional support.
- Cross-sectoral collaborations can alleviate already-stretched education budgets and help build a stronger support base for implementation. In Korea, a partnership approach between six Ministries comes with financial commitments (as well as specialist expertise) from across government. In Wales (United Kingdom), establishing funding streams from other government sectors by delivering mutually beneficial initiatives is identified as a way of strengthening the long-term future of the Eco-Schools programme. There are also efforts to seek financing from outside government: in Chile, the Ministry works in partnership with a B Corporation, Kyklos, specialised in promoting environmental culture and the circular economy, to deliver the Environmental Interschool programme.

Key messages

In 2024, as governments confront the urgency of the climate crisis, policy lessons and policy examples of efforts identified in this chapter can inform efforts to ensure all learners translate environmental awareness into action (see Figure 2.5).

Figure 2.5 Summary of policy lessons for translating environmental awareness into action



Note: "Impactful policies" are those with policy evaluations included in the analysis; "Promising policies" tend to be more recent policies that have design or implementation features aligned with empirical evidence of good practice.
Source: OECD (2023[3]) *Education Policy Outlook National Survey for Comparative Policy Analysis 2023: Empowering All Learners* to go *Green.*

References

Alarcon Castro, G. (2022), *Evaluación de la implementación de la Política Nacional de Educación Ambiental Peruana en niveles intermedios del istema educativo [Implementation evaluation of the Peruvian National Environmental Education Policy at intermediate levels of the system]*, https://conferenciaclacso.org/programa/resumen_ponencia.php?&ponencia=Conf-1-2624-90999&eje=4 (accessed on 14 August 2023). [48]

Arik, S. and M. Yilmaz (2020), "The effect of constructivist learning approach and active learning on environemntal education: A meta-analysis study", *International Electronic Journal of Environmental Education*, Vol. 10/2, https://dergipark.org.tr/en/download/article-file/845635 (accessed on 14 August 2023). [26]

Austrian Federal Ministry of Education, Science and Research (2022), *Kompetenzen von Pädagoginnen und Pädagogenzur Umweltbildung für nachhaltige Entwicklung [Competencies for educators and environemntal educators for sustainable development]*, https://www.bmbwf.gv.at/dam/jcr:06bbf49e-dd3e-4222-b6e8-610d899bf1fc/kompetenzen_paed_umweltbildung_f_nae.pdf (accessed on 14 August 2023). [80]

Austrian Federal Ministry of Education, Science and Research (n.d.), *Allianz Nachhaltige Universitäten und ihr Projekt UniNEtZ [Alliance for Sustainable Universities and the UniNEtZ project]*, https://www.bmbwf.gv.at/Themen/HS-Uni/Hochschulgovernance/Leitthemen/Nachhaltigkeit/Allianz-Nachhaltige-Universit%C3%A4ten-und-das-Projekt-UniNEtZ-%E2%80%93-Universit%C3%A4ten-und-Nachhaltige-EntwicklungsZiele.html (accessed on 14 August 2023). [99]

Badier, W. et al. (2022), *L'éducation au développement durable et la labellisation E3D1 [Education for sustainable development and E3D1 certification}*, https://hal.science/hal-03566225/document (accessed on 12 September 2023). [102]

Boeveÿde Pauw, J. and P. Van Petegem (2013), *Environmental care at school: Impact analysis and improvement proposals - Final report [Milieuzorg op school: Impactanalyse en erbetervoorstellen - Eindrapport]*, Edubron, https://www.researchgate.net/publication/259328045_Milieuzorg_op_school_Impactanalyse_en_verbetervoorstellen (accessed on 12 October 2023). [95]

Bois, E. et al. (2021), "Engagement des éco-délégués en collège et lycée : quel pouvoir d'agir ? [Involvement of eco-delegates in secondary schools: what power to act?]", *Tréma* 56, https://doi.org/10.4000/trema.7090. [42]

Bowers, A. and E. Creamer (2020), "A grounded theory systematic review of environmental education for secondary students in the United States", *International Research in Geographical and Environmental Education*, Vol. 30/3, pp. 184-201, https://doi.org/10.1080/10382046.2020.1770446. [27]

Byrne, M. et al. (2023), *Review of the Eco-Schools Environmental Education Programme in Wales (2018-2022)*, https://www.gov.wales/sites/default/files/statistics-and-research/2023-05/review-of-the-eco-schools-environmental-education-programme-in-wales-2018-2022-summary.pdf (accessed on 14 August 2023). [91]

Chilean Ministry of Environment (2020), *Educación ambiental: Una mirada desde la institucionalidad ambiental chilena [Environmental education: A look at Chilean environmental institutionalisation]*, https://bibliotecadigital.mineduc.cl/bitstream/handle/20.500.12365/17610/Libro-EA.pdf?sequence=1&isAllowed=y (accessed on 14 August 2023). [40]

Cognuck González, S. and Y. Sánchez (2022), *De las palabras a la acción: El rol de las personas jóvenes en la acción climática [From words to action: The role of young people in climate action]*, UNICEF, https://www.unicef.org/lac/media/41066/file/De-las-palabras-a-la-accion-unicef-meri.pdf (accessed on 14 August 2023). [55]

Colorado Department of Education (2021), *Colorado's Environmental Education Plan: Advancing Environmental Literacy in Colorado*, https://caee.org/sites/default/files/documents/2-21%20Draft%20CO%20EE%20Plan.pdf (accessed on 14 August 2023). [78]

Correa, N. (2019), *Pueblos indígenas y población afrodescendiente [Indigenous peoples and afrodescendent populations]*, Food and Agriculture Organization of the United Nations, http://www.fao.org/3/ca5500es/ca5500es.pdf. [25]

Deleye, M., K. van Poeck and T. Block (2017), *Duurzaamheid binnen universiteiten en hogescholen [Sustainability within universities and colleges: A multi-level perspective on the Flemish higher education system]*, https://publicaties.vlaanderen.be/view-file/27827 (accessed on 14 August 2023). [85]

Department for Education of England (2022), *Policy paper: Sustainability and climate change: a strategy for the education and children's services systems*, https://www.gov.uk/government/publications/sustainability-and-climate-change-strategy/sustainability-and-climate-change-a-strategy-for-the-education-and-childrens-services-systems (accessed on 14 August 2023). [35]

Department for Energy Security and Net Zero of the United Kingdom (2023), *2022 UK greenhouse gas emissions, provisional figures*, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1147372/2022_Provisional_emissions_statistics_report.pdf (accessed on 14 August 2023). [64]

Drewes, A. and J. Henderson (eds.) (2020), *Climate change professional development approaches 'MADE CLEAR': looking back on one project and looking forward to the future*, Taylor & Francis. [74]

Dubois, G. et al. (2019), "It starts at home? Climate policies targeting household consumption and behavioral decisions are key to low-carbon futures", *Energy Research & Social Science*, Vol. 52, pp. 144-158, https://doi.org/10.1016/j.erss.2019.02.001. [66]

Dunlop, L. and E. Rushton (2022), "Putting climate change at the heart of education: Is England's strategy a placebo for policy?", *British Educational Research Journal*, Vol. 48/6, pp. 1083-1101, https://doi.org/10.1002/berj.3816. [36]

Eames, C. and H. Mardon (2020), *The Enviroschools Programme in Aotearoa New Zealand: Action-oriented, culturally responsive, holistic learning*, Springer Nature. [90]

Eames, C. et al. (2020), "Climate Change: Prepare Today, Live Well Tomorrow—A review", *Set: Research Information for Teachers* 3, pp. 40-47, https://doi.org/10.18296/set.0185. [57]

Earl, J., T. Maher and T. Elliott (2017), "Youth, activism, and social movements", *Sociology Compass*, Vol. 11/4, p. e12465, https://doi.org/10.1111/soc4.12465. [20]

Economist Impact (2022), *The Learning Ecosystems Framework*, The Economist Group, https://cdn.vev.design/private/BCwBc9ZFZyVz8yQQKr9VeLxSnjf1/97_NWlW5Wo_Economist%20Impact_Learning%20Ecosystems_Whitepaper.pdf.pdf (accessed on 14 August 2023). [69]

Education Gazette of New Zealand (2022), *Toimata: Two decades of education for sustainability*, New Zealand Ministry of Education, https://gazette.education.govt.nz/articles/toimata-two-decades-of-education-for-sustainability/ (accessed on 12 September 2023). [100]

Eduscol (2023), *La Labellisation E3D [The E3D Label]*, https://eduscol.education.fr/1118/la-labellisation-e3d (accessed on 14 August 2023). [97]

Enviroschools (n.d.), *New and Events: National*, https://enviroschools.org.nz/news-and-events/ (accessed on 14 August 2023). [89]

Filho, W. et al. (2019), "The role of green and Sustainability Offices in fostering sustainability efforts at higher education institutions", *Journal of Cleaner Production*, Vol. 232, pp. 1394-1401, https://doi.org/10.1016/j.jclepro.2019.05.273. [46]

French Ministry of National Education and Youth (2020), *Le Bulletin Officiel: Renforcement de l'éducation au développement durable [Official bulletin: Strengthening Education for Sustainable Development]*, https://www.education.gouv.fr/bo/20/Hebdo36/MENE2025449C.htm (accessed on 14 August 2023). [96]

Gordon, H. (2008), "Gendered Paths to Teenage Political Participation", *Gender & Society*, Vol. 22/1, pp. 31-55, https://doi.org/10.1177/0891243207311046. [23]

Gough, A., J. Lee and E. Tsang (eds.) (2020), *Green Schools Globally*, Springer International Publishing, Cham, https://doi.org/10.1007/978-3-030-46820-0. [101]

Government of Greece (2022), *Journal of the Government of the Greek Republic: Min. Decision 66152/GD4/2022*. [28]

Grant, D., A. Jorgenson and W. Longhofer (2018), "Pathways to Carbon Pollution: The Interactive Effects of Global, Political, and Organizational Factors on Power Plants' CO2 Emissions", *Sociological Science*, Vol. 5, pp. 58-92, https://doi.org/10.15195/v5.a4. [12]

Greek Institute of Education Policy (2022), *Αποτελέσματα αποτίμησης της εφαρμογής των Εργαστηρίων Δεξιοτήτων για το σχ. Έτος 2021-2022 [Evaluation results of the implementation of the Skills Workshops for 2021-2022]*, http://iep.edu.gr/images/%CE%95%CF%81_%CE%94%CE%B5%CE%BE_%CE%91%CF%80%CE%BF%CF%84%CE%AF%CE%BC%CE%B7%CF%83%CE%B7_%CE%95%CF%86%CE%B1%CF%81%CE%BC%CE%BF%CE%B3%CE%AE%CF%82_2021_2022.pdf (accessed on 14 August 2023). [29]

Green Office Movement (n.d.), *Explore 24 Green Office case studies*, https://www.greenofficemovement.org/green-office-case-studies/ (accessed on 14 August 2023). [45]

Hamburg Department for Environment and Energy (2019), *Learning from successful projects: Expanding environmental education offers [Aus gelungenen Projekten lernen: Umweltbildungsangebote ausweiten]*, https://www.hamburg.de/contentblob/12379148/30bc2240d5654b0d4b83f42091e6ea5e/data/ausschreibung.pdf (accessed on 14 August 2023). [52]

Hobusch, U. and D. Froehlich (2021), "Education for Sustainable Development: Impact and Blind Spots within Different Routes in Austrian Teacher Education", *Sustainability*, Vol. 13/21, p. 11585, https://doi.org/10.3390/su132111585. [81]

Hungarian Environmental Education Association (2019), *Nemzeti Környezeti Nevelési Stratégiai [National Environmental Education Strategy Review]*, https://mkne.hu/wp-content/uploads/2022/04/1_38_NKNSA_kezirat_.pdf (accessed on 14 August 2023). [87]

IEA (2022), *World Energy Outlook 2022*, OECD Publishing, Paris, https://doi.org/10.1787/3a469970-en. [61]

Interescolar Ambiental (2022), *Finalizó el primer año de la Red de educadores ambientales del Interescolar [The first year of the Interschool Environmental Educators Network ended]*, https://interescolarambiental.cl/finalizo-el-primer-ano-de-la-red-de-educadores-ambientales-del-interescolar/ (accessed on 14 August 2023). [75]

IPCC (ed.) (2023), *Climate Change 2022 - Mitigation of Climate Change*, Cambridge University Press, https://doi.org/10.1017/9781009157926. [1]

Janssen, T. and P. Vleeschouwer (2022), *Handvatten voor sterke duurzaamheidseducatie [Handbook for strong education for sustainability: Guide to the Rubric for Sustainability Competencies]*, https://publicaties.vlaanderen.be/view-file/51436 (accessed on 14 August 2023). [84]

K12 Climate Action Commission (2021), *K12 Climate Action Plan*, https://www.k12climateaction.org/blog/climate-action-plan-2021 (accessed on 14 August 2023). [62]

Korean Ministry of Education (2022), *보도자료 : 탄소중립 실천, 학교에서 시작합니다 [Press release: Carbon neutrality starts at school]*, https://www.moe.go.kr/boardCnts/viewRenew.do?boardID=294&boardSeq=90950&lev=0&searchType=null&statusYN=W&page=1&s=moe&m=020402&opType=N (accessed on 14 August 2023). [92]

Kristóf, H. et al. (2022), *Fenntarthatósági Témahét: Diákok és tanárok a fenntarthatóságról kutatási program [Sustainability Theme Week: Students and teachers in the sustainability research programme]*, https://www.fenntarthatosagikutatas.hu/letoltes/ft2022_jelentes_ELTE_vegleges.pdf (accessed on 14 August 2023). [30]

Kroufek, R. and J. Činčera (2021), *Metodický rámec pro environmentální gramotnost ve školách: Souhrnná zpráva [A methodological framework for environmental literacy in schools: Summary report]*, https://www.mzp.cz/C1257458002F0DC7/cz/environmentalni_vzdelavani_poradenstvi/$FILE/OFDN-Souhrnna_zprava_TITSMZP804-20210415.pdf (accessed on 14 August 2023). [33]

Lawson, D. et al. (2018), "Intergenerational learning: Are children key in spurring climate action?", *Global Environmental Change*, Vol. 53, pp. 204-208, https://doi.org/10.1016/j.gloenvcha.2018.10.002. [14]

Longhofer, W. et al. (2016), "NGOs, INGOs, and Environmental Policy Reform, 1970–2010", *Social Forces*, Vol. 94/4, pp. 1743-1768, https://doi.org/10.1093/sf/sow031. [13]

Lui, R. and K. Crisp (2019), *UPSHIFT: Innovating non-formal education for youth*, World Non-formal Education Forum, https://transformingeducationsummit.sdg4education2030.org/system/files/2022-08/Upshift._Empowering_youth_to_build_skills.pdf (accessed on 14 August 2023). [51]

Maes, M. et al. (2022), "Monitoring exposure to climate-related hazards: Indicator methodology and key results", *OECD Environment Working Papers*, No. 201, OECD Publishing, Paris, https://doi.org/10.1787/da074cb6-en. [65]

McGrath, J. (2023), "What systematic connections should we have around schools to support the work of teachers?: Global lessons and the potential of ambition loops", *OECD Education Working Papers*, No. 296, OECD Publishing, Paris, https://doi.org/10.1787/77de597c-en. [70]

Ministry of Education and Merit (2023), *Upshift Skills Development Programme*, https://istruzioneveneto.gov.it/wp-content/uploads/2023/01/UPSHIFT_UNICEF-MI_brief.pdf (accessed on 14 August 2023). [50]

Ministry of Education of Chile (2022), *Plan de formación ciudadana: Orientaciones para su elaboración y revisión [Citizen training plan: Guidelines for development and revision]*, https://convivenciaparaciudadania.mineduc.cl/wp-content/uploads/2022/01/Plan-Formacio%CC%81n-Ciudadana.pdf (accessed on 14 August 2023). [41]

Ministry of Environment of Czechia (2023), *Rekordních 105 milionů jde na klimatické vzdělávání [A record 105 million goes to climate education]*, https://www.mzp.cz/cz/news_20230428_Rekordnich-105-milionu-jde-na-klimaticke-vzdelavani (accessed on 14 August 2023). [34]

Ministry of Environment of Peru (2021), *Programa Municipal EDUCCA: Educación, cultura y ciudadanía ambiental EDUCCA [Municipal Programme: Education, culture and environmental citizenship]*, https://www.gob.pe/institucion/minam/campa%C3%B1as/130-programa-municipal-de-educacion-cultura-y-ciudadania-ambiental-educa (accessed on 14 August 2023). [47]

Ministry of National Education, Children and Youth of Luxembourg (2023), *Léieren am Gaart – Réseau des jardins pédagogiques: les enfants et jeunes à la découverte de la nature [Learning Gardens - Network of educational gardens: children and young people discovering nature]*, https://menej.gouvernement.lu/fr/support/recherche.gouvernement%2Bfr%2Bactualites%2Btoutes_actualites%2Bcommuniques%2B2023%2B05-mai%2B24-leieren-am-gaart.html (accessed on 14 August 2023). [37]

Ministry of National Planning and Economy of Costa Rica (2016), *Informe de evaluación del Parque La Libertad 2016 : tomo I [Evaluation report for Liberty Park 2016: Volume I]*, https://www.parquelalibertad.org/docs/tomolinformedeevaluacionparquelalibertad.pdf (accessed on 14 August 2023). [54]

Município Guimarães (2023), *Alunos das escolas de Guimarães votam no Orçamento Participativo 2023 [School students in Guimarães vote in the Schools Participatroy Budget 2023]*, https://www.cm-guimaraes.pt/viver/noticias/noticia/alunos-das-escolas-de-guimaraes-votam-no-orcamento-participativo-2023 (accessed on 14 August 2023). [49]

New Zealand Ministry of Education (2022), *Toimata: Two decades of education for sustainability*, https://gazette.education.govt.nz/articles/toimata-two-decades-of-education-for-sustainability/ (accessed on 14 August 2023). [88]

New Zealand Ministry of Education (2020), *Pūtātara: About this resource*, https://putatara.education.govt.nz/#/about (accessed on 14 August 2023). [56]

North American Association for Environmental Education (2019), *State Environmental Literacy Plans: 2019 status report*, North America Association for Environmental Education, https://cdn.naaee.org/sites/default/files/2022-07/naaee_selp_2019_status_report.pdf (accessed on 14 August 2023). [79]

OECD (2023), *Education Policy Outlook National Survey for Comparative Policy Analysis 2023: Empowering All Learners to Go Green*, OECD Publishing. [3]

OECD (2023), "Engaging young citizens: Civic education practices in the classroom and beyond", *OECD Education Policy Perspectives*, No. 65, OECD Publishing, Paris, https://doi.org/10.1787/2166378c-en. [60]

OECD (2023), *OECD Skills Outlook 2023: Skills for a Resilient Green and Digital Transition*, OECD Publishing, Paris, https://doi.org/10.1787/27452f29-en. [16]

OECD (2022), *Are Students Ready to Take on Environmental Challenges?*, PISA, OECD Publishing, Paris, https://doi.org/10.1787/8abe655c-en. [2]

OECD (2022), *Building Trust to Reinforce Democracy: Main Findings from the 2021 OECD Survey on Drivers of Trust in Public Institutions*, Building Trust in Public Institutions, OECD Publishing, Paris, https://doi.org/10.1787/b407f99c-en. [19]

OECD (2022), *Declaration on Building Equitable Societies Through Education*, OECD Publishing, https://legalinstruments.oecd.org/en/instruments/OECD-LEGAL-0485. [5]

OECD (2022), *Summary by the Co-Charis: Re-building an inclusive and equitable society through education*, OECD Publishing, https://www.oecd.org/education/ministerial/resources/ (accessed on 14 August 2023). [6]

OECD (2021), *Education Policy Outlook 2021: Shaping Responsive and Resilient Education in a Changing World*, OECD Publishing, Paris, https://doi.org/10.1787/75e40a16-en. [4]

OECD (2020), *Lessons for Education from COVID-19: A Policy Maker's Handbook for More Resilient Systems*, OECD Publishing, Paris, https://doi.org/10.1787/0a530888-en. [71]

OECD (2020), *PISA 2018 Results (Volume VI): Are Students Ready to Thrive in an Interconnected World?*, PISA, OECD Publishing, Paris, https://doi.org/10.1787/d5f68679-en. [22]

OECD (2020), *What Students Learn Matters: Towards a 21st Century Curriculum*, OECD Publishing, Paris, https://doi.org/10.1787/d86d4d9a-en. [7]

OECD (2019), *Accelerating Climate Action: Refocusing Policies through a Well-being Lens*, OECD Publishing, Paris, https://doi.org/10.1787/2f4c8c9a-en. [10]

OECD (2019), *PISA 2018 Results (Volume III): What School Life Means for Students' Lives*, PISA, OECD Publishing, Paris, https://doi.org/10.1787/acd78851-en. [18]

OKKA Foundation (2022), *Transformer 2030 (2018-2023)*, https://okka-saatio.com/transformer-2030-2018-2023/ (accessed on 15 August 2023). [72]

ÖKOLOG (n.d.), *ÖKOLOG: Home*, https://www.oekolog.at/ (accessed on 14 August 2023). [77]

Osler, A. and H. Starkey (2003), "Learning for Cosmopolitan Citizenship: Theoretical debates and young people's experiences", *Educational Review*, Vol. 55/3, pp. 243-254, https://doi.org/10.1080/0013191032000118901. [21]

Parque la Libertad (2021), *Parque la Libertad: Informe Anual 2021 [Liberty Park: Annual report 2021]*, https://www.parquelalibertad.org/docs/informe2021.pdf (accessed on 14 August 2023). [53]

Perales Franco, C. and T. McCowan (2020), "Rewiring higher education for the Sustainable Development Goals: the case of the Intercultural University of Veracruz, Mexico", *Higher Education*, Vol. 81/1, pp. 69-88, https://doi.org/10.1007/s10734-020-00525-2. [58]

Poirson, B. (2021), *Mission Education au Développement Durable : Propositions faisant suite au travail d'animation de la communauté des éco-délégués [Education for sustainable development mission: Recommendations following a year of facilitating the Eco-delegates network]*, https://ww2.ac-poitiers.fr/mission-edd/sites/mission-edd/IMG/pdf/t-l-charger-le-rapport-de-la-mission-parlementaire-ducation-au-d-veloppement-durable-89843.pdf (accessed on 14 August 2023). [43]

Réti, M., E. Lippai and M. Nemes (2022), "Framing the Frames: Integrating an ESD Approach Into an Existing National Framework", in *Sustainable Development Goals Series, Competences in Education for Sustainable Development*, Springer International Publishing, Cham, https://doi.org/10.1007/978-3-030-91055-6_12. [82]

Romanian Ministry of Education (2023), *Green Week: Home*, https://www.saptamanaverde.edu.ro/ro (accessed on 14 August 2023). [31]

Rousell, D. and A. Cutter-Mackenzie-Knowles (2019), "A systematic review of climate change education: giving children and young people a 'voice' and a 'hand' in redressing climate change", *Children's Geographies*, Vol. 18/2, pp. 191-208, https://doi.org/10.1080/14733285.2019.1614532. [15]

Royal Anniversary Trust (2023), *Accelerating the UK Tertiary Education Sector towards Net Zero*, The Royal Anniversary Trust, https://www.queensanniversaryprizes.org.uk/wp-content/uploads/2023/01/Accelerating-towards-Net-Zero.pdf (accessed on 14 August 2023). [63]

Schmelkes, S. (2013), *Las universidades interculturales en Mexico: ¿Una contribución a la equidad en educación superior? [Intercultural universities in mexico: What contribution to equity in higher education?]*, https://www.unich.edu.mx/wp-content/uploads/2013/09/Art.-Las-Universidades-Interculturales-en-M%C3%A9xico.pdf (accessed on 14 August 2023). [59]

Schofer, E. and A. Hironaka (2005), "The Effects of World Society on Environmental Protection Outcomes", *Social Forces*, Vol. 84/1, pp. 25-47, https://doi.org/10.1353/sof.2005.0127. [11]

Sustainability Victoria (2023), *About Resource Smart Schools*, https://www.sustainability.vic.gov.au/energy-efficiency-and-reducing-emissions/resourcesmart-schools/about-resourcesmart-schools (accessed on 14 August 2023). [94]

Sustainability Victoria (2022), *SV2030: A Decade of Action*, Sustainability Victoria, https://assets.sustainability.vic.gov.au/susvic/SV2030-Strategic-Plan.pdf (accessed on 14 August 2023). [93]

Sustainable Education Hub (n.d.), *Guidance during design processes*, https://omgeving.vlaanderen.be/nl/doelgroepen/hoger-onderwijs/begeleiding-bij-ontwerptrajecten (accessed on 14 August 2023). [73]

Swatek, E. and F. Rauch (2020), *Quantitative Erhebung zu Stellenwert und Wirkung von ÖKOLOG an Schulen [Quantitative survey on the importance and impact of ÖKOLOG in schools]*, https://www.oekolog.at/dokumente/86/Endbericht_%C3%96KOLOG_FB_Erhebung_2020_final1_QAUXMkL_4.pdf (accessed on 14 August 2023). [76]

Taft, J. (2014), "The Political Lives of Girls", *Sociology Compass*, Vol. 8/3, pp. 259-267, https://doi.org/10.1111/soc4.12135. [24]

Thøgersen, J. and C. Noblet (2012), "Does green consumerism increase the acceptance of wind power?", *Energy Policy*, Vol. 51, pp. 854-862, https://doi.org/10.1016/j.enpol.2012.09.044. [9]

Tilbury, D. and C. Galvin (2022), *Input Paper: A Whole School Approach to Learning for Environmental Sustainability*, Publicaitons Office of the European Union, https://education.ec.europa.eu/sites/default/files/2022-02/input-paper-whole-school-approach-sustainability.pdf (accessed on 14 August 2023). [86]

Tilbury, D. and I. Mulà (2023), *Learning from thirty years of experience: case studies in teacher education for sustainability*, Publications Office of the European Union, https://eenee.eu/wp-content/uploads/2023/03/Case_studies_teacher_education_.pdf (accessed on 14 August 2023). [83]

UNECE (2022), *Engaging young people in the implementation of ESD in the UNECE Region: Good practices in the engagement of youth in education for sustainable development*, https://unece.org/sites/default/files/2022-09/Engaging_Young_People_web_final_05.09.2022.pdf (accessed on 14 August 2023). [44]

UNESCO (2021), *Getting every school climate-ready: how countries are integrating climate change issues in education*, UNESCO, https://unesdoc.unesco.org/ark:/48223/pf0000379591 (accessed on 14 August 2023). [8]

UNESCO (2021), *Learn for our planet: a global review of how environmental issues are integrated in education*, UNESCO, https://unesdoc.unesco.org/ark:/48223/pf0000377362 (accessed on 14 August 2023). [39]

UNFCCC (2023), *Race to Zero*, https://climatechampions.unfccc.int/join-the-race/whos-in/ (accessed on 14 August 2023). [68]

UNICEF (2021), *The Climate Crisis is a Child's Rights Crisis: Introducing the Children's Climate Risk Index*, https://www.unicef.org/media/105376/file/UNICEF-climate-crisis-child-rights-crisis.pdf (accessed on 14 August 2023). [17]

Vasile, Andries (2022), *Modelul "Scolii Altfel" din România: O nouă perspectivă pentru învățământul general din Republica Moldova [The "Different Schools" model from Romania: A new perspective for general education in the Republic of Moldova]*, https://ibn.idsi.md/sites/default/files/imag_file/192-194_16.pdf (accessed on 14 August 2023). [32]

Wallonia-Brussels Federation, the Brussels Region and Wallonia (2021), *Action programme for the cooperation agreement in Environmental Education and Education for Sustainable Development between the Wallonia-Brussels federation, Wallonia and Brussels-capital region (2021-24)*, http://accordcooperation.blogspot.com/p/blog-page_7.html (accessed on 29 September 2023). [38]

White, P. et al. (2023), "Agency in the Anthropocene: Supporting document to the PISA 2025 Science Framework"*, OECD Education Working Papers*, No. 297, OECD Publishing, Paris, https://doi.org/10.1787/8d3b6cfa-en. [67]

White, R. et al. (2023), *A Handbook for Monitoring and Evaluating Education for Sustainable Development in Higher Education*, https://www.qaa.ac.uk/docs/qaa/members/handbook-for-monitoring-and-evaluating-esd-in-universities.pdf?sfvrsn=ac42af81_12 (accessed on 14 August 2023). [98]

3 Providing all learners with experiences to help them shape the green economy

The increasing frequency of extreme weather events and the imminent prospect that the planet will cross climate tipping points in the coming years mean the transition towards a low-carbon, resource efficient and socially inclusive economy has become an immediate priority for 2024 rather than a distant goal. The *OECD Declaration on Building Equitable Societies Through Education (2023)* outlines countries' commitment to ensuring that education and training equips people of all ages and backgrounds with the skills they need to thrive through this transition. To achieve this vision, policymakers must go beyond simply embedding green skills in the curriculum and updating the training offer. This chapter therefore explores how policymakers can provide all learners with active learning experiences that empower them to shape the green economy, drawing on an analysis of recent data and promising or impactful policy efforts. This analysis leads to policy lessons to guide policymakers efforts in 2024 and the mid-to-long-term.

In Brief

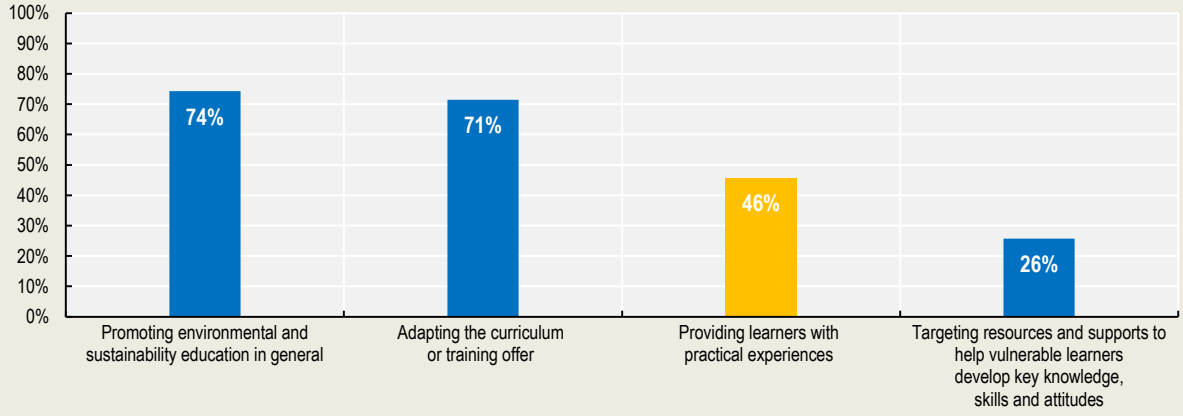
Providing all learners with experiences to help them shape the green economy

In 2024, countries and economies are likely to experience an increasing frequency of extreme weather events, with the imminent prospect that the planet will cross climate tipping points in the coming years. The transition towards a low-carbon, resource efficient and socially inclusive (or 'green') economy must become an immediate priority for 2024 rather than a distant goal. Governments have invested significantly in the green economy as part of COVID-19 recovery measures, but these investments will be wasted unless matched by measures to address skills deficits and ensure everyone can benefit.

To meet this challenge, policy makers must go beyond simply embedding 'green' content in the curriculum; they must work to provide all learners with opportunities to solve real-world problems, to work collaboratively, and draw on knowledge from different disciplines. However, the *Education Policy Outlook National Survey for Comparative Policy Analysis 2023: Empowering All Learners to go Green* indicates that policy makers are more likely to prioritise adapting the curriculum and training offer than providing learners with practical experiences that help them apply and further develop key knowledge, skills and attributes for the green economy. While 71% of participating education ministries indicated that the former was a priority to a great extent, only 46% indicated the latter (see Figure 3.1).

Figure 3.1. Few education systems prioritise providing learners with practical experiences for the transition to greener and fairer societies compared to adapting the curriculum

Percentage of participating education systems reporting prioritising policy areas "to a great extent" for the next five years



Note: Figure prepared with responses from 35 education systems.
Source: OECD (2023[1]), Education Policy Outlook National Survey for Comparative Analysis 2023: Empowering All Learners to Go Green.

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This chapter explores recent **relevant policy efforts** taking place across participating education systems, predominantly since 2020, to provide learners with experiences that will help them shape the green economy.

- For learners: Education systems are providing active learning experiences linked to the real-world to foster transversal competencies. This includes experiences outside of traditional classroom settings, such as the workplace, outdoors, or online. As well as addressing general skills shortages, several education systems have implemented measures to encourage underrepresented groups (e.g. girls and women, disadvantaged students, minorities) to enter key sectors such as science, technology, engineering and mathematics (STEM). These often combine practical experiences with targeted mentoring or career guidance.
- For educators and institutions: Recent professional learning initiatives aim to place teachers in the driving seat, and to give them opportunities to implement projects and test new approaches, often in collaboration with colleagues in other institutions or partners outside of the formal education sector. The COVID-19 pandemic has accelerated the trend towards more flexible forms of professional learning (e.g. online, blended). Governments are increasingly seeking to harness the innovative capacity of educational institutions to achieve short- and longer-term environmental goals. This includes measures to foster collaboration between higher education institutions and business or industry partners to address skills bottlenecks and stimulate research and innovation.

Recent data and analysis from these and other policy experiences offer some **emerging lessons** to help policy makers provide all learners with experiences to help them shape the economy in 2024. For learners, these lessons call on policymakers to monitor the longer-term impact of green skills initiatives to better understand what works, to use innovative methods and digital technologies to provide experiences for hard-to-reach populations, and to strengthen coordination and anticipation mechanisms to ensure the relevance of skills. For educators and institutions, the lessons encourage policymakers to value the role of parents of younger learners to challenge stereotypes and misconceptions which could hinder environmental values and behaviours to take hold, and to strengthen the role of leaders of education institutions to promote environments favourable to green innovation.

Infographic 3.1. Providing all learners with experiences to help them shape the green economy

Relevant policy efforts and lessons to support education systems

Introduction

In many respects, the green transition is already happening, although it risks being slowed down by skills bottlenecks. The COVID-19 pandemic has given a boost to the green economy, with governments investing significantly in key sectors as part of recovery measures (OECD, 2023[2]). This spending is likely to be matched by increasing investment in climate change adaptation as the extreme weather events experienced by populations across the world in 2023 become more frequent and more catastrophic (OECD, 2023[3]). Public and private investment in the green economy is already having an impact on the demand for labour and skills, with demand for green jobs growing faster than the demand for other jobs since the outbreak of the COVID-19 pandemic. This demand is likely to continue to grow in the coming years, exacerbating the skills shortages many countries are already experiencing in key sectors (OECD, 2023[2]).

Despite the growth in the overall demand for green jobs, however, the green transition risks exacerbating existing inequalities, bringing additional challenges to those who were hardest hit by recent shocks. As well as creating new employment opportunities, environmental policies will also lead to job losses in the short-term, particularly for people working in carbon-intensive sectors. Since green jobs tend to require a higher skill level and be concentrated in capital regions, recent investments in green sectors will not automatically benefit the most vulnerable workers (OECD, 2023[2]; McGrath and Powell, 2016[4]; OECD/Cedefop, 2015[5]; Ranworth, Wykes and Bass, 2014[6]). Policymakers must act now to avoid the risk that increased economic hardship undermines political support for environmental policies in the long-term (OECD, 2023[3]; Asai, Borgonovi and Wildi, 2022[7]).

In the *Declaration on Building Equitable Societies Through Education*, adopted on 8 December 2022, ministers and representatives of OECD member and partner countries outlined the vital role that education and training will play in ensuring individuals and societies thrive through this transition. The Declaration outlines countries' commitment 'to helping learners build skills for a digital, green, inclusive and democratic world' (OECD, 2022[8]). To achieve this vision, policy makers must go beyond simply embedding the skills for the green economy in the curriculum and updating the training offer. Rather, they must work to provide all learners with the transformative experiences that will empower them to shape the green economy.

Data from the *EPO Survey 2023* indicates that preparing learners for the green transition is a priority for education systems that could take further traction. Some 83% of participating education systems reported that **providing learners with practical experiences that help them apply and further develop key knowledge, skills and attributes for the green economy** was a priority to at least a moderate extent for the next five years (see Figure 3.2).

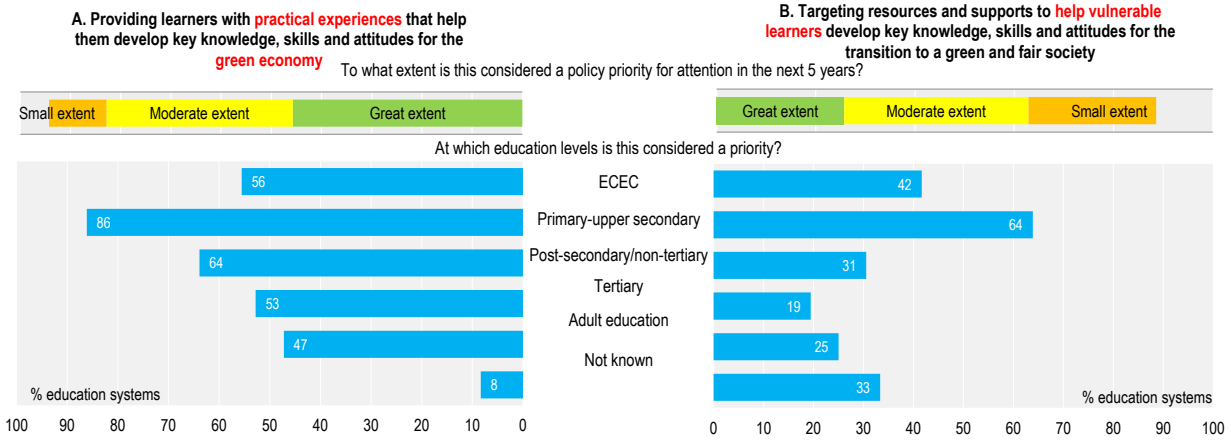
A significantly larger share (86%) of participating education systems reported that this was a priority for primary-upper secondary education compared to other education levels, suggesting school education is often the focus of efforts in these areas. Conversely, only 47% of participating education systems indicated that this was a priority for adult education. This finding is somewhat surprising given the vital role adult learning will have in addressing current skills shortages among the active population (OECD, 2023[2]). A smaller share of participating education systems (63%) reported that targeting resources and supports to help vulnerable learners develop **key knowledge, skills and attributes for the transition to a green and fair society** was a priority to a 'great' or 'moderate' extent, although they were also more likely to see this as a priority for primary to upper-secondary education compared to other education levels.

However, data collected by the *EPO Survey 2023* also suggests that education ministries were more likely to prioritise adapting the curriculum and training offer than providing practical experiences. While some 71% of participating education systems indicated that the former was a priority to a great extent, only 46% indicated the latter was a priority (see Chapter 1). Ensuring that everyone can play an active role in shaping the green transition involves more than simply embedding more 'green' content in the curriculum or creating new 'green' courses. To empower all learners to manage the complexity and uncertainty of the

climate crisis and necessary changes in the world of work, education must provide them with opportunities to solve real-world problems, to work collaboratively, and to draw on knowledge from different disciplines (Mulà et al., 2017[9]; LaForce et al., 2016[10]; Goos et al., 2020[11]; Lozano et al., 2019[12]).

Figure 3.2. Empowering all learners to shape the green economy is a priority for education systems, notably within school education

Education systems' reports of extent of prioritisation by policy area and education level



Note: Figure prepared with responses from 35 education systems.
Source: OECD (2023[1]), Education Policy Outlook National Survey for Comparative Policy Analysis 2023: Empowering All Learners to go Green.

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This chapter therefore explores how policy makers can provide all learners with experiences that empower them to shape the green economy through policy efforts aimed at:

Strengthening transversal competencies through active learning experiences (e.g. creativity, critical thinking, responsibility). This involves moving beyond curriculum reform and targeting resources and supports to the most vulnerable populations to ensure a just transition.

Promoting a culture of learning and collaboration in education institutions and nurturing external partnerships to strengthen teachers' use of active pedagogies and technical knowledge and to draw on resources from beyond the institution to provide active learning experiences.

For each of these areas, this chapter analyses relevant policy initiatives, principally across OECD education systems. This analysis leads to some policy lessons to guide policymakers short-term efforts in 2024, as well as medium-term efforts to advance the agenda set out in the *Declaration on Building Equitable Societies Through Education*. Lessons are then synthesised into key policy pointers for the longer-term.

Strengthening transversal competencies and targeting support can empower learners to shape the green transition

Moving forward to 2024, governments must ensure that recent investments in the green economy are matched by measures to ensure that individuals of all ages and backgrounds acquire the skills to benefit from the opportunities it offers. In many respects, these skills do not differ greatly from the skills people

need to thrive in the 'traditional' economy and promoting them will help learners thrive in all aspects of their lives. Recent empirical analysis by the OECD suggests that the skills categories that are likely to grow the most in demand by 2030 as European Union countries implement policy targets aimed at reducing greenhouse emissions include interacting with computers, creative thinking, analysing data and information, and communicating with people outside an organisation (Borgonovi et al., 2023[13]). Moreover, employers in previous studies have identified a lack of generic skills (e.g. literacy, numeracy, collaboration, communication, problem solving) as a key barrier to the green transition, suggesting these skills will continue to be important as economies transform (Miranda and Larcombe, 2012[14]). Previous analysis by the Education Policy Outlook points to a need to foster learners' agency and co-agency, and to promote transformative competencies—or the skills learners will need to transform society and build a better future—to empower them to respond to global challenges and adapt positively to uncertainty throughout their lifetime (OECD, 2021[15]; OECD, 2019[16]). This includes competencies such as critical thinking, a growth mindset, creativity, open-mindedness, and responsibility, all of which will be important for the green transition (see Box 3.1).

At the same time, learners may need to acquire domain-specific or technical skills to participate fully in the low-carbon economy. Emerging evidence suggests that the green transition is associated with increased demand for skills in science, technology, engineering and mathematics (STEM) and in fields such as manufacturing and construction (OECD, 2023[2]). If governments are to achieve the ambitious targets set out in their 'green' recovery strategies, they will need to address longstanding skills shortages in critical sectors and to make careers in them more attractive (OECD, 2023[2]).

An additional challenge for 2024 and the next few years is that some individuals or groups are better placed to benefit from the green transition than others. Recent OECD analysis points to significant variation in the share of green-task jobs—defined as jobs involving at least 10% of tasks that support environmental goals—between different regions within countries. On average across OECD countries with available data, the difference in the share of green jobs between the top and bottom regions is 7 percentage points, with capital regions often having the highest share (see Figure 3.3).

The same analysis suggests that it is mainly workers with higher levels of education that have benefitted from the expansion of green job opportunities. Those with lower educational attainment are more likely to work in polluting jobs and are at a greater risk of displacement due to the green transition (OECD, 2023[2]; McGrath and Powell, 2016[4]; OECD/Cedefop, 2015[5]; Ranworth, Wykes and Bass, 2014[6]).

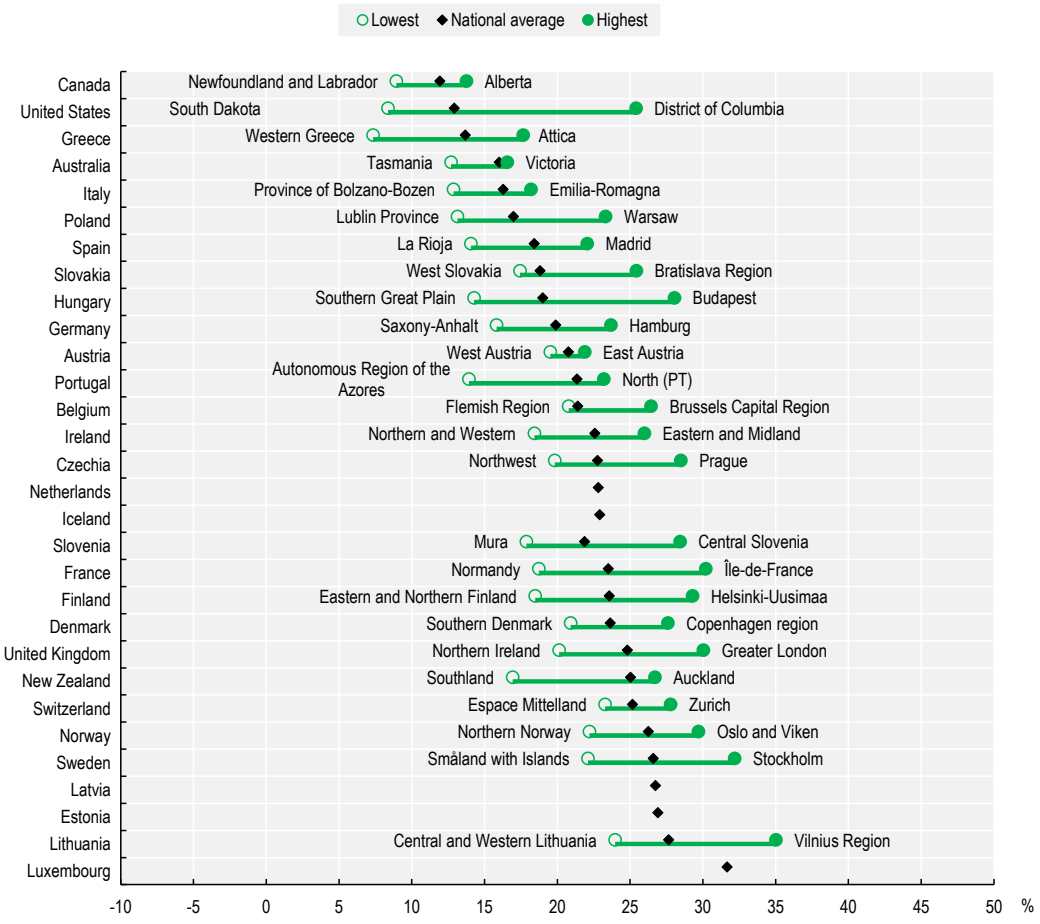
Short-term measures to support those at risk of being left behind in the green transition should be accompanied by efforts to increase diversity in critical sectors. Cultural stereotypes and a lack of role models can discourage some groups from entering fields such as science, engineering, or construction, even when they have already demonstrated their potential to succeed in their educational pathways (e.g. girls and women, disadvantaged students, ethnic minorities).

In the same way, a key message that emerges from the research on STEM and education for sustainable development for the follow up to the *2022 Declaration* is that *how* learners learn may be more important than *what* they learn. This implies that policy makers need to move beyond introducing more 'green' content into the curriculum and promote active pedagogies that support learner engagement and develop practical competence. Teaching should provide opportunities for inquiry, critical thinking, and creativity and incorporate approaches such as project and problem-based learning. Interdisciplinary approaches help learners apply knowledge from different fields to real-world problems (Mulà et al., 2017[9]; LaForce et al., 2016[10]). Creativity and problem solving often require strong disciplinary knowledge, however, and this knowledge may be lacking in fields such as engineering and technology, which do not feature widely in compulsory education curricula (Harrison and Royal, 2011[17]; LaForce et al., 2016[10]; Marginson et al., 2013[18]). As such, education and training must promote domain-specific knowledge and skills *alongside* the transversal competencies that transcend individual domains, being mindful about how these knowledge and skills can support learners for the transition to greener and fairer societies on the ground (see Box 3.1).

Policy makers working on green skills need to keep in mind that while pedagogy is important, the classroom is not the only place where learners can develop these competencies. Studies have shown that extracurricular activities and out-of-school learning experiences can also stimulate young people's interest in environmental and scientific fields, notably among underrepresented groups (Bowser and Cid, 2021[19]; DeFelice et al., 2014[20]). Successful interventions of this kind often incorporate careers information and guidance activities, or connect formal learning to the world of work (OECD, 2022[21]; LaForce et al., 2016[10]).

Figure 3.3. Green jobs are distributed unevenly between regions in OECD countries

Percentage of jobs where at least 10% of tasks are considered to support environmental goals.



Note: Green-task jobs are defined as jobs involving at least 10% of tasks that support environmental goals. Jobs are based on 3-digit ISCO08 codes. The figure shows the share of jobs in a region that entail at least one green-task, where green tasks follow O*NET definition. United Kingdom data is from 2019.

Source: OECD (2023[2]), Job Creation and Local Economic Development 2023: Bridging the Great Green Divide, OECD Publishing, Paris, https://doi.org/10.1787/21db61c1-en

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Box 3.1. Transversal competencies are key for sustainable development

The *OECD Framework for Responsiveness and Resilience in Education Policy,* calls on policy makers to foster learners' **agency and co-agency** and support the development of **transformative competencies** to help them manage change and disruption (OECD, 2021[15]). Following the definition established by the OECD Learning Compass 2030, the Framework understands transformative competencies as 'the types of knowledge, skills, attitudes, and values students need to transform society and shape the future for better lives' (OECD, 2019[16]). This includes competencies such as critical thinking, a growth mindset, creativity, open-mindedness, and responsibility. The evidence suggests that these play a vital role in helping learners thrive through and actively shape the green transition.

While recognising the importance of specialised knowledge and skills, the broader specific literature on education for sustainable development (ESD) and the green economy also points to a range of competencies that transcend individual domains to help people shape green economies along with the needed societal transformations. For example:

- Equipping people for a complex and uncertain world as part of ESD: Mulà et al. (2017[9]) argue that education needs to go beyond 'teaching about' sustainable development and passing on expert knowledge in relevant fields and to 'equip people to respond to the complexities and uncertainties of the future'. The broader ESD literature suggests that this involves promoting non-cognitive skills, values and attitudes such as collaboration, empathy, and responsibility as well as more complex non-cognitive skills such as systems thinking, critical thinking, and anticipatory thinking (Lozano et al., 2019[12]; Wiek, Withycombe and Redman, 2011[22]; Rieckmann, 2012[23]; Lambrechts et al., 2013[24]). Several of these competences feature in the European sustainability competence framework (e.g. systems thinking, critical thinking, individual initiative) and in the key competencies for ESD identified by UNESCO (e.g. anticipatory competency, collaboration competency) (European Commission, 2022[25]; Rieckmann, 2018[26]).
- Equipping people with skills for a green economy: With regards to the green economy specifically, the Inter-Agency Working Group on Work-Based learning makes a useful distinction between two sets of skills that people will need 'to live, work and act in resource efficient and sustainable economies and societies'. This working group defines technical skills as those needed 'to adapt or implement standards, processes, services, and products or technologies to protect ecosystems and biodiversity, and to reduce energy, materials and water consumption'. While these skills may relate to a specific occupation, they may also be relevant across employment sectors. In the same way, their definition of transversal skills ('sustainability competencies', 'core skills' or 'life skills') relates to 'sustainable thinking and acting' and skills that are relevant to all occupations and sectors as well as life outside of work (Inter-Agency Group on Work-based Learning, 2022[27]).

Building on the Framework and relevant literature, this report explores how education and training can nurture these and other transversal competencies (including transformative competencies, technical skills or transversal skills) that people will need to build a more sustainable future.

Sources: OECD (2021[15]), *Education Policy Outlook 2021: Shaping Responsive and Resilient Education in a Changing World*, OECD Publishing, Paris, https://doi.org/10.1787/75e40a16-en

Selected recent policy efforts

In their efforts to increase the supply of skills for the green economy in the short- and long-term, several education systems are moving beyond changes to the written curriculum or the training offer to promote transversal competencies through active learning experiences. Many of these efforts target vulnerable or underrepresented groups to ensure the green transition works for everyone. Among the lessons learned is the value of digital resources in helping deliver enrichment and career activities related to green jobs, the importance of coordination and anticipation mechanisms to prevent skills bottlenecks related to the green transition, and the need to monitor green skills interventions over a longer time span.

Promoting transversal competencies through active learning experiences

An increasing number of countries have introduced education and training measures to support their net zero targets or green recovery strategies that are tied to them, notably in vocational education and training (VET) and adult learning. Several recent strategies for younger learners highlight the role of STEM competencies in the green transition. These policies share a focus on promoting transversal competencies alongside domain-specific knowledge and skills by providing learners with active learning experiences. This includes experiences outside of traditional classroom settings, with learning taking place in the workplace, outdoors, or online to give learners greater flexibility.

Transversal competencies to address skills gaps

In **England (United Kingdom)**, for example, the sustainability and climate change strategy for education and children's services (2022) contains several measures that support the UK-wide Net Zero Strategy (2021) (Department for Education of England, 2022[28]; Government of the United Kingdom, 2021[29]). This includes expanding the Skills Bootcamps initiative and prioritising key green sectors in the offer of courses. Skills Bootcamps offer free, flexible upskilling and reskilling opportunities to adults. The second wave of the initiative (2021) already included Skills Bootcamps in green skills as well as fields such as engineering, and digital, while the third wave (2022) will prioritise areas such as zero emission vehicles, carbon capture, nature restoration, and waste management (Department for Education of England, 2022[28]). England (United Kingdom) has also convened a Green Apprenticeships Advisory Panel to work with employers on aligning existing apprenticeships with net zero objectives and to investigate areas where new apprenticeship standards could be developed, such as in argi-tech and renewable energy (Institute for Apprenticeships and Technical Education, n.d.[30]).

Although the primary aim of the Skills Bootcamps is to help adults build sector-specific skills, the initiative also helps them develop transversal competencies for the workplace through employability and soft skills training. Early results from an ongoing process evaluation (2023) suggest that soft skills and employability sessions were most effective when they were sensitive to participants' previous employment experience, involved personalised feedback and support with job applications and CVs, and provided opportunities for them to reflect on their own employability. Another key finding was that the flexible training offer was a factor that attracted participants to Skills Bootcamps. This was especially true for those who were employed, self-employed, or had caring responsibilities. Many providers used online software or adopted a part-time model to increase the flexibility of their programmes. Participants also appreciated opportunities to embed their learning through applied projects and industry-relevant scenarios, since this helped them visualise their pathway to employment (CFE Research, 2023[31]). This underlines the value connecting learning experiences to real-world problems and the working world.

Recent efforts to align a more flexible vocational education offer with the needs of the green economy in **Finland** also involve practical experiences linked to the world of work. As part of the Development Programme for Sustainable Development and Green Transition in VET (2021), the National Agency for Education is funding 10 collaborative projects involving some 75 VET providers to support the development of the skills for the green transition, but also the sustainable operation of vocational institutions (Finnish

National Agency for Education, 2021[32]). Projects will run until December 2023, with monitoring taking place on a continuous basis (Finnish National Agency for Education, 2021[32]).

One of the core projects involves developing a national sustainability roadmap for the VET sector based on the outputs of a network of 61 institutions working collaboratively on different themes. Activities in the pedagogy and learning theme support institutions in integrating sustainability competences (e.g. climate responsible operations, systems thinking, circular economy) in different professional fields and across different learning contexts (e.g. online, within the institution, outdoors, and in the workplace). This includes training workplace supervisors on sustainable operations and providing teachers with adaptable resources and examples of best practice. The roadmap will serve as a practical resource for institutions and providers, framing the development of local goals and measures related to the green transition (VASKI Project, 2023[33]; VASKI Project, 2023[34]). Another funded project aims to promote careers in sustainability fields through outdoor experiences where students learn about sustainable operations through concrete examples. This project promotes responsibility by encouraging students to reflect on how their actions affect their immediate environment (Hevosopisto, n.d.[35]).

Sweden is developing a broader and more flexible offer of tertiary level vocational education following a national inquiry (2023) that addressed how these courses can support the transition towards a sustainable society, including the goal of achieving net zero by 2045. Vocational tertiary education has grown significantly in Sweden since being introduced in 2009. Employers and VET providers work together on the design and implementation of programmes, 97% of which combine classroom and work-based learning. The National Agency for Higher Vocational Education (MYH) assess the quality and outcomes of courses, supports implementation, and steers provision towards the needs of the labour market through funding mechanisms (OECD, 2021[15]; OECD, 2023[1]).

The 2023 inquiry recognised the contribution tertiary vocational has already made to providing the skills for climate mitigation and the circular economy. However, it points to the challenge of ensuring education and training meets the rapidly changing needs of the green economy, citing a report from the Swedish Confederation of Business Industry wherein employers reported that labour and skills shortages were hindering the green transition. One key finding was that changing the regulatory framework of tertiary education is not enough to bring about change in how providers operate. Instead, the report emphasises the importance of the quality assurance and operational support provided by the MYH in ensuring the successful implementation of programmes. The report also recommends developing more flexible routes into tertiary VET to increase the supply of trainees (Swedish Ministry of Education, 2023[36]). Measures taken to achieve this include developing shorter courses and developing mechanisms for the recognition of prior learning (OECD, 2023[1]).

Sweden's finance scheme for transition and retraining, introduced in 2022, aims to play a crucial role in facilitating access to higher vocational training and other upskilling and reskilling initiatives that support the green and digital transitions. The scheme is designed to enable workers to upskill or reskill at any stage of their lives by providing them with up to 80% of their salary for up to one year of full- or part-time study. It emerged from collaboration with social partners such as trade unions and industry and these partners continue to be involved its evaluation and continuous improvement (Government of Sweden, 2023[37]; OECD, 2023[1]).

Transforming STEM education for the future science workforce

As well as developing sound disciplinary knowledge in STEM subjects, recent measures in countries and education systems such as **Australia**, the **Flemish Community of Belgium**, **Kazakhstan** and the **Slovak Republic** aim to promote the transversal competencies – or 'soft skills' - that future scientists will need. This includes promoting active pedagogies and supporting partnerships with industry and the science sector to enhance the relevance of learning experiences. For example, **Australia**'s National STEM School Education Strategy (2016 – 2026), focuses on foundational skills, developing mathematical, scientific, and

digital literacy, and promoting competencies such as problem solving, critical analysis and creative thinking skills. The Australian Government plays a key role in sharing research and evaluation findings. A report from 2019 synthesises evaluative evidence from STEM initiatives implemented at national or state and territory level to help professionals design and implement effective interventions that fit their context (Australian Department of Education, 2022[38]; Education Council of Australia, 2021[39]; Education Council of Australia, 2021[39]).

One example that could be of interest to other education systems is the nationwide Science by Doing programme, which has been found to have improved student engagement and strengthened teachers' capacity to implement Australia's science curriculum through practical experiences (University of Technology, Sydney, 2018[40]). Science by Doing is an online, evidence-based programme that gives students and teachers free access to curriculum units and resources and provides professional learning modules for teachers. The resources engage students through a guided inquiry approach and relate science learning to real-world issues such as the circular economy, climate change and vaccinations. The programme was updated in 2022 to reflect changes in the Australian Curriculum (Science by Doing, n.d.[41]).

Teachers surveyed for a 2018 evaluation identified the flexibility of the programme as a key strength. Teachers reported that they were able to adapt the programme to their circumstances, meaning those with limited access to technology were still able to use the resources with their students. Students found the resources interesting and fun to use. At the same time, evidence points to the challenge of ensuring such online programmes can adapt to rapid changes in technology and that they are compatible with the wide range of devices teachers and students use. Online programmes can also strengthen their contribution to the evidence base by making greater use of data analytics and comparing student outcomes between participating and non-participating schools (University of Technology, Sydney, 2018[40]).

Alongside strategies for early childhood education and care (ECEC) and school education, countries are increasingly implementing measures to strengthen STEM competencies among adult learners. In 2021, the **Flemish Community of Belgium** moved from a STEM Action Plan (2012-2020) that targeted learners in school and higher education to a STEM agenda for 2030 that places a greater emphasis on those who have already entered the workforce. This broader and deeper approach to developing STEM competencies responds to priorities set out in the Government of Flanders' Recovery Plan (2020), international agendas such as the European Green Deal (2020), and skills shortages that have been exacerbated by the green and digital transitions. Building on the guiding principles of the previous action plan, the agenda aims to strengthen STEM literacy among the general population (STEM literacy) while also nurturing STEM specialists from diverse backgrounds (STEM specialisation). Measures targeting adults include an initiative that provides STEM training offers to young people in precarious employment. Another initiative directs entrepreneurs and their employees towards training in STEM fields (Flemish Department of Work and Social Economy, 2021[42]; Flemish Social and Economic Council, 2021[43]).

As part of efforts to improve the quality of STEM education during under the previous action plan, the Flemish Department of Education and Training also developed a quality framework that informed the design of STEM attainment targets of primary and secondary education. Reflecting the twin focus on general STEM literacy and specialist skills, the framework emphasises competencies such as problem solving, collaboration, creativity, communication, and responsibility (Flemish Department of Education and Training, 2015[44]). National data suggest that the implementation of the action plan coincided with an increase in the number of young people progressing from STEM studies in secondary education to higher education. The share of female entrants to STEM pathways in academic and vocational higher education has also increased. However, there has been less progress in increasing participation in STEM in vocational and technical secondary education and adult learning (Flemish Social and Economic Council, 2021[43]).

A report from 2018 also points to the potential of encouraging graduates and workers from other fields to transition to STEM careers by targeting those who already participate in relevant activities. More than half of the STEM graduates surveyed who were currently working in other fields expressed an interest in returning to a STEM job in the future, while one in three graduates from non-STEM fields were interested in a more technological or scientific career. Those who successfully transitioned into STEM careers often did so through courses they took in their spare time, self-study, or leisure activities. As such, the report recommends using available enrolment data to identify people who may be interested in STEM and working with business and industry to embed professional experiences in informal learning. The report also highlights some of the barriers that individuals who wish to transition into STEM careers may face. It points to a need to overcome the perception that mathematics and science are challenging and that rapid developments in technology make it difficult to acquire the knowledge to work in STEM fields (De Coen et al., 2018[45]).

Kazakhstan has also been working to promote domain-specific and transversal competencies related to STEM among adults while consolidating measures that target younger learners. This includes the pilot (2021) of an online STEM bootcamp aimed at women in remote regions organised in partnership with the United Nations Development Programme (UNDP). As well as introducing participants to fields such as programming and web design, the bootcamps aimed to develop the communication and leadership skills they will need to succeed in a STEM career (United Nations Development Programme, 2021[46]). The UNDP also supported a skill-building marathon (2023) for female scientists already working in higher education that focused on the soft skills they need to promote their research and advance their careers. This responds to some of the gender imbalances in Kazakhstan's science sector. While women represent more than 50% of the scientific community, they are underrepresented in leadership roles and are more likely to drop out from doctoral programmes than their male counterparts. The women who participated in the event later stressed the need for regular platforms where female scientists can network and discuss their research and career paths (United Nations Development Programme, 2023[47]; United Nations Development Programme, 2023[48]).

At the school level, Kazakhstan has been working to promote an interdisciplinary and project-based approach to STEM through the State Programme for Education and Science Development (2020 – 2025) (Institute of Legislation and Legal Information of the Republic of Kazakhstan, 2021[49]). Beyond renewing curriculum content in STEM subjects, reforms that began in 2014 aimed to embed tasks that support the development of new technologies and scientific innovations. A key pillar has been the introduction of educational robotics, which supports an integrated approach to teaching STEM as well as the development of technical skills such as programming and assembly (Dzharkinbayeva, 2019[50]). According to national data provided to the OECD, more than 1 000 schools have opened robotics laboratories, while teachers have been trained in the field. At the same time, Kazakhstan has reported challenges in ensuring logistical and pedagogical support for the introduction of new STEM approaches, especially rural areas. Kazakhstan is also seeking to ensure that effective STEM practices are shared across the education system (OECD, 2023[1])

While many countries have prioritised STEM, the **Slovak Republic** has taken a more transversal approach to promoting the skills younger learners need to shape the green economy. Its ongoing primary and lower secondary education reform (2023-2027) aims to shift the focus of teaching and learning from knowledge transmission to the development of the complex competencies that learners will need for life in a low-carbon, digital economy, and society. These include critical thinking, problem solving, collaboration, and initiative and responsibility. The reform is a component of the country's post-COVID-19 Recovery and Resilience Plan and supports the EU target of achieving climate neutrality by 2050 (Ministry of Education, Science, Research and Sport of the Slovak Republic, n.d.[51]; Ministry of Education, Science Research and Sport of the Slovak Republic, n.d.[52]).

One of the key measures has been to give teachers and schools greater flexibility in how they organise learning so they can implement a broader range of teaching methods (e.g. project-based learning, block

teaching, experimentation) (Ministry of Education, Science, Research and Sport of the Slovak Republic, n.d.[53]; Ministry of Education, Science, Research and Sport of the Slovak Republic, n.d.[54]). The Slovak Republic has also established a network of regional teacher support centres. These centres build regional partnerships involving schools, teacher education providers, and other organisations to support the implementation of the reform, including by supporting the professional learning of school leaders and providing mentoring and counselling for teachers. Some 16 centres were established by 2022, with an additional 16 planned for September 2023 to coincide with the initial rollout of the curriculum (Ministry of Education, Science, Research and Sport of the Slovak Republic, n.d.[55]).

Targeting resources and supports is necessary for a just transition

Since many individuals and families across OECD countries will already be facing constrained financial circumstances in 2024, the targeted education and training measures implemented by some governments will play a crucial role in ensuring the recent push to accelerate the green transition does not exacerbate existing inequalities. In some cases, these policies are informed by an assessment of how processes such as digitalisation and the decarbonisation of the economy will affect specific groups and incorporate measures targeting those at risk of losing out. Governments have also implemented interventions to encourage underrepresented groups or vulnerable workers to enter key sectors and equip them with the competencies they need to succeed. These often combine the kind of practical experiences that benefit people from all backgrounds with more targeted mentoring or career guidance.

In **Austria**, **Wales (United Kingdom)**, and **New Zealand**, for example, education and training measures to support the countries' net zero targets are informed by an assessment of the challenges this transition will pose for different population groups, employment sectors, or regions. These countries have also sought to involve stakeholders from different groups in this process. **Austria**'s Just Transition Action Plan for Education and Training (2023) is the result of a collaborative process involving stakeholders from industry, science, and civil society that began in 2020 (Austrian Federal Ministry of Climate Action, Environment, Energy, Mobility, Innovation and Technology, 2023[56]). As part of this research, Austria's Just Transition Committee identified sectors with overwhelmingly negative prospects (e.g. aviation), sectors with unfavourable starting conditions, but which could make the transition more easily (e.g. energy), and those more indirectly affected by the transition to net zero (e.g. tourism) (Meinhart et al., 2022[57]). The resulting action plan includes measures targeted at those in vulnerable industries. From 2023, people working in companies facing closure, restructuring, or technological change will receive tailored career guidance. Other measures include establishing new apprenticeships in key sectors and providing green skills training for teachers and apprenticeship supervisors (Austrian Federal Ministry of Climate Action, Environment, Energy, Mobility, Innovation and Technology, 2023[56]).

In **Wales (United Kingdom)**, the government has recently examined how tackling longstanding inequalities could increase the supply of the skills required for the net zero transition (Parken et al., 2023[58]). The research supports the implementation of Wales's Net Zero Skills Action Plan (2023), which includes a commitment to develop further actions based on its findings (Welsh Government, 2023[59]). One of the key findings was that Wales will struggle to meet its Net Zero 2050 targets without addressing inequalities in education, training, employment, and the distribution of skills. A particular challenge is that the priority decarbonising sectors identified in Wales's Net Zero plan have an ageing and disproportionately white and male workforce (e.g. construction, manufacturing, transport, energy). There is an urgent need to widen the pool of trainees to ensure the continued supply of skills. Furthermore, there is an identified lack of employer demand for 'green' reskilling and upskilling training. Although the education and training providers interviewed for the research were enthusiastic about implementing these courses, businesses have been hesitant to invest in green jobs and training. Finally, the report underlines the need for a more coordinated and systematic approach to ensuring education and training pathways supply the skills for the green economy (Parken et al., 2023[58]; OECD, 2023[2]). International evidence suggests that other countries face this challenge (OECD, 2023[2]; Cedefop, 2019[60]).

New Zealand plans to monitor the impact of the green transition on different groups on an ongoing basis as part of its Equitable Transition Strategy. Developing an Equitable Transition strategy was one of the actions in New Zealand's first Emissions Reduction Plan (2022), which outlines the policies and strategies needed for the country to meet its targets on the pathway to achieving net zero emissions by 2050. Following a series of nationwide workshops and a national survey, a draft strategy was published in June 2023 for further consultation, with a final version due to be published in 2024 (New Zealand Ministry for the Environment, n.d.[61]; New Zealand Ministry of Business, Innovation and Employment, 2023[62]; New Zealand Ministry of Business, Innovation and Employment, n.d.[63]).

The strategy focuses on people, how the transition to a low-emissions economy will affect different groups, and how these groups can be supported. An Interagency Governance Group is charged with ensuring that stakeholders reflecting a broad range of groups are involved in defining the long-term outcomes of the strategy and outlining the steps to achieve them (e.g. Māori, regional and rural communities, women, disabled people, young people, low-income households). This focus is reflected in the Ministry of Education's contribution to the draft strategy, which includes actions to work with Māori to better understand how the Ministry can support Māori-led capacity-building programmes. Other actions aim to ensure that the VET system can support the short-term needs of workers affected by rapid changes in the labour market while providing for the long-term needs of workers for a low-emissions future. New Zealand is also developing a data tool that will enable national and local Government, Māori and community organisations and other users to monitor how emissions reduction policies are impacting different population groups over time. This will include indicators relating to well-being as well as employment rates and income levels in different sectors (New Zealand Ministry for the Environment, n.d.[61]; New Zealand Ministry of Business, Innovation and Employment, 2023[62]; OECD, 2023[1]).

Since 2019, **Canada** has been updating two existing federal programmes that offer young people experiences in the environmental science, STEM, or natural resources sectors with a focus on addressing the needs of those facing barriers to employment (e.g. those living in rural communities, Indigenous, LGBTQ+, youth from low-income families, and young women). Both programmes work by providing wage subsidies to employers and are offered as part of its Youth Employment and Skills Strategy (YESS) (Employment and Social Development Canada, 2023[64]). The Science and Technology Internship Program (STIP)—Green Jobs provides 15-30 year-olds with internships and mentoring in natural resource sectors such as energy, forestry, mining, earth science, clean technology. According to national data, the programme created 4 000 green jobs between 2017/18, with some 60% of participants coming from the equity groups targeted by the programme (women, Aboriginal peoples, people with disabilities, members of visible minorities) (Natural Resources Canada, 2023[65]). The Science Horizons Youth Internship Program helps organisations hire recent higher education graduates, providing them with 6-to-12-month experiences working on environmental projects. As well as providing a 25 000 CAD wage subsidy to employers, the programme provides 5 000 CAD per participant to fund skills development, certifications and training, and accessibility supports (Government of Canada, 2023[66]).

Results from the most recent evaluation of the YESS (2020) indicate that interventions involving a wage subsidy can support labour market integration among young people with upper secondary education. In line with the programme's objective of promoting transitions to the labour market, a larger proportion of participants were still employed immediately after taking part in such programmes as opposed to having returned to school. An impact analysis of a similar wage subsidy programme led by Employment and Social Development Canada found that participants had, on average, higher earnings, a higher incidence of employment, and were less likely to claim social assistance benefits compared to a control group. Since young people with upper secondary education tend to face less barriers to employment, however, it is less clear from the evaluation whether those without it will benefit in the same way (Employment and Social Development Canada, 2020[67]). As such, it will be important for Canada to adapt these federal programmes to the needs of disadvantaged young people and monitor their impact.

In a similar vein**'**s Technology Leap (2012) offers internships to young people who have completed natural science or technology programmes in upper secondary school and has contributed to more women applying for engineering courses in higher education. The initiative aims to stimulate young men and women's interest in pursuing studies and careers in technology, engineering, and the natural sciences and increase the supply of skills that support the digital and green transitions. Internships last four months, and participants receive a salary agreed between employer organisations and trade unions (Swedish National Agency for Education, 2023[68]).

A 2022 evaluation compared the outcomes of students who participated in the Technology Leap between 2012 and 2020 to young people from the target group who either did not apply to the programme or were unsuccessful. Some 63.5% of Technology Leap enrolled in natural sciences or technology courses within two years of completing upper secondary school compared to 43% of the target group overall. While men were overall more likely to transition to courses in these subjects, the gender gap was smaller among those who had participated in the Technology Leap, suggesting the programme helped to reduce the effect of gender on study choices (Swedish National Agency for Education, 2022[69]).

The evaluation points to some of the factors that helped to translate participants' broad interest in STEM into a decision to apply to a higher education programme in a related field. Firstly, the practical experience provided by the internship clarified participants expectations about working in a STEM career and helped them orientate their interests within a field that many previously saw as diffuse. The experience of being trusted, undertaking independent tasks, and receiving support in the workplace helped to develop their confidence in being able to work in a STEM role. Importantly, the workplace experience challenged their ideas of *who* can be an engineer, notably the perception that an engineer is a middle-aged man. Female participants reported that the internship made them feel more confident that they were welcome in the industry (Swedish National Agency for Education, 2022[69]).

However, the evaluation recommends that the programme should be more explicitly targeted at disadvantaged young people and those from immigrant backgrounds. Young people from these groups are underrepresented in the Technology Leap and in STEM subjects at tertiary level. Young people from smaller towns or rural areas were also less likely to apply to the programme, since many of the internships offered were in big cities. This points to a need to reach out to employers in less urbanised areas (Swedish National Agency for Education, 2022[69]).

Other recent initiatives aimed at increasing the participation of underrepresented groups in STEM combine practical experiences with more personalised support or mentorship. Since 2021, the **Flemish Community of Belgium** has been working to expand the reach of its 100 STEM academies, which have been shown to have a positive impact on participants' attitudes towards STEM, notably among girls (Flemish Department of Work and Social Economy, 2021[42]; Blondeel and Coussement, 2022[70]). The academies offer practical, integrated STEM activities to 5-18 year-olds outside of school hours and implement measures to target underrepresented groups. The Flemish Agency for Innovation and Entrepreneurship invites calls for funding from a range of organisations that wish to establish a STEM academy. This could include schools or youth organisations with experience in organising relevant extracurricular activities or individuals with STEM expertise. Activities must be design and inquiry-based, provide learners with insight on the real-world relevance of STEM, and strengthen transversal as well as domain-specific competencies (Flemish Agency for Innovation and Entrepreneurship, n.d.[71]).

An evaluation carried out in 2021-2022 highlights key factors that explain the programme's positive effect on young people's understanding of the importance of STEM for society, their self-efficacy and sense of competence, and their sense that others saw them as a 'STEM' person. It found a particular effect on girls' perceptions of STEM and their intention to study STEM in upper secondary education. Firstly, the STEM academies offered hands-on activities which gave participants opportunities to build, design, and research with specific materials (e.g. wood, computers) and led to a concrete result (e.g. making something move). The opportunity to learn something was an important motivating factor for children and their parents, and

especially for girls. Finally, the social dimension of the activities also helped to motivate students. Children and parents interviewed for the evaluation underlined the role of the coaches or mentors who led activities in ensuring quality and student engagement. The evaluation calls for further research on the impact of those who lead informal STEM activities, especially since their role often differs from that of a teacher or sports coach. The evaluation was also limited in the sense that it only looked at the short-term impact of STEM activities. This points to need for evaluations that monitor the attitudes, performance, and study choices of young people who have participated in STEM interventions over the medium-to-long-term, a challenge that has also been identified in **Australia** (Blondeel and Coussement, 2022[70]; Education Council of Australia, 2021[39]). Building on the success of the STEM academies, the Flemish government wants to ensure every child and young person can access them by expanding their activities to every municipality in the region (Flemish Department of Work and Social Economy, 2021[42]).

Coaching and mentoring are also an important dimension of **Australia**'s Curious Minds programme, in which girls in the final years of lower secondary education explore various aspects of STEM in a series of national camps. Results from the first implementation period (2015-2021) suggest that it has had a positive impact on participants' confidence and their motivation to study male dominated courses (Curious Minds, 2023[72]). One of the key success factors identified is the strength of the student-mentor relationships; girls work on a project with a female mentor working in a male dominated field over a period of six months (Curious Minds, n.d.[73]). Based on evaluations of the pilot phase of the programme, the mentoring system was enhanced into a coaching model with a focus on more specific goals. A key indicator of the success of the programme is that as of 2020, 100% of participants chose to study at least one STEM subject in upper secondary education (Education Council of Australia, 2021[74]). Some 49% of girls who participated between 2015 and 2021 came from more disadvantaged areas, pointing to the programme's potential to address multiple aspects of diversity (Curious Minds, 2023[72]).

Furthermore, a programme from **South Australia** also combines mentoring and career guidance with scholarships that enable students from underrepresented groups to pursue STEM studies at upper secondary level (e.g. students with a lower socio-economic status and Aboriginal learners). Students can use the scholarship funds to cover tutoring, digital devices, excursions, or any other activity that directly supports them in achieving in their STEM subject. The mentoring and careers activities support their professional development (South Australia Department of Education, n.d.[75]). An internal evaluation found that the cost of the scholarship compared to the positive impact on students' performance and career aspirations meant the intervention provided good value for money (Education Council of Australia, 2021[74]).

Some policy lessons emerge on helping learners to acquire transversal competencies through active learning experiences for 2024

Recent data and analysis from these and other policy experiences to help learners acquire transversal competencies through active learning experiences offer some lessons to help guide education systems' efforts in 2024.

1. Education systems can leverage digital technologies to promote equal access to enrichment and careers activities related to green jobs

Providing students with the kind of active learning experiences that help them shape the green economy can be challenging for schools in disadvantaged, rural or remote areas. Education systems are addressing this challenge by using online learning for enrichment and work-readiness activities and to foster collaboration between schools across distances.

- Data from the Programme for International Student Assessment (PISA) 2018 indicate that advantaged students have better access to work-readiness activities than their disadvantaged counterparts. On average across OECD countries, there was 8.6 percentage point difference in

the share of students in advantaged schools where career guidance was formally scheduled in the timetable compared to students in disadvantaged schools. There was also a 2.8 percentage point difference in the share of advantaged students who reported that they had completed an internship, attended a job shadowing, or visited a job fair compared to disadvantaged students.

- Queensland's (Australia) Virtual STEM Academies (QVSA) provides an illustration of how students in rural and remote areas can benefit from these kinds of enrichment and extension activities (Education Council of Australia, 2021[74]). QVSA delivers enrichment programmes focusing on real-world STEM challenges using a low bandwidth virtual video conferencing platform. In the grand challenges programme, for example, students from different schools work collaboratively to solve problems of national or global significance using science, technology and innovation. As well as supporting the delivery of these programmes to rural and remote communities at a low cost, the platform allows students and teachers to collaborate with peers across the state of Queensland and draw on the expertise of university researchers and industry experts.
- At the same time, further evaluative evidence from Australia points to a need to ensure that online programmes can adapt to rapid changes in technology and that they are compatible with the wide range of devices teachers and students use. Online programmes can also strengthen their contribution to the evidence base by making greater use of data analytics and comparing student outcomes between participating and non-participating schools (University of Technology, Sydney, 2018[40]).

2. Strengthening coordination and anticipation mechanisms is essential to ensure the ongoing supply of green skills

Addressing existing skills bottlenecks and ensuring the ongoing supply of skills for the green economy requires a coordinated strategy that builds on existing strengths and takes account of future needs. This requires education policy makers and providers to work with actors in other areas of government and from business and industry to set out a common vision and to define a pathway for achieving it.

- OECD data indicate that the demand for 'green-task' jobs—defined as jobs involving at least 10% of tasks that support environmental goals—has grown faster than the demand for non-green-task jobs since the outbreak of the COVID-19 pandemic. While vacancies for green-task jobs increased by almost 110% between the last quarter of 2019 and the second quarter of 2022, the number of non-green-task vacancies posted increased by some 80% (OECD, 2023[2]).
- International evidence from the OECD and CEDEFOP suggests that many countries lack a comprehensive strategy for addressing evolving skills demands and further evidence collected for this report shows that more strategic collaboration could take place with partners such as employers or the ministries of labour (see Chapter 2) (OECD, 2023[2]; Cedefop, 2019[60]). Instead, initiatives to promote green skills tend to emerge on an ad hoc basis and focus on regions and sectors already experiencing shortages. The OECD recommends complementing existing efforts with a structured and systematic strategy that builds synergies between different initiatives and anticipates and responds to medium- and longer-term skills needs (OECD, 2023[2]).

3. A short-term view is not enough; educators and policy makers must monitor the longer-term impact of green skills interventions to generate evidence on what works

Several education systems have implemented measures to increase the supply of skills in STEM and other key sectors in the green economy. Tracking the outcomes of learners who have benefitted from these experiences (e.g. achievement, study choices, employment) as they progress through the education system and into the labour market helps to generate evidence on which interventions are having the desired short- and long-term effects. However, evidence points to the need of adopting a longer-term view.

- Data from the EPO Survey 2023 suggest that the monitoring and evaluation of efforts to promote the knowledge, skills and attitudes for the green economy and climate action are less of a priority

for education systems than other areas. Some 72% of participating education systems indicated that introducing/strengthening the assessment, monitoring and evaluation of outcomes and processes related to sustainability education was considered a priority for the next five years to at least a moderate extent. However, the share of education systems that indicated that this was a priority was the lowest of all of the other areas of curriculum and training development referenced in this item of the survey (OECD, 2023[1]).

- Impact studies of interventions to promote STEM in students in some education systems point to a shared need and challenge of going beyond monitoring shorter term impact to adopting a broader, longer-term approach. For example, a recent evaluation of STEM academies in the Flemish Community of Belgium recommended continuing to monitor participants. The aim is to see whether the increase in their self-efficacy and understanding of the importance of STEM observed at the end of the programme leads to increased participation in STEM subjects and careers in the future (Blondeel and Coussement, 2022[70]). Similarly, a synthesis of evaluations of STEM interventions in Australia recommends monitoring the STEM achievement of beneficiaries in national assessments over time (Education Council of Australia, 2021[39]). In the United Kingdom, a report on widening participation in higher education highlights a need for evaluations that go beyond participants' self-reported aspirations and attitudes following an intervention. Rather, evaluations should track their pathway through secondary education and enrolment in tertiary education to see which interventions have a long-term effect (Robinson and Salvestrini, 2020[76]).
- An example of an evaluation strategy that monitors both short and longer-term outcomes comes from Canada. The evaluation of the Career Focus programme incorporates an incremental impact analysis comparing the labour market outcomes of participants and a control group for at least five years following their completion of the programme (Employment and Social Development Canada, 2020[67]).

Education systems must promote a culture of learning and collaboration in institutions and support external partnerships to provide experiences for all

In 2024, as governments seek to ensure the supply of skills that will drive a green recovery, they should not forget the important role played by education institutions at all levels of the system. Short-term disruptions such as the COVID-19 pandemic and longer-term evolutions such as digitalisation have drawn attention to the role that these institutions and the professionals who work in them play in equipping learners to thrive through change and meeting the evolving skills needs of economies and societies.

However, education institutions can also generate research and innovations that contribute directly to the goals set out in national recovery strategies or environmental policies. Policymakers can optimise the contribution of education institutions to the green transition, firstly, by **promoting a culture of learning and collaboration**, and secondly, by **supporting external partnerships** that empower learners to shape the green economy. This includes partnerships with parents, employers, and the local community.

The OECD Framework for Responsiveness and Resilience in Education Policy provides guidance on strengthening the resilience of education staff so they can prepare learners for many possible futures and on convening a wider range of actors to advance the work of institutions (OECD, 2021[15]). This section applies this guidance to the question of how education institutions can strengthen their contribution to the green economy through their internal culture and their external relationships.

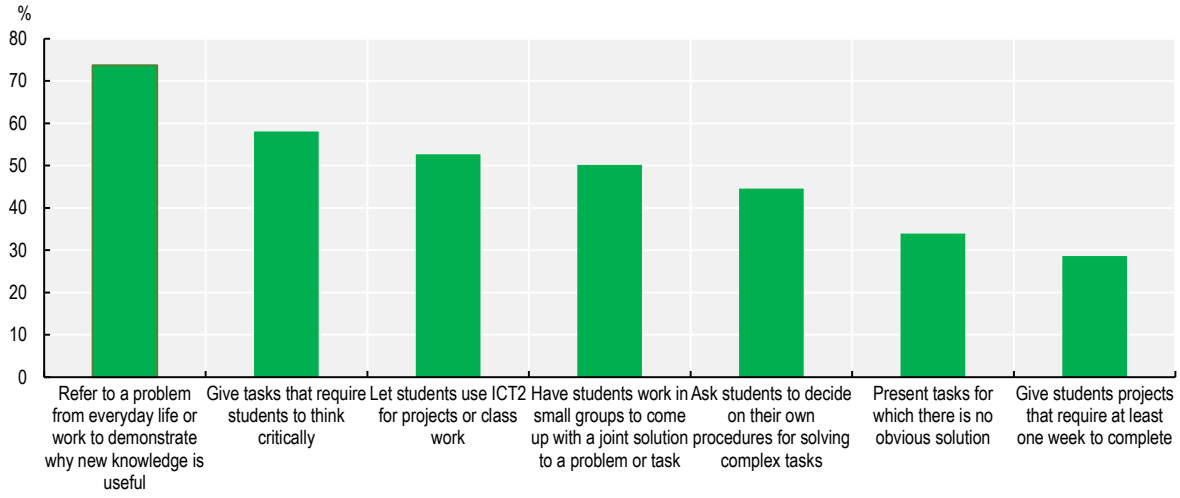
Promoting a culture of learning and collaboration matters to bring the green curriculum to life

Professionals may experience specific challenges when implementing the kind of active pedagogies that develop the competencies learners need to thrive in the green economy. Evidence from the Teaching and Learning and Learning International Survey (TALIS) 2018 suggests that teachers make use of some of these pedagogies more than others. While some 73.7% of teachers on average across OECD countries reported that they 'frequently' or 'always' refer to a problem from everyday life or work to demonstrate why new knowledge is useful, only 28.6% said they 'frequently' or 'always' give students projects that require at least one week to complete (see Figure 3.4).

Previous research points to challenges in deciding how to apply these pedagogies within and across different disciplines, linking transversal competencies and active pedagogies to specialist content, rethinking assessment strategies, and understanding how competencies articulate in different industries and professions (Mulà et al., 2017[9]). Bringing about a shift in pedagogical practices may be especially challenging in contexts where teachers are used to working within their own disciplines—such as in secondary or higher education—and or where they are wedded to more teacher-centred approaches (Mulà et al., 2017[9]; Lozano et al., 2019[12]). Those working in ECEC or primary education may be less confident in their disciplinary knowledge in STEM fields or in integrating technology into their practices (Goos et al., 2020[11]).

Figure 3.4. Teachers are making greater use of some active pedagogies than others

Percentage of teachers in OECD countries who reported that they "frequently" or "always" use the following practices in their class (TALIS 2018)



Note: These data are reported by teachers and refer to a randomly chosen class they currently teach from their weekly timetable.
Source: OECD (2019[77]), TALIS 2018 Results (Volume I): Teachers and School Leaders as Lifelong Learners, TALIS, OECD Publishing, Paris, https://doi.org/10.1787/1d0bc92a-en.

StatLink https://stat.link/d7132g

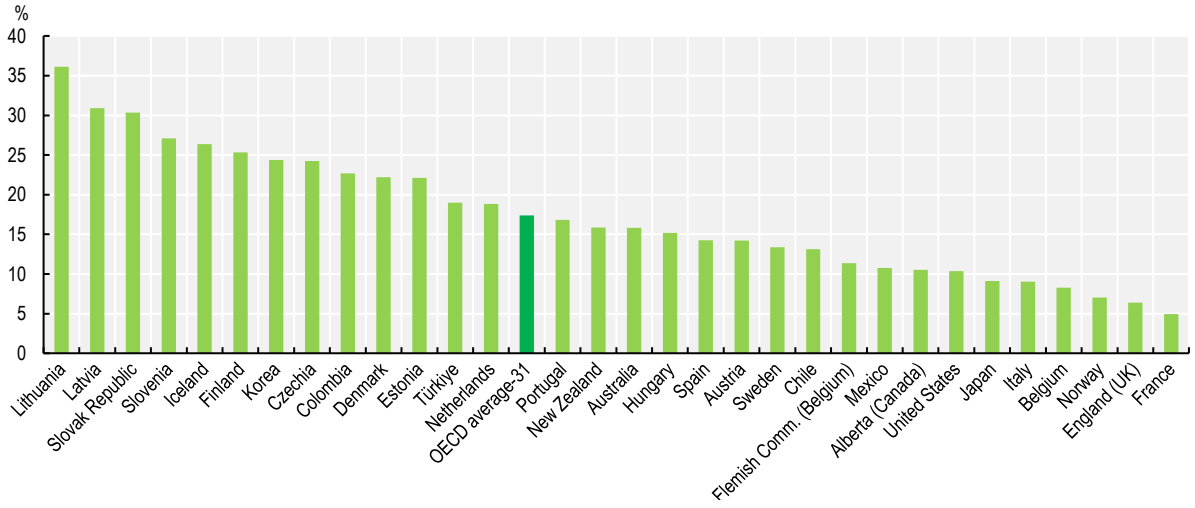
Many of the features of effective professional learning previously highlighted by the Education Policy Outlook also feature in the literature on sustainability competencies, innovation, and STEM education (OECD, 2021[15]). Recent studies point to the importance of practice-oriented, collaborative, and institution-based forms of professional learning that take place over a sustained duration, give professionals time to

test new ideas and reflect, and make use of practices such as mentoring, school networking and coaching (Redman, Wiek and Redman, 2018[78]; Mulà et al., 2017[9]; Goos et al., 2020[11]; Mulà et al., 2017[9]). These approaches are often more cost-effective than external forms of professional development and can be better tailored to local needs (OECD, 2021[15]).

Involving partners from fields related to the green economy in the delivery of professional learning can help teachers better align their teaching with work in these sectors (OECD, 2022[21]). However, data from TALIS 2018 suggest that few teachers in the OECD take part in this type of professional learning. On average across OECD countries, only 17.4% of teachers reported participating in observation visits to business premises, public organisations, or non-governmental organisations as part of professional learning activities in the 12 months prior to the survey (see Figure 3.5). Like their students, teachers will benefit from further opportunities to develop their practical competence in key sectors.

Figure 3.5. Few teachers take part in professional learning activities involving partners beyond the education sector

Percentage of teachers in OECD countries who reported participating in observation visits to business premises, public, or non-governmental organisations in the 12 months prior to the survey (TALIS 2018)



Note: Countries are shown in ascending order of the percentage of teachers who reported participating in observation visits to business premises, public, or non-governmental organisations as part of professional development in the 12 months prior to the survey.
Source: OECD (2019[77]), *TALIS 2018 Results (Volume I): Teachers and School Leaders as Lifelong Learners*, TALIS, OECD Publishing, Paris, https://doi.org/10.1787/1d0bc92a-en.

StatLink https://stat.link/gd852e

Supporting external partnerships can help provide more cost-effective approaches for greening initiatives

As pointed out in Chapter 4, education ministries need to engage with local actors such as parents, community bodies, employers and entrepreneurs to help advance the work of education institutions on aspects related to the transition to greener and fairer societies. Institutions can draw on resources and expertise in the local area, while partners benefit from the skills and innovations generated within local education institutions (OECD, 2021[15]). Importantly, institutions can work with these partners to provide learners with experiences that develop key competencies and help them relate what they learn to the green economy.

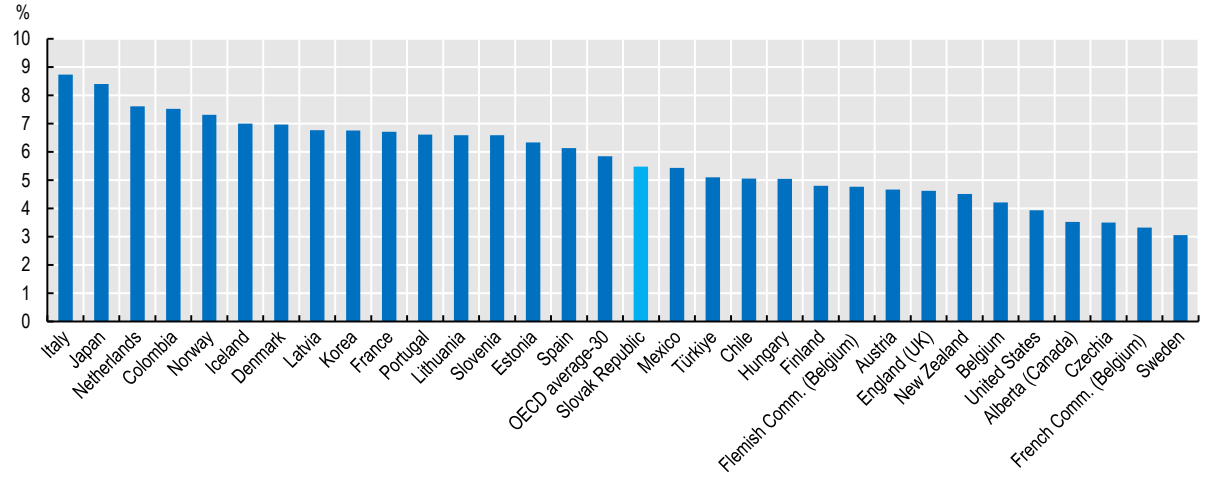
- The recent experience of the COVID-19 pandemic has drawn attention to the role of parents as partners in the learning process and the positive impact that engaging with them can have on learning outcomes, especially for younger learners. This is especially true for the most vulnerable learners (OECD, 2021[15]). Interventions aimed at increasing the participation of underrepresented groups in environmental or STEM fields often recognise this role and include measures to strengthen parents' engagement in their children's learning, to challenge parental stereotypes, or even to strengthen parents' self-efficacy in these areas (Goos et al., 2020[11]; Camasso and Jagannathan, 2017[79]; Wolfe and Riggs, 2017[80]).
- Individuals or groups in the local community (e.g. individual volunteers, voluntary or professional organisations, other education institutions) can support institutions in providing clubs, summer camps, trips or visits that develop learners' practical competence in key domains such as environmental engineering or sustainable design or that strengthen transversal competencies such as creativity and collaboration. Relatable role models working in relevant fields can mentors to students from underrepresented groups (Goos et al., 2020[11]; Archer et al., 2020[81]; Bowser and Cid, 2021[19]; Marginson et al., 2013[18]; Wolfe and Riggs, 2017[80]; DeFelice et al., 2014[20]).
- Local employers or entrepreneurs can provide experiences more directly related to the world of work. Related activities range from one-off career talks or workplace visits to longer-term collaborations that involve solving industry problems. Partnerships with industry need not be limited to the sectors commonly associated with the green economy (e.g. energy, agriculture, transport). The green transition has implications for all employment sectors and contact with the world of work can helps strengthen transversal competencies (Miranda and Larcombe, 2012[14]; OECD, 2021[15]).

In addition to drawing on resources from the local community, educational institutions can also play a direct role in shaping the green economy at the local, regional or national level. Much of the research on this theme focuses on the role of VET and higher education institutions. These institutions can generate research or innovations to solve problems identified by local government or companies but can also develop technologies or processes that help partners operate more sustainably (Ávila et al., 2017[82]). Quality relationships between institutions and employers also help to ensure alignment between the education and training pathways and the demand for skills in the local green economy (OECD, 2021[15]; Miranda and Larcombe, 2012[14]; OECD, 2023[2]).

Policymakers must ensure that teachers, leaders, and other education professionals are adequately prepared to engage with external partners and have the time and space to do so. This may involve creating dedicated roles for engagement activities or carving out dedicated time (OECD, 2021[15]). However, it is crucial that education staff – notably those in leadership roles – value these collaborations and understand their importance. One recent study identifies a lack of support from higher education leaders as a key barrier to sustainability and innovation within the sector. The authors point to a need to improve the spread of new knowledge and technologies beyond the 'walls' of higher education institutions through a process of continuous learning that involves local government and the private sector (Ávila et al., 2017[82]). At the school level, TALIS 2018 data indicate that there is progress to be made in strengthening principals' collaboration with local businesses and the community. Across OECD countries, principals reported that they spent an average of 5.8% of their time on interactions with the local and regional community, business and industry (see Figure 3.6).

Figure 3.6. There is room to strengthen principals' collaborations

Average percentage of time throughout the year that principals report spending on interactions with local and regional community, business and industry (TALIS 2018)



Note: Countries are ranked in decreasing order of the average percentage of time throughout the year reported.
Source: OECD (2020[83]), TALIS 2018 Results (Volume II): Teachers and School Leaders as Valued Professionals, TALIS, OECD Publishing, Paris, https://doi.org/10.1787/19cf08df-en.

StatLink https://stat.link/nkz1x9

Selected recent policy efforts

Recent efforts to strengthen the contribution of education institutions and the professionals who work in them to the green economy include practical professional learning initiatives, many of which bring together networks of education institutions. Governments have also sought to nurture these professionals' collaboration with partners in business and industry to stimulate innovation, notably in the higher education sector. Some lessons identified from the initiatives analysed relate to the importance of engaging parents as a way to challenge stereotypes and misconceptions related to the green transition, as well as strengthening the role of institutional leaders to support aspects related to green innovation.

Promoting a culture of learning and collaboration

Recognising the role of teaching professionals in ensuring the supply of skills needed to achieve short and long-term climate mitigation targets, in recent years, countries have sought to provide them with professional learning experiences to strengthen their pedagogical practice as well as relevant technical knowledge and skills. Recent efforts in this area aim to place teachers in the driving seat, and to give them opportunities to implement projects and test new approaches, often in collaboration with colleagues in other institutions or partners outside of the formal education sector. The recent experience of the COVID-19 pandemic has accelerated the trend towards more flexible forms of professional learning, with an increasing range of offers in online or blended formats.

Recent evidence from **Germany** illustrates how policymakers can support teaching professionals in promoting STEM and sustainability competencies among younger children. Funded by the Federal Ministry of Education and Research, the Little Scientists Foundation provides a range of support for professionals in ECEC centres, primary schools, and after-school care centres to help them implement an inquiry-based,

evidence-informed approach to STEM. Since 2018, the Foundation has also offered advanced courses in education for sustainable development (ESD). A 2023 report identifies key lessons for the successful implementation of computer science education at pre-primary and primary levels. Drawing on national and international evidence, the report informs the design and continuous improvement of the Foundation's two computer science courses for teachers; an introductory course launched in 2017, and an advanced course offered in a blended format since 2021 (Little Scientists Foundation, 2023[84]; Little Scientists Foundation, n.d.[85]).

The report points to the importance of empowering teachers to adapt new methods to their circumstances and the needs of their students and engaging parents as partners in the learning process. A key finding was that to integrate computer science in their everyday teaching, teachers need to develop competence in three key areas: identifying and designing effective learning environments; selecting quality materials that are adapted to the child's individual stage of development; and maintaining children's motivation. The courses can provide them with a range of practical ideas for learning activities and give them opportunities to implement and reflect on them between sessions (Little Scientists Foundation, 2023[84]).

In line with other recent evaluations of the Foundation's programmes, the report also underlines the role of instructional leadership in driving institutional change. According to participants in the pilot of the computer science workshop, the importance ECEC leaders placed on the subject influenced the degree of time and financial resources they made available for its implementation. A report from 2019 points to the important role these leaders play in disseminating the knowledge they had gained in ESD training among their colleagues (Little Scientists Foundation, 2019[86]).

Recent experiences from **Scotland (United Kingdom)** and **Ireland** also highlight instructional leadership and parental engagement as key enablers for transforming the culture of institutions. These initiatives bring together clusters of schools and point to the value of fostering collaboration between professionals working at different levels of the education system. Scotland's Improving Gender Balance and Equalities (IGBE) team works with clusters of schools and ECEC centres to embed a whole-of-institution approach to addressing gender imbalances in subject choices, notably in STEM fields and apprenticeships. The team was established in 2019, following a three-year action research project, and had reached 1 156 institutions by 2022. Activities include face-to-face and online workshops for teachers, enquiry-based research, and gender-aware leadership training. There has also been a strong focus on working with ECEC centres to challenge gender stereotypes and ingrained norms from an early age (Scottish Government, 2022[87]; Education Scotland, 2023[88]).

A review of the initial action research project (2018) identified the role of the project champions—often a school leader or Head of Science—as a key success factor. These champions played a key role in coordinating school-level activity, liaising with the project officers, and promoting the project among their colleagues. Teachers identified the partnerships that emerged between institutions at different education levels as another key success factor. Some institutions had embedded a gender balance focus in their transition activities, while STEM ambassadors from some secondary schools worked with primary school students from their cluster. The findings suggest that as well as ensuring that young people receive consistent messages about gender as they progress through the education system, this approach can promote the sharing of effective practices between education levels (SDS Evaluation and Research team, 2018[89]).

Several of partnerships established through **Ireland**'s School Excellence Fund (Digital and STEM), involved collaboration with business, industry, and the higher education sector as well as between primary and secondary schools. Ireland funded 30 digital clusters and 10 STEM clusters between 2018 and 2022 for collaborative projects promoting the innovative use of digital technologies and STEM in teaching and learning (Irish Department of Education, 2023[90]; Professional Development Service for Teachers, n.d.[91]). Participating schools had a dedicated advisor from Ireland's Professional Development Service for Teachers to support their learning and collaboration. One project aimed to bridge the gap from primary to

secondary education by developing digital skills among primary students. Students from the secondary school leading the cluster mentored primary students and worked with them on projects involving robotics, coding and renewable energy. In the second phase of the project, students and teachers were trained on using Google apps in the classroom (Professional Development Service for Teachers, n.d.[91]).

Benefits and challenges identified for the cluster model identified in a 2022 evaluation include that the financial grant provided for materials and personnel and the dedicated out-of-school time given to the clusters played a key role in enabling collaboration within schools and between the formal and informal education sectors. This enabled teachers and students to extend learning opportunities beyond the school gates while also drawing on skills from the local community. The report recommends strengthening links with the non-formal education sector to provide further professional learning opportunities for teachers. Recognising the role of school leaders in ensuring the success of the clusters, it also calls for more tailored training activities for principals (Morrisey, 2022[92]).

Other recent initiatives bring together partners from education and business to develop flexible, industry-relevant learning opportunities for VET professionals. Between 2020 and 2022, for example **Germany**'s Federal Institute for Vocational Education and Training (BIBB) funded seven projects developed in collaboration between training providers and strategic partners such as professional associations, trade unions, and public bodies at the local, regional or national level (German Federal Institute for Vocational Education and Training, n.d.[93]). The projects were selected from a previous round of funding (2015-2019) which aimed to strengthen professional training for sustainable development and green growth (German Federal Institute for Vocational Education and Training, n.d.[94]). The aim of the 2020-2022 funding round was to adapt successful projects to focus more explicitly on the competence development of VET teachers and trainers and to reflect the increasing demand for digital skills in the workplace. The projects were also scaled up, either by implementing them more widely (e.g. scaling from local to national level), or by applying successful models to a broader range of professional domains (German Federal Institute for Vocational Education and Training, n.d.[93]).

One project adapted a programme on sustainable food production that had been designed for trainee bakers to meet the professional development needs of training staff in the entire food industry. This involved developing, testing and evaluating new offline, online and blended learning approaches (NachDenkEr Project, n.d.[95]; German Federal Institute for Vocational Education and Training, n.d.[93]; Rothe et al., 2022[96]). According to the project implementation report, maintaining close contact with training staff enabled the project team to develop a learning offer that met their needs. This included developing shorter introductory online courses on sustainability and digitalisation in the food trade and giving interested participants opportunities to specialise later. The team also offered face-to-face modules at industry events to reach a larger audience (Rothe et al., 2022[96]).

Partner organisations from **Spain**, **Italy**, **Portugal**, **Greece**, and **Malta** took a similar collaborative approach to developing a new green skills qualification for trainers in the construction industry, which they launched in 2020. The eleven partners included building sector organisations, VET providers and higher education research centres (Bus.Trainers Project, n.d.[97]). The project began with an assessment of the skills needs of training staff, drawing on the methodology of the European Qualifications Framework (EQF). This process informed the design of the content, structure and learning objectives of the qualifications and the resources produced in the appropriate languages. A pilot of the open online course took place in 2019 and was used to make improvements ahead of the official launch. After completing 200 teaching hours on themes such as energy efficiency and renewable energy systems, participants receive an 'Eco-trainer' accreditation corresponding to eight European Credit System for Vocational Education and Training credits (Bus.Trainers Project, n.d.[98]; Bus.Trainers, 2020[99]). The partners have signed an agreement with actions to ensure the sustainability of the programme and commissioned an external evaluation to support continuous improvement (Bus.Trainers, 2020[100]).

Education institutions can also be supported to develop a green institutional culture and build green partnerships

Governments are increasingly seeking to harness the innovative capacity of educational institutions to achieve the goals set out in their COVID-19 recovery strategies and longer-term environmental goals. Some have implemented measures to foster collaboration between VET or higher education and research institutions and business or industry partners to address goals related to skills development or to stimulate research and innovation that addresses climate goals. The analysis conducted for this report suggests that direct government interventions to develop school-industry partnerships may be less common, although these partnerships are an important dimension of some countries' STEM strategies.

Partnerships between higher education institutions (HEIs) and industry are a crucial dimension of recent environmental strategies in countries such as **Singapore**, **Denmark**, and **Korea**. **Singapore**'s Green Plan 2030, established in 2021, sets out concrete and ambitious targets for a ten-year period to support the longer-term goal of achieving net zero emissions by 2050. Several of the targets have direct implications for skills development, such as the target of quadrupling solar energy deployment by 2025 and greening 80% of Singapore's buildings by 2030 (Government of Singapore, n.d.[101]; Government of Singapore, n.d.[102]). As part of these efforts, the Ministry of Education is supporting HEIs to nurture community and industry partnerships that address national sustainability goals or that empower local partners to reduce their carbon emissions (Singapore Ministry of Education, 2022[103]).

For example, the Integrative Built Environment Centre at Temasek Polytechnic was established in 2022 to support the Green Plan. Collaboration with a range of industry partners helps to ensure the relevance of teaching and research within the Centre, but also supports a culture of learning within these companies (Temasek Polytechnic, n.d.[104]; Singapore Ministry of Education, 2022[103]). As well as offering initial and continuing professional education for the built environment sector, the Centre develops innovative solutions to support industry transformation. An example of a more mature initiative comes from Nanyang Technological University, where the Renewable Energy Integration Demonstrator Singapore (REIDS) has been operating since 2014. On one level, REIDS serves the needs of local business and public sector partners by fostering research and development in fields related to energy. However, the project has a broader remit of designing, demonstrating and testing solutions for sustainable and affordable energy access for all across the Southeast Asia region. The project is already supplying energy to a landfill facility run by Singapore's National Environment Agency (Nanyang Technological University, n.d.[105]; Drozdowski-Strehl, 2017[106]).

Since 2022, **Denmark** has been funding four green partnerships bringing together actors from research, business, and the public sector to address the missions set out in its Green Research Strategy (2020). This mission-driven, collaborative approach supports Denmark's goal of achieving a 70% reduction in greenhouse gas emissions by 2030 and net zero emissions by 2050 while also increasing the competitiveness of Danish business and industry (Danish Ministry of Higher Education and Science, n.d.[107]; Innovation Fund of Denmark, 2022[108]). Over a five-year period, each partnership will work on a sequence of multidisciplinary innovation projects and develop concrete solutions to one of four missions: carbon capture and storage; green fuels for transport and industry; sustainable agriculture and food production; and recycling and plastic waste reduction. Denmark's Innovation Foundation oversees the allocation of funding and the monitoring of outputs. This began with a two-step process whereby the Foundation invited HEIs and other organisations involved in research and innovation to develop a roadmap for 2050 describing opportunities and challenges relating to one of the missions. With the support of national and international experts, the Foundation selected one or more roadmaps under each mission, invited partnership proposals, and evaluated submissions based on a research and innovation assessment (Innovation Fund of Denmark, 2022[108]; Innovation Fund of Denmark, n.d.[109]). A further funding call was opened in 2023, enabling existing partnerships to implement additional streams of work or to invite additional partners (Innovation Fund of Denmark, 2023[110]; Mission Green Fuels, n.d.[111]).

The government of **Korea** has also played an active role in facilitating collaboration between education and research institutions and partners from industry and the public sector as part of the National Strategy for Green Growth (2009-2050) and the most recent Five-Year Plan for Green Growth (2019-2023) (Government of Korea, 2019[112]; Global Green Growth Institute, 2015[113]). As part of the Global Frontier Project (2010-2021), for example, the Ministry of Education, Science and Technology (MEST) funded 15 clusters made up of different research organisations to conduct R&D projects in high-risk and high-impact areas related to the green economy. Research priorities were identified through expert group meetings, public hearings, and an assessment of global issues and future trends. One of the aims of the project was to draw on expertise from different disciplines to enable technological convergence. One project sought to integrate biotechnology and chemical technology to develop materials that could replace petroleum-based energy products. The research centre brought together some 300 researchers from universities, public and private research institutes, and private companies (Global Green Growth Institute, 2015[113]).

A study published in 2018 provides guidance on how to ensure the sustainability of the research clusters beyond the end of the funding period. To ensure the financial sustainability of projects, the report recommends strengthening the commercialisation capacity of project teams and encouraging them to gradually expand their profit-making activities. It also recommends developing clear criteria to the continuation of projects, and a clear plan for their continuation or termination. In cases where projects come to end, there is a need to consider who the intellectual property they generated belongs to (Business Strategy Research Institute, 2018[114]). The **Netherlands** provides funding and support for regional networks to provide flexible lifelong learning opportunities that address identified skills shortages, with the first wave of projects focusing on the energy transition and raw materials. Beyond addressing skills bottlenecks in key economic sectors, the National Catalyst for Lifelong Learning (2022) aims to develop a lifelong learning ecosystem and promote a learning culture where it is common for people to invest in their personal and professional development through their lives, through both formal and informal learning, and to move between employment sectors. The programme follows a Quadruple Helix model, which involves bringing together partners from four sectors of society (industry, education, the public sector, and civil society) to stimulate innovation. Education partners include VET institutions, research universities, and universities of applied science. Networks can request funding for smaller projects that bring together relevant partners to identify development needs and propose an innovative lifelong learning solution (e.g. micro-credentials, a skills passport) or for major projects that involve testing and evaluating skills development approaches based on identified needs. The first wave of projects launched in June 2023, with the latest funding round focusing on transforming educational institutions (Metselaar, 2023[115]; National Lifelong Learning Catalyst, n.d.[116]). Countries such as **Ireland** and **Australia** have produced guidelines to support schools and businesses in developing partnerships that support the development of STEM competencies among younger learners and their teachers. The guidelines highlight common success factors for effective partnerships, but also point to the challenges that schools and business often face.

Both guidelines advocate for **ensuring support from the whole school community, and especially school leaders.** This was one of the key messages from the school and business representatives interviewed for the Australian report (STEM Partnerships Forum, 2018[117]). Ensuring a whole-of-school approach helps to avoid the risk that partnerships rely on the motivation of individual teachers or school leaders and means they are more likely to be sustainable in the long-term (STEM Partnerships Forum, 2018[117]; Irish Department of Education, 2023[118]). To achieve this, the guidelines from Ireland recommend that schools establish a core STEM team that includes leaders, learners, and parents (Irish Department of Education, 2023[118]). In both countries, the guidelines also recommend **actively involving teachers in partnership activities**. This includes creating opportunities for teachers to develop their own industry-relevant knowledge and competencies. Industry partners in Australia indicated that partnerships were more effective when teachers engaged with them and took an interest in what students were learning (STEM Partnerships Forum, 2018[117]).

In a similar vein, the guidelines from Ireland recommend that schools involve careers professionals in partnership activities so they can make links between the learning and students' future career and study choices (Irish Department of Education, 2023[118]). Finally, both guidelines stress the importance of **defining clear roles, responsibilities, objectives and goals at the early stages** of a partnership. Partnerships are more likely to be effective when such goals align with national curricula, or with school-level goals. The Australian guidelines set out a 7-step process for planning and implementing an effective partnership, from identifying strengths and needs to designing and implementing an evaluation strategy (STEM Partnerships Forum, 2018[117]). A common challenge identified in both guidelines is that some schools may have greater access to potential partners than others, due to their location or connections within the parent community. A solution identified in Ireland is for schools to join forces to better engage with a business or industry partner (Irish Department of Education, 2023[118]).

Another key finding from the Australian research was that successful school-industry partnerships were facilitated by an intermediary organisation (e.g. an education authority, a teacher professional organisation, a science centre or agency, a HEI). These organisations played an important role in mitigating the challenges that can arise from the cultural differences between schools and industry. Importantly, they can help industry partners navigate school and system requirements (e.g. understanding the school calendar and teaching cycles, child protection requirements). While some intermediaries simply played match making role – helping schools find industry partners or vice versa – others played a more active role in designing and implementing partnership activities (STEM Partnerships Forum, 2018[117]).

Some policy lessons emerge on supporting local learner-centred networks

Recent data and analysis from these and other policy experiences emerge to help local networks become learner-centred and promote connections that nurture change and opportunities for all in 2024.

Educators need to engage parents as key partners in their efforts within education institutions to challenge stereotypes and misconceptions related to the green transition

Parents and carers of younger learners play a key role in empowering these learners to shape the green economy. Like teachers and other key actors, however, they may harbour stereotyped or outdated ideas about education and work that hamper efforts to broaden learners' skills sets and perspectives. Engaging them as equal partners in the learning process can help to alleviate any concerns they have and challenge misconceptions.

OECD evidence points to a need to strengthen collaboration with parents and guardians. While 62.4% of school principals on average across the OECD reported that parents or guardians support student achievement in their school either "quite a bit" or "a lot", only around half (47.9%) indicated that parents or guardians were involved in school activities to the same degree.

A common challenge identified in the implementation of computer science education in ECEC centres in **Germany** was giving teachers access to digital devices and that some parents objected to the idea of using them with younger children. Teacher professional learning activities organised by the Little Scientists Foundation therefore provide examples of how children can explore concepts such as encryption without using computers and how teachers can use physical environments to address key competencies. The Foundation also supports ECEC professionals to engage with parents to challenge negative perceptions and to promote the creative use of technologies in the home (Little Scientists Foundation, 2023[84]).

In **Scotland (United Kingdom)**, some teachers encountered a degree of resistance from parents or felt that their work to challenge gender stereotypes or broaden students' horizons risked being undermined by the messages students were receiving at home. Recognising the role of parents in influencing young people's career and study choices, some schools conducted surveys to better understand parents' perceptions on issues relating to gender and used these to inform parental engagement activities. A

common approach involved inviting parents to career and study choice activities (SDS Evaluation and Research team, 2018[89]).

Strengthening the role of institutional leaders is critical to foster initiative and collaboration and enable green innovation

It is key that institutional leaders (including school principals, higher education management, and other leaders) understand and value the contribution of their institution to the green transition and that they have the skills to enable or drive innovation within the institution and collaboration beyond it. This may require dedicated professional learning activities.

Data from TALIS 2018 indicate that some school principals already play an important role in stimulating collaboration and innovation among their colleagues. On average across the OECD, some 59.3% of principals reported that they 'often' or 'very often' take actions to support co-operation among teachers to develop new teaching practices in their school. Furthermore, there was a 9.2 percentage point gap in the share of principals working in schools with a high concentration of socio-economically disadvantaged students who reported that they worked to foster collaboration in this way (66.2%) and those working in more advantaged contexts (57.8%). This suggests that students in disadvantaged schools may be more likely to benefit from this kind of innovation and collaboration (OECD, 2020[83]).

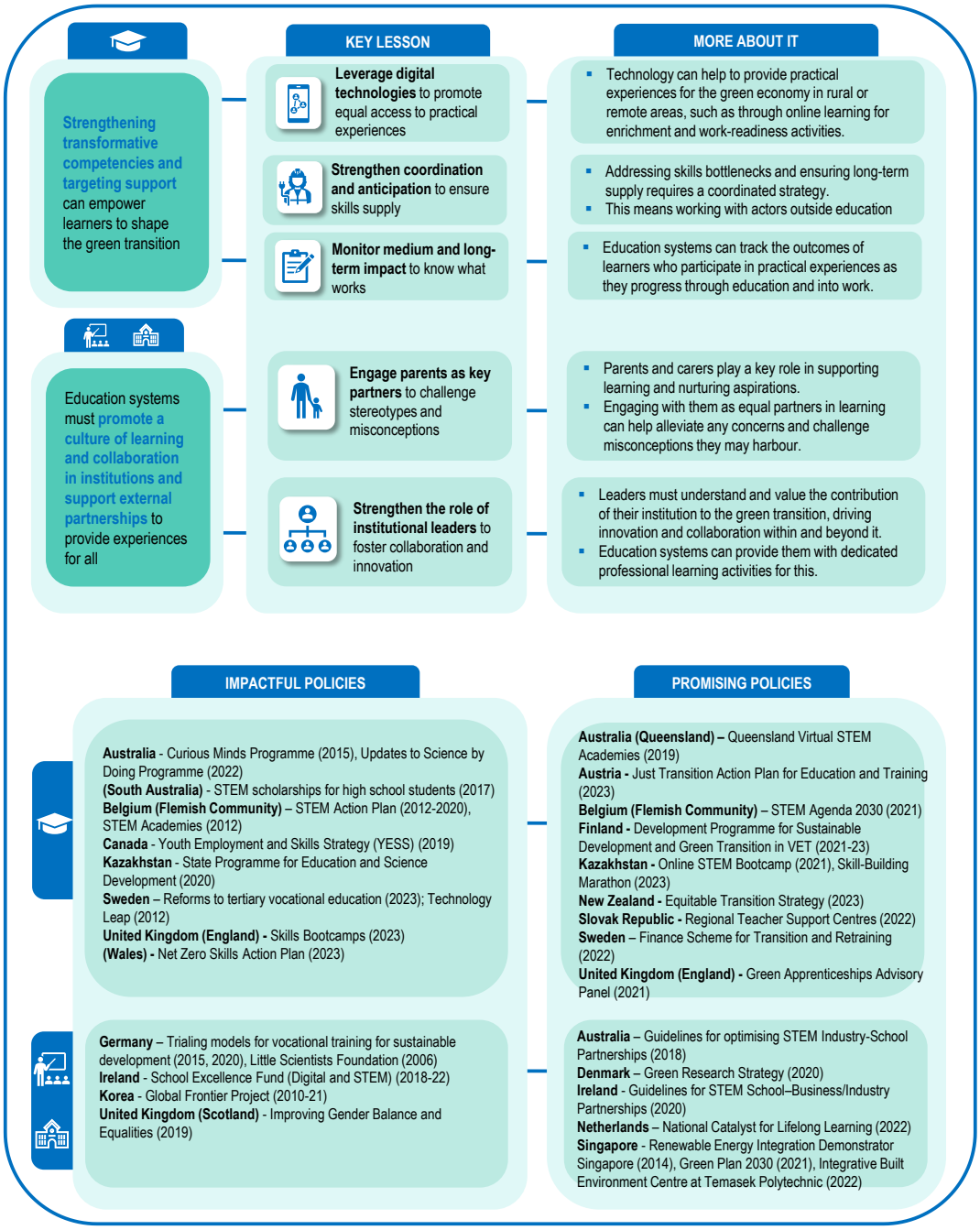
An evaluation of **Ireland**'s Creative Clusters initiative identified the school principal as a key enabler in embedding change at the school level. Even in schools where another teacher coordinated the cluster, principal buy-in was decisive in ensuring teachers had the time and space to develop their practice collaboratively. Conversely, implementation challenges arose when principals lacked enthusiasm for the initiative. Considering that only 53% of principals surveyed for the evaluation took part in training before the start of the initiative, the report recommends that they receive tailored training early in the academic year and that principals' attendance at subsequent training days should be a requirement for participation (Morrisey, 2022[92]).

Recognising the role of institutional culture and leadership in promoting sustainability competencies in early childhood education, the **Germany**'s Little Scientists Foundation now offers tailored workshops for leaders of ECEC centres alongside those already offered to teachers. The workshop support leaders in developing their own position on education for sustainability in their leadership, in planning and implementing relevant projects in the institution, and creating networks with partners beyond the institution. In an evaluation of the workshops, participating leaders noted positive changes in the use of resources within ECEC centres and the use of project-based learning in the classroom, although fewer reported changes in the centre's organisational structure or the development of external collaborations (Little Scientists Foundation, 2019[86]).

Key messages

Recent data and analysis from these and other policy experiences offer some **emerging lessons** to help provide all learners with experiences to help them shape the economy in 2024 (see Figure 3.7).

Figure 3.7. Summary of policy lessons for providing all learners with experiences to help them shape the green economy



Note: "Impactful policies" are those with policy evaluations included in the analysis; "Promising policies" tend to be more recent policies that have design or implementation features aligned with empirical evidence of good practice.
Source: OECD (2023[1]), Education Policy Outlook National Survey for Comparative Policy Analysis 2023: Empowering All Learners to go Green.

References

Archer, L. et al. (2020), *ASPIRES 2: Young people's science and career aspirations, age 10–19*, UCL Institute of Education, https://discovery.ucl.ac.uk/id/eprint/10092041/15/Moote_9538%20UCL%20Aspires%202%20report%20full%20online%20version.pdf (accessed on 16 May 2023). [81]

Asai, K., F. Borgonovi and S. Wildi (2022), "Understanding how economic conditions and natural disasters shape environmental attitudes: A cross-country comparison to inform policy making", *OECD Social, Employment and Migration Working Papers*, No. 280, OECD Publishing, Paris, https://doi.org/10.1787/8e880ea2-en. [7]

Australian Department of Education (2022), *National STEM School Education Strategy 2016–2026*, https://www.education.gov.au/australian-curriculum/support-science-technology-engineering-and-mathematics-stem/national-stem-school-education-strategy-2016-2026 (accessed on 30 June 2023). [38]

Austrian Federal Ministry of Climate Action, Environment, Energy, Mobility, Innovation and Technology (2023), *Just Transition Aktionsplan Aus- und Weiterbildung [Just Transition Action Plan]*, https://www.bmk.gv.at/dam/jcr:639289da-cd79-4b31-a928-0d0f6d2fc268/Just-Transition_Aktionsplan_UA.pdf (accessed on 12 September 2023). [56]

Ávila, L. et al. (2017), "Barriers to innovation and sustainability at universities around the world", *Journal of Cleaner Production*, Vol. 164, pp. 1268-1278, https://doi.org/10.1016/j.jclepro.2017.07.025. [82]

Blondeel, A. and S. Coussement (2022), *Onderzoeksrapport verkennend impactonderzoek STEM-academies [STEM academies exploratory impact study research report]*, https://lirias.kuleuven.be/retrieve/696359 (accessed on 7 July 2023). [70]

Borgonovi, F. et al. (2023), "The effects of the EU Fit for 55 package on labour markets and the demand for skills", *OECD Social, Employment and Migration Working Papers*, No. 297, OECD Publishing, Paris, https://doi.org/10.1787/6c16baac-en. [13]

Bowser, G. and C. Cid (2021), "Developing the ecological scientist mindset among underrepresented students in ecology fields", *Ecological Applications*, Vol. 31/6, https://doi.org/10.1002/eap.2348. [19]

Bus.Trainers (2020), *Bus.Trainers launches the European qualification 'Eco-Trainer of Construction Sector', in Madrid*, http://ecotrainers.eu/wordpress/en/bus-trainers-launches-the-european-qualification-eco-trainer-of-construction-sector-in-madrid/ (accessed on 12 July 2023). [99]

Bus.Trainers (2020), *Partnership addresses 'Eco-Trainer' training and qualification during the last meeting*, http://ecotrainers.eu/wordpress/en/partnership-addresses-the-training-and-qualification-of-eco-trainer-during-their-last-meeting/ (accessed on 12 July 2023). [100]

Bus.Trainers Project (n.d.), *Partners*, http://ecotrainers.eu/wordpress/en/socios-en/ (accessed on 12 July 2023). [97]

Bus.Trainers Project (n.d.), *Phases*, http://ecotrainers.eu/wordpress/en/phases/ (accessed on 12 July 2023). [98]

Business Strategy Research Institute (2018), *글로벌프런티어 사업종료 후 연구단별 지속발전 모델 정립 연구 [A Study on Sustainable Development Model of Research Group]*, National Research Foundation of Korea, https://scienceon.kisti.re.kr/srch/selectPORSrchReport.do?cn=TRKO201900024719&dbt=TRKO (accessed on 12 July 2023). [114]

Camasso, M. and R. Jagannathan (2017), "Nurture thru Nature: Creating natural science identities in populations of disadvantaged children through community education partnership", *The Journal of Environmental Education*, Vol. 49/1, pp. 30-42, https://doi.org/10.1080/00958964.2017.1357524. [79]

Cedefop (2019), *Skills for green jobs: 2018 update: European synthesis report*, https://data.europa.eu/doi/10.2801/036464 (accessed on 7 July 2023). [60]

CFE Research (2023), *Evaluation of Skills Bootcamps; Wave 2 Implementation Report*, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1146974/Evaluation_of_Skills_Bootcamps_Wave_2_Implementation_Report_March_2023.pdf (accessed on 3 July 2023). [31]

Curious Minds (2023), *2015 – 2021 Student Outcomes Infographic*, https://curiousminds.edu.au/student-outcomes-infographic/ (accessed on 7 July 2023). [72]

Curious Minds (n.d.), *200+ women scientists and schoolgirls closing gender gap in STEM*, https://curiousminds.edu.au/200-women-scientists-and-schoolgirls-closing-gender-gap-in-stem/ (accessed on 7 July 2023). [73]

Danish Ministry of Higher Education and Science (n.d.), *Faktabilag: Grønne partnerskaber*, https://ufm.dk/publikationer/2020/fremtidens-gronne-losninger-strategi-for-investeringer-i-gron-forskning-teknologi-og-innovation/gron-forskningsstrategi/4-faktabilag-gronne-partnerskaber.pdf (accessed on 12 July 2023). [107]

De Coen, A. et al. (2018), *Techniek 10 jaar later: Loopbaanpaden en –uitkomsten van STEM-studenten [Engineering 10 years later: Career paths and outcomes of STEM graduates*, https://www.ideaconsult.be/images/Eindrapport_VIONA_STEM-loopbanen_dec18_v2.pdf (accessed on 2 July 2023). [45]

DeFelice, A. et al. (2014), "Engaging Underrepresented High School Students in an Urban Environmental and Geoscience Place-Based Curriculum", *Journal of Geoscience Education*, Vol. 62/1, pp. 49-60, https://doi.org/10.5408/12-400.1. [20]

Department for Education of England (2022), *Sustainability and climate change: a strategy for the education and children's services systems*, https://www.gov.uk/government/publications/sustainability-and-climate-change-strategy/sustainability-and-climate-change-a-strategy-for-the-education-and-childrens-services-systems#action-area-2-green-skills-and-careers (accessed on 3 July 2023). [28]

Drozdowski-Strehl, R. (2017), *Renewable Energy Integration Demonstrator - Singapore*, http://nrel.github.io/iiESI.org/assets/pdfs/2.1a-drozdowski-reids-presentation-singapore-iiesi-london.pdf (accessed on 12 July 2023). [106]

Dzharkinbayeva, G. (2019), *STEM-мектеп оқушыларын оқытудың жаңа әдістемесі және әлемдік білім берудің негізгі тренд [STEM is a new method of teaching school students and the main trend of world education]*, https://bilimainasy.kz/stem-%D0%BC%D0%B5%D0%BA%D1%82%D0%B5%D0%BF-%D0%BE%D2%9B%D1%83%D1%88%D1%8B%D0%BB%D0%B0%D1%80%D1%8B%D0%BD-%D0%BE%D2%9B%D1%8B%D1%82%D1%83%D0%B4%D1%8B%D2%A3-%D0%B6%D0%B0%D2%A3%D0%B0/ (accessed on 3 July 2023). [50]

Education Council of Australia (2021), *STEM Education Initiatives Synthesis Report*, https://www.education.gov.au/education-ministers-meeting/resources/stem-education-initiatives-synthesis-report (accessed on 30 June 2023). [39]

Education Council of Australia (2021), *STEM School Education Interventions: Synthesis report—APPENDIX C (Program Summaries)*, https://www.education.gov.au/education-ministers-meeting/resources/stem-education-initiatives-synthesis-report (accessed on 7 July 2023). [74]

Education Scotland (2023), *Improving gender balance and equalities 3-18*, https://education.gov.scot/resources/improving-gender-balance-3-18/ (accessed on 11 July 2023). [88]

Employment and Social Development Canada (2023), *About the Youth Employment and Skills Strategy Program*, https://www.canada.ca/en/employment-social-development/programs/youth-employment-strategy.html (accessed on 7 July 2023). [64]

Employment and Social Development Canada (2020), *Horizontal Evaluation of the Youth Employment Strategy - Career Focus Stream*, https://www.canada.ca/en/employment-social-development/corporate/reports/evaluations/horizontal-career-focus.html (accessed on 7 July 2023). [67]

European Commission (2022), *GreenComp The European sustainability competence framework*, Publications Office of the European Union, https://publications.jrc.ec.europa.eu/repository/handle/JRC128040 (accessed on 20 October 2023). [25]

Finnish National Agency for Education (2021), *Kestävää kehitystä tuetaan ammatillisessa koulutuksessa 3,5 miljoonalla [Sustainable development is supported in vocational training with 3.5 million]*, https://www.oph.fi/fi/uutiset/2021/kestavaa-kehitysta-tuetaan-ammatillisessa-koulutuksessa-35-miljoonalla (accessed on 3 July 2023). [32]

Flemish Agency for Innovation and Entrepreneurship (n.d.), *STEM academies*, https://www.vlaio.be/nl/vlaio-netwerk/stemvlaio/stem-academies/stem-academies (accessed on 7 July 2023). [71]

Flemish Department of Education and Training (2015), *STEM-Kader voor het Vlaamse onderwijs [STEM Framework for Flemish education]*, https://www.vlaanderen.be/publicaties/stem-kader-voor-het-vlaamse-onderwijs (accessed on 23 July 2023). [44]

Flemish Department of Work and Social Economy (2021), *STEM Agenda 2030*, https://publicaties.vlaanderen.be/view-file/46395 (accessed on 30 June 2023). [42]

Flemish Social and Economic Council (2021), *Advies STEM-Agenda 2030 [Policy Advice: STEM Agenda 2030]*, https://publicaties.vlaanderen.be/view-file/46385 (accessed on 30 June 2023). [43]

German Federal Institute for Vocational Education and Training (n.d.), *BBNE-Transfer 2020-2022*, https://www.bibb.de/de/121439.php (accessed on 12 July 2023). [93]

German Federal Institute for Vocational Education and Training (n.d.), *Modellversuche Berufsbildung für nachhaltige Entwicklung 2015-2019 [Pilot projects vocational training for sustainable development 2015-2019]*, https://www.bibb.de/de/42885.php (accessed on 12 July 2023). [94]

Global Green Growth Institute (2015), *Korea's Green Growth Experience: Process, Outcomes and Lessons Learned*, Global Green Growth Institute, https://gggi.org/wp-content/uploads/2017/11/2016-01-Koreas-Green-Growth-Experience-Process-Outcomes-and-Lessons-Learned.pdf (accessed on 12 July 2023). [113]

Goos, M. et al. (2020), *Department of Education Review of Literature to Identify a Set of Effective Interventions for Addressing Gender Balance in STEM in Early Years, Primary and Post-Primary Education Settings*, https://www.gov.ie/pdf/?file=https://assets.gov.ie/96986/f05f7b2f-e175-442e-85e9-4a2264391843.pdf#page=null (accessed on 2023 May 12). [11]

Government of Canada (2023), *About the Science Horizons Youth Internship Program*, https://www.canada.ca/en/environment-climate-change/services/science-technology/managing/horizons-youth-internship-program/about.html (accessed on 7 July 2023). [66]

Government of Korea (2019), *제3차 녹색성장 5개년 계획 [The 3rd Five-Year Plan for Green Growth]*, https://www.korea.kr/briefing/pressReleaseView.do?newsId=156332503 (accessed on 12 July 2023). [112]

Government of Singapore (n.d.), *A City of Green Possibilities*, https://www.greenplan.gov.sg/ (accessed on 12 July 2023). [102]

Government of Singapore (n.d.), *Our Key Targets for the Green Plan*, https://www.greenplan.gov.sg/targets (accessed on 12 July 2023). [101]

Government of Sweden (2023), *Flexibility, adaptability and security in the labour market*, https://www.government.se/information-material/2022/04/flexibility-adaptability-and-security/ (accessed on 23 October 2023). [37]

Government of the United Kingdom (2021), *Net Zero Strategy: Build Back Greener*, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1033990/net-zero-strategy-beis.pdf (accessed on 3 July 2023). [29]

Harrison, M. and T. Royal (2011), "Supporting the T and the E in STEM: 2004-2010.", *Design and Technology Education*, Vol. 16/1, https://eric.ed.gov/?id=EJ916493. [17]

Hevosopisto (n.d.), *Hankkeet ja kehittäminen [Projects and development]*, https://www.hevosopisto.fi/hevosopisto/innovaatiot-ja-kehittaminen/ (accessed on 4 July 2023). [35]

Innovation Fund of Denmark (2023), *Missionsdrevne grønne partnerskaber har åbnet for ansøgninger til pulje to [Mission-driven green partnerships have opened applications for pool two]*, https://innovationsfonden.dk/da/nyhed/missionsdrevne-groenne-partnerskaber-har (accessed on 12 July 2023). [110]

Innovation Fund of Denmark (2022), *Innovationsfonden søsætter missionsdrevne grønne partnerskaber [The Innovation Fund launches mission-driven green partnerships]*, https://innovationsfonden.dk/da/nyhed/innovationsfonden-soesaetter (accessed on 12 July 2023). [108]

Innovation Fund of Denmark (n.d.), *Innomissions*, https://innovationsfonden.dk/da/p/innomissions (accessed on 12 July 2023). [109]

Institute for Apprenticeships and Technical Education (n.d.), *Green Apprenticeships and Technical Education Advisory Panel - GATE-AP*, https://www.instituteforapprenticeships.org/about/who-we-are/green-apprenticeships-and-technical-education-advisory-panel/ (accessed on 3 July 2023). [30]

Institute of Legislation and Legal Information of the Republic of Kazakhstan (2021), *Қазақстан Республикасында білім беруді және ғылымды дамытудың 2020 – 2025 жылдарға арналған мемлекеттік бағдарламасын бекіту туралы [On approval of the state program for the development of education and science in the Republic of Kazakhstan for 2020-2025]*, https://adilet.zan.kz/kaz/docs/P1900000988 (accessed on 3 July 2023). [49]

Inter-Agency Group on Work-based Learning (2022), *Work-based Learning and the Green Transition*, Publications Office of the European Union, https://www.etf.europa.eu/sites/default/files/2022-10/Work-based%20learning_green%20transition.pdf (accessed on 20 October 2023). [27]

Irish Department of Education (2023), *Guidelines for STEM School–Business/Industry Partnerships*, https://assets.gov.ie/43641/5df34ac0bbc940d89a748f6699e84dd0.pdf (accessed on 12 July 2023). [118]

Irish Department of Education (2023), *STEM Education Implementation Plan - Phase 1 Enhancing Progress Report*, https://assets.gov.ie/249005/6fc0c45d-4e83-4329-bbd0-e448a4fbfd9f.pdf (accessed on 12 July 2023). [90]

LaForce, M. et al. (2016), "The eight essential elements of inclusive STEM high schools", *International Journal of STEM Education*, Vol. 3/1, https://doi.org/10.1186/s40594-016-0054-z. [10]

Lambrechts, W. et al. (2013), "The integration of competences for sustainable development in higher education: an analysis of bachelor programs in management", *Journal of Cleaner Production*, Vol. 48, pp. 65-73, https://doi.org/10.1016/j.jclepro.2011.12.034. [24]

Leicht, A. (ed.) (2018), *Learning to Transform the World; key competencies in ESD*, UNESCO, https://unesdoc.unesco.org/ark:/48223/pf0000261802. [26]

Little Scientists Foundation (2023), *Early Computer Science Education - Goals and Success Criteria for Pre-Primary and Primary Education*, Verlag Barbara Budrich GmbH, https://www.stiftung-kinder-forschen.de/fileadmin/Redaktion/Englisch/Research/E-Book_Volume_9.pdf (accessed on 12 July 2023). [84]

Little Scientists Foundation (2019), *Monitoring Bericht 2018/2019 des stifitung "Haus de Kleinen Forscher" [House of Little Scientists Monitoring Report 2018/2019]*, Little Scientists Foundation, https://www.stiftung-kinder-forschen.de/fileadmin/Redaktion/4_Ueber_Uns/Evaluation/HDKF_Monitoringbericht_2018-19.pdf (accessed on 12 July 2023). [86]

Little Scientists Foundation (n.d.), *More Educational Opportunities for All*, https://www.stiftung-kinder-forschen.de/en/about-us/the-foundation (accessed on 12 July 2023). [85]

Lozano, R. et al. (2019), "Teaching Sustainability in European Higher Education Institutions: Assessing the Connections between Competences and Pedagogical Approaches", *Sustainability*, Vol. 11/6, p. 1602, https://doi.org/10.3390/su11061602. [12]

Marginson, S. et al. (2013), *STEM: Country Comparisons - International comparisons of science, technology, engineering and mathematics (STEM) education*, Australian Council of Learned Academies, https://acola.org/wp-content/uploads/2018/12/saf02-stem-country-comparisons.pdf (accessed on 15 May 2023). [18]

McGrath, S. and L. Powell (2016), "Skills for sustainable development: Transforming vocational education and training beyond 2015", *International Journal of Educational Development*, Vol. 50, pp. 12-19, https://doi.org/10.1016/j.ijedudev.2016.05.006. [4]

Meinhart, B. et al. (2022), *Transformation und "Just Transition" in Österreich [A Just Transition in Austria]*, Austrian Institute for Economic Research, https://www.wifo.ac.at/jart/prj3/wifo/resources/person_dokument/person_dokument.jart?publikationsid=68029&mime_type=application/pdf (accessed on 12 September 2023). [57]

Metselaar, D. (2023), *Update regelingen bouwsteen 2 en 3 [Update regulations building blocks 2 and 3]*, https://llokatalysator.nl/update-regelingen-bouwsteen-2-en-3/ (accessed on 20 October 2023). [115]

Ministry of Education, Science Research and Sport of the Slovak Republic (n.d.), *Štátny vzdelávací program pre základné vzdelávanie (2023) [State educational program for basic education (2023)]*, https://www.minedu.sk/statny-vzdelavaci-program-pre-zakladne-vzdelavanie-2023/ (accessed on 3 July 2023). [52]

Ministry of Education, Science, Research and Sport of the Slovak Republic (n.d.), *O zmenách vo vzdelávaní [About changes in education]*, https://vzdelavanie21.sk/zmeny-v-obsahu-a-forme-vzdelavania/ (accessed on 3 July 2023). [54]

Ministry of Education, Science, Research and Sport of the Slovak Republic (n.d.), *Komponent 7: Vzdelávanie pre 21. storočie [Component 7: Education for the 21st century]*, https://www.minedu.sk/komponent-7-vzdelavanie-pre-21-storocie/ (accessed on 3 July 2023). [51]

Ministry of Education, Science, Research and Sport of the Slovak Republic (n.d.), *Učitelia 21 [Teachers 21]*, https://vzdelavanie21.sk/ucitelia-pre-21-storocie/ (accessed on 3 July 2023). [55]

Ministry of Education, Science, Research and Sport of the Slovak Republic (n.d.), *Základné princípy zmien [Basic principles of change]*, https://vzdelavanie21.sk/zmeny-v-obsahu-a-forme-vzdelavania/zakladne-principy/ (accessed on 3 July 2023). [53]

Miranda, G. and G. Larcombe (2012), "Enabling Local Green Growth: Addressing Climate Change Effects on Employment and Local Development", *OECD Local Economic and Employment Development (LEED) Papers*, No. 2012/1, OECD Publishing, Paris, https://doi.org/10.1787/5k9h2q92t2r7-en. [14]

Mission Green Fuels (n.d.), *MissionGreenFuels Pool 2 Call*, https://missiongreenfuels.dk/pool-2-call/ (accessed on 12 July 2023). [111]

Morrisey, D. (2022), *Creative Clusters: A Collaborative approach to Cultivating Creativity in Schools*, https://assets.gov.ie/244051/e026b88c-fe4c-4d4c-8f14-2967abeb5efa.pdf (accessed on 12 July 2023). [92]

Mulà, I. et al. (2017), "Catalysing Change in Higher Education for Sustainable Development", *International Journal of Sustainability in Higher Education*, Vol. 18/5, pp. 798-820, https://doi.org/10.1108/ijshe-03-2017-0043. [9]

NachDenkEr Project (n.d.), *NachDenkEr: Nachaltiges Denken Erleben [NachDenkEr: Experience sustainable thinking]*, https://nachdenker-bbne.de/ (accessed on 12 July 2023). [95]

Nanyang Technological University (n.d.), *Renewable Energy Integration Demonstrator - Singapore*, https://www.ntu.edu.sg/erian/research-capabilities/renewable-energy-integration-demonstrator---singapore (accessed on 12 July 2023). [105]

National Lifelong Learning Catalyst (n.d.), *LLO-Katalysator [LLL Catalyst]*, https://llokatalysator.nl/ (accessed on 20 October 2023). [116]

Natural Resources Canada (2023), *Green Jobs in Natural Resources*, https://natural-resources.canada.ca/climate-change/canadas-green-future/green-jobs/87 (accessed on 7 July 2023). [65]

New Zealand Ministry for the Environment (n.d.), *Emissions reduction plan*, https://environment.govt.nz/what-government-is-doing/areas-of-work/climate-change/emissions-reduction-plan/ (accessed on 11 September 2023). [61]

New Zealand Ministry of Business, Innovation and Employment (2023), *Equitable Transitions Strategy*, https://www.mbie.govt.nz/business-and-employment/economic-development/equitable-transitions-strategy/ (accessed on 11 September 2023). [62]

New Zealand Ministry of Business, Innovation and Employment (n.d.), *Terms of Reference – Equitable Transitions Strategy for Aotearoa New Zealand*, https://www.mbie.govt.nz/dmsdocument/25559-terms-of-reference-equitable-transitions-strategy-for-aotearoa-new-zealand (accessed on 11 September 2023). [63]

OECD (2023), *Education Policy Outlook National Survey for Comparative Policy Analysis 2023: Empowering All Learners to go Green*. [1]

OECD (2023), *Job Creation and Local Economic Development 2023: Bridging the Great Green Divide*, OECD Publishing, Paris, https://doi.org/10.1787/21db61c1-en. [2]

OECD (2023), *Net Zero+: Climate and Economic Resilience in a Changing World*, OECD Publishing, Paris, https://doi.org/10.1787/da477dda-en. [3]

OECD (2022), *Declaration on Building Equitable Societies Through Education, OECD/LEGAL/0485*, https://legalinstruments.oecd.org/en/instruments/OECD-LEGAL-0485. [8]

OECD (2022), *Education Policy Outlook 2022: Transforming Pathways for Lifelong Learners*, OECD Publishing, Paris, https://doi.org/10.1787/c77c7a97-en. [21]

OECD (2021), *Education Policy Outlook 2021: Shaping Responsive and Resilient Education in a Changing World*, OECD Publishing, Paris, https://doi.org/10.1787/75e40a16-en. [15]

OECD (2020), *TALIS 2018 Results (Volume II): Teachers and School Leaders as Valued Professionals*, TALIS, OECD Publishing, Paris, https://doi.org/10.1787/19cf08df-en. [83]

OECD (2019), *TALIS 2018 Results (Volume I): Teachers and School Leaders as Lifelong Learners*, TALIS, OECD Publishing, Paris, https://doi.org/10.1787/1d0bc92a-en. [77]

OECD (2019), *Tranformative Competencies for 2030*, OECD Publishing, https://www.oecd.org/education/2030-project/teaching-and-learning/learning/transformative-competencies/Transformative_Competencies_for_2030_concept_note.pdf (accessed on 20 October 2023). [16]

OECD/Cedefop (2015), *Green skills and innovation for inclusive growth*, OECD Publishing, Paris, https://doi.org/10.1787/9789264239296-en. [5]

Parken, A. et al. (2023), *An Equal and Just Transition to Net Zero*, Cardiff University, https://orca.cardiff.ac.uk/id/eprint/157749/. [58]

Professional Development Service for Teachers (n.d.), *Schools Excellence Fund – Digital Clusters*, https://www.pdsttechnologyineducation.ie/projects-initiatives/digital-clusters/ (accessed on 12 July 2023). [91]

Ranworth, K., S. Wykes and S. Bass (2014), *Securing social justice in green economies: A review and ten considerations for policymakers*, IIED, https://www.iied.org/sites/default/files/pdfs/migrate/16578IIED.pdf (accessed on 12 May 2023). [6]

Redman, E., A. Wiek and A. Redman (2018), "Continuing Professional Development in Sustainability Education for K-12 Teachers: Principles, Programme, Applications, Outlook", *Journal of Education for Sustainable Development*, Vol. 12/1, pp. 59-80, https://doi.org/10.1177/2455133318777182. [78]

Rieckmann, M. (2012), "Future-oriented higher education: Which key competencies should be fostered through university teaching and learning?", *Futures*, Vol. 44/2, pp. 127-135, https://doi.org/10.1016/j.futures.2011.09.005. [23]

Robinson, D. and V. Salvestrini (2020), *The impact of interventions for widening access to higher education: A review of the evidence*, Education Policy Institute, https://epi.org.uk/publications-and-research/impact-of-interventions-for-widening-access-to-he/ (accessed on 11 September 2023). [76]

Rothe, M. et al. (2022), *Förderschwerpunkt „Berufsbildung für nachhaltige Entwicklung im Transfer für Ausbildungspersonal [Funding focus "Vocational training for sustainable development for training staff]*, https://www.bibb.de/dokumente/ablage/Abschlussbericht_NachDenkEr.pdf (accessed on 12 July 2023). [96]

Science by Doing (n.d.), *Science by Doing*, https://www.sciencebydoing.edu.au/ (accessed on 2023 June 2023). [41]

Scottish Government (2022), *STEM Education and Training Strategy: Refresh*, Scottish Government, https://www.gov.scot/publications/stem-education-training-strategy-refresh/ (accessed on 11 July 2023). [87]

SDS Evaluation and Research team (2018), *Review of Improving Balance Scotland*, Skills Development Scotland, https://www.skillsdevelopmentscotland.co.uk/media/44705/review-of-improving-gender-balance-2018.pdf (accessed on 11 July 2023). [89]

Singapore Ministry of Education (2022), *Strengthening Our Contributions Towards the Green Economy and Empowering the Next Generation of Sustainability Leaders*, https://www.moe.gov.sg/news/press-releases/20220308-strengthening-our-contributions-towards-the-green-economy-and-empowering-the-next-generation-of-sustainability-leaders (accessed on 12 July 2023). [103]

South Australia Department of Education (n.d.), *STEM scholarships for high school students under-represented in science and mathematics*, https://www.education.sa.gov.au/students/awards-and-scholarships/stem-scholarships-high-school-students-under-represented-science-and-mathematics (accessed on 7 July 2023). [75]

STEM Partnerships Forum (2018), *Optimising STEM Industry-School Partnerships: Inspiring Australia's Next Generation*, Education Council, https://www.chiefscientist.gov.au/sites/default/files/2019-11/optimising_stem_industry-school_partnerships_-_final_report.pdf (accessed on 12 July 2023). [117]

Swedish Ministry of Education (2023), *Framtidens yrkeshögskola –stabil effektiv och hållbar [Higher VET of the Future – Stable, Efficient and Sustainable]*, Government of Sweden, https://www.regeringen.se/contentassets/995fdff0970f4fb4a04aa28e5dcaf3e8/framtidens-yrkeshogskola-stabil-effektiv-och-hallbar-sou-202331.pdf (accessed on 29 September 2023). [36]

Swedish National Agency for Education (2023), *Teknikspranget 2022 [The Technolog Leap in 2022]*, Swedish National Agency for Education, https://www.skolverket.se/publikationsserier/regeringsuppdrag/2023/teknikspranget-2022#:~:text=Skolverket%20betalade%20ut%20totalt%2015,ing%C3%A5tt%20ett%20avtal%20med%20Kungl. (accessed on 2 October 2023). [68]

Swedish National Agency for Education (2022), *Utvärdering av Teknikspranget [Evaluation of the Technology Leap]*, Swedish National Agency for Education, https://www.skolverket.se/publikationsserier/regeringsuppdrag/2022/utvardering-av-teknikspranget. [69]

Temasek Polytechnic (n.d.), *Integrative Built Environment Sector*, https://www.tp.edu.sg/research-and-industry/centres-of-excellence/centres-under-school-of-engineering/integrative-built-environment-centre-ibec.html (accessed on 12 July 2023). [104]

United Nations Development Programme (2023), *Inspiring Change: Skillathon for Women Scientists Held in Astana*, https://www.undp.org/kazakhstan/news/inspiring-change-skillathon-women-scientists-held-astana (accessed on 24 July 2023). [47]

United Nations Development Programme (2023), *UNDP in Kazakhstan and Nazarbayev University join efforts to promote gender equality in academic settings through alliance*, https://www.undp.org/kazakhstan/news/undp-kazakhstan-and-nazarbayev-university-join-efforts-promote-gender-equality-academic-settings-through-alliance (accessed on 24 July 2023). [48]

United Nations Development Programme (2021), *UNDP is supporting STEM education in the regions of Kazakhstan*, https://www.undp.org/kazakhstan/news/undp-supporting-stem-education-regions-kazakhstan (accessed on 24 July 2023). [46]

University of Technology, Sydney (2018), *Science by Doing Stage 4 (2016 to 2018): Final Report*, https://opus.lib.uts.edu.au/rest/bitstreams/e06beb9f-d9f7-4222-b258-a5f82a02b728/retrieve (accessed on 2023 June 2023). [40]

VASKI Project (2023), *Pedagogiset ratkaisut ja oppimisympäristöt [Pedagogical solutions and learning environments]*, https://vaski.info/pedagogiset-ratkaisut/ (accessed on 4 July 2023). [34]

VASKI Project (2023), *VASKI – Vastuullinen ja kestävä ammatillinen koulutus [VASKI – Responsible and sustainable vocational training]*, https://vaski.info/ (accessed on 4 July 2023). [33]

Welsh Government (2023), *Stronger, Fairer, Greener Wales: Net Zero Skills Action Plan*, https://www.gov.wales/sites/default/files/publications/2023-02/net-zero-skills-action-plan.pdf (accessed on 7 July 2023). [59]

Wiek, A., L. Withycombe and C. Redman (2011), "Key competencies in sustainability: a reference framework for academic program development", *Sustainability Science*, Vol. 6/2, pp. 203-218, https://doi.org/10.1007/s11625-011-0132-6. [22]

Wolfe, B. and E. Riggs (2017), "Macrosystem Analysis of Programs and Strategies to Increase Underrepresented Populations in the Geosciences", *Journal of Geoscience Education*, Vol. 65/4, pp. 577-593, https://doi.org/10.5408/17-256.1. [80]

4 Positioning education as a strategic sector for the transition to greener societies

Education must be at the forefront of strategic and short-term planning for economic and broader green transformation. Education shapes individuals' behaviours, values, and purposes. It inspires community action and influences local economies. At systemic level, it drives global economies and policy agendas. Adopting the lens of policy implementation, this chapter explores the role the education sector currently plays in the transition to greener and fairer societies, perceptions of this role and collaborations with other sectors, and ways in which education can be better positioned for greater impact in the shorter term, with policy pointers for 2024.

In Brief

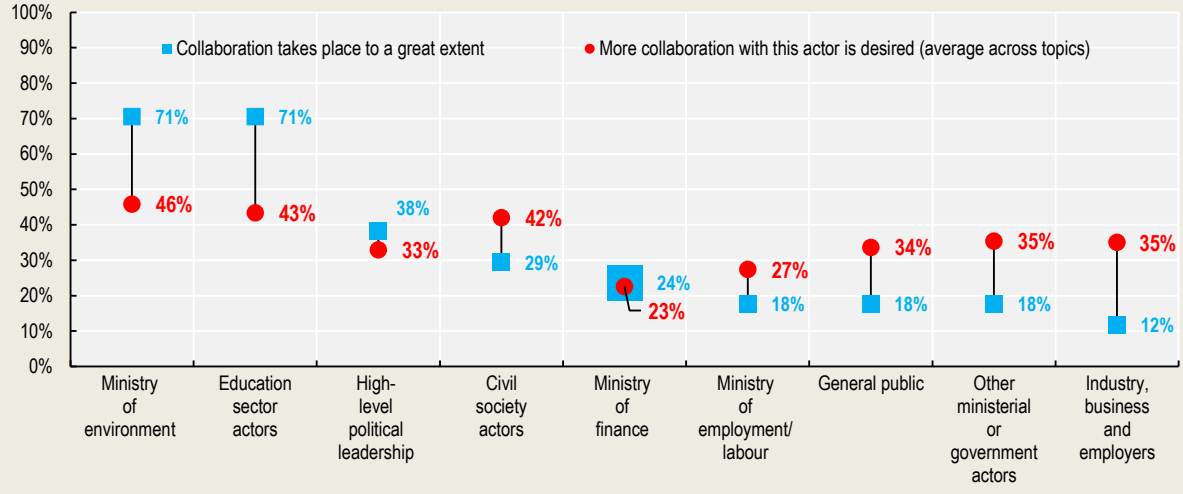
Positioning education as a strategic sector for the transition to greener societies

In 2024, education is crucial for driving the transition to greener and fairer societies. It operates on multiple levels: at the individual level, it shapes behaviours, values, and shared purposes; within communities, it inspires collective actions and influences local economies; and at the systemic level, it drives global economies and policy agendas. Education bridges research, policy, and action, facilitating the diffusion of new technologies and supporting policy action. Moreover, it enhances community resilience, enabling societies to address various challenges. Overall, education is a powerful ally for other government sectors in promoting sustainable policy changes and is essential for achieving a more equitable and environmentally conscious future.

Yet evidence collected by the *Education Policy Outlook National Survey for Comparative Policy Analysis 2023: Empowering All Learners to go Green* (EPO Survey 2023) indicates that collaboration of education ministries with other actors is varied for the transition to greener and fairer societies. While 71% of participating education ministries reported collaboration to a great extent with ministries of environment, fewer than one-quarter reported the same for other key actors such as ministries of finance, ministries of employment/labour, the general public or industry, business and employers (see Figure 4.1).

Figure 4.1. Perceptions of education ministries of collaborations to a great extent with other actors for the transition to greener and fairer societies (2023)

Percentage of participating education ministries reporting that collaborations happen 'to a great extent' with the following actor



Note: Values are ranked by descending order of the percentage of education ministries reporting that collaboration happens to a great extent with these actors. Figure prepared with responses from 34 education systems.
Source: OECD (2023[1]), *Education Policy Outlook National Survey for Comparative Policy Analysis 2023: Empowering All Learners to go Green*.

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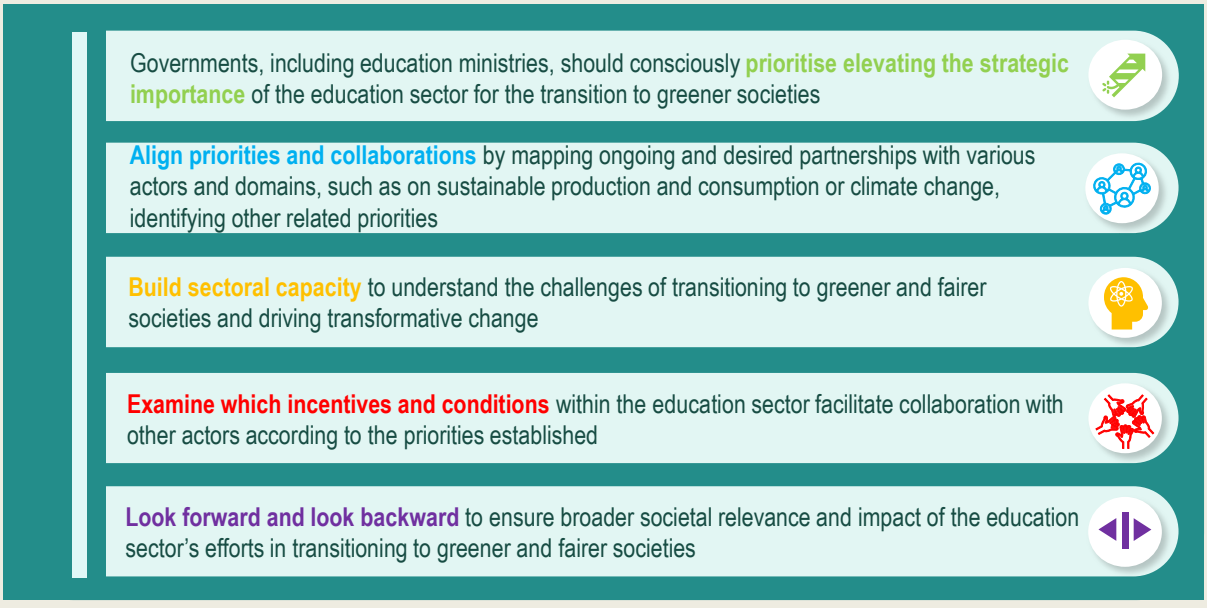
Increasing collaborations with these and other actors will be important moving forward. The chapter explores some **relevant policy efforts** taking place across participating education systems, predominantly since 2020, to help the education sector collaborate in broader green transitions:

- **Instruments in place**: Many education ministries have integrated environmental and sustainability education into their education strategies and goals, along with climate change or green transition strategies. Also, about 60% of them have implemented strategic measures related to skills development, Sustainable Development Goals (SDGs), or overall development strategies. System-level strategies for environmental and sustainability education are relatively common, yet often associated with other education-specific or cross-sectoral strategies.
- **Scope of policy efforts**: Various measures, including common objectives, roadmaps, and guidance, are implemented by countries to promote collaboration within the education sector and across government sectors. These measures often aim to align with others, such as the Sustainable Development Goals. While emphasising the importance of comprehensive approaches and multi-stakeholder collaboration for greener and fairer societies, there appears to be room in these measures for promoting adaptability to specific contexts, considering lifelong learning and socio-cultural sensitivities.

Some **policy lessons** to help policy makers position education as a strategic sector in the transition to greener and fairer societies emerge. Governments must prioritise elevating the education sector's strategic importance, securing high-level political and financial support for cross-sectoral collaboration. Alignment of priorities, mapping collaborations, especially with the private sector and finance ministries, are crucial. Capacity-building within the education sector, including formal, non-formal and informal learning, should focus on understanding the challenges and evidence for sustainability. Incentives and dedicated resources for inter-sectoral collaboration also matter. Additionally, enhancing foresight and evaluating inter-sectoral collaborations can boost education's impact and relevance in this transition (see Infographic 4.1).

Infographic 4.1. Positioning education as a strategic sector for broader transformation

Relevant policy lessons to support education systems in the transition to greener and fairer societies



Introduction

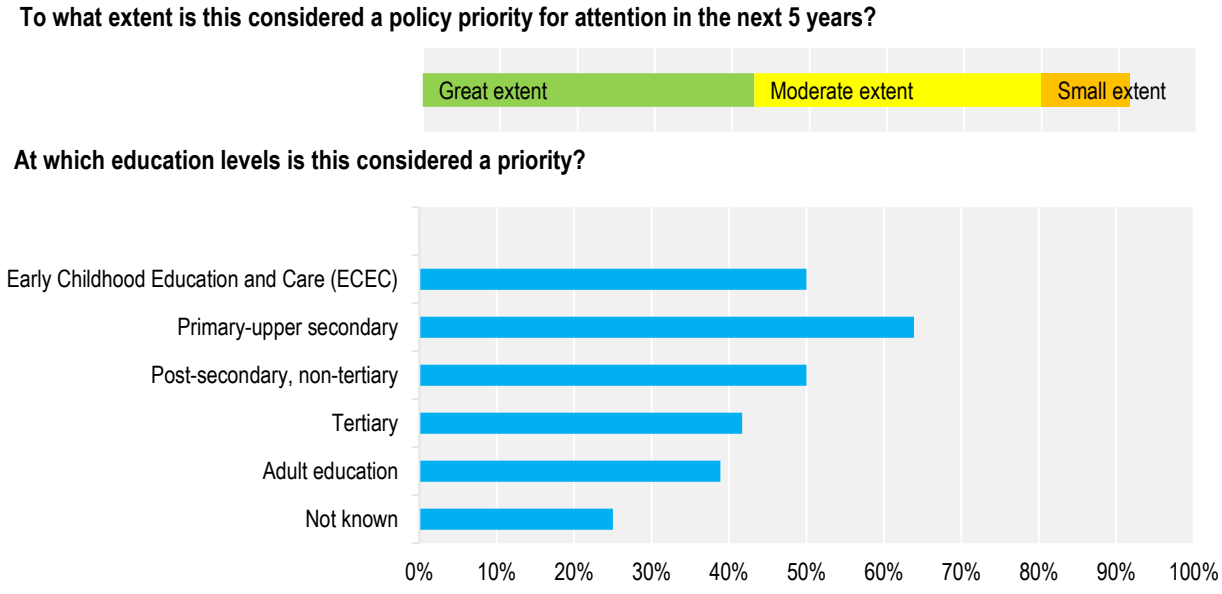
Human activity has pushed our planet to the brink, jeopardising the delicate balance of ecosystems. In the face of this pressing challenge, societies and economies need to fundamentally reshape their way of life, both in the present and in their vision for the future (OECD, 2022[2]; WEF, 2023[3]). This requires a comprehensive effort that brings together different sectors, including the economy, finance, health, and education. While promising policy solutions already exist, realising their full potential demands coordinated, cross-sectoral efforts that span from local to global policy environments (United Nations Climate Change Secretariat, 2018[4]).

Meeting this challenge on a global scale will demand visionary political leadership, technical expertise, and widespread public engagement and commitment to change. It is within this context that education ministers and representatives from both OECD and non-OECD countries and economies, through the *Declaration on Building Equitable Societies Through Education*, made a significant commitment on December 8, 2022. Through it, they pledged to assist learners in developing the skills required for a digital, sustainable, inclusive, and democratic world that harmonises individual growth with the economic, social, and environmental well-being of societies (OECD, 2022[5]).

The role that education can potentially play in driving this change makes critical for the education sector to explore how to effectively transform this potential into action. Among the education ministries who participated in the Education Policy Outlook National Survey for Comparative Policy Analysis 2023: Empowering All Learners to go Green (*EPO Survey 2023*), only 43% indicated that elevating the importance of the education sector in governmental efforts for the transition towards greener and fairer societies is considered a top policy priority to a great extent (Figure 4.2) (see also Chapter 1). This underscores the imperative for education actors to reflect on how they can position the education sector more strategically and be supported for it.

Figure 4.2. Making the education sector more important in the transition towards greener and fairer societies (2024-28)

Percentage of education ministries reporting this priority for attention and by education level



Note: Figure prepared with responses from 34 education systems.
Source: OECD (2023[1]), Education Policy Outlook National Survey for Comparative Policy Analysis 2023: Empowering All Learners to go Green.

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It could be thought that education ministries' direct actions to elevate the importance of the education sector are more directed at upper levels of education, which in principle are more related to economic transformation (e.g. through research to develop new technologies or ways to curb climate change). However, responses from participating education ministries suggest that these also tend to take place mainly in the scope of younger populations. Among education ministries who reported that this is a priority to a large extent, those who reported that this priority is being addressed at post-secondary levels (including higher education and adult education), also tended to report this for younger population ages. This was the case for Bulgaria, Colombia, Germany, Iceland, Italy, Romania, England (United Kingdom), and Scotland (United Kingdom).

To effectively help drive the transition towards greener and fairer societies, the education sector needs a clear understanding of its current strategic relevance in this transformation and how it can maximise its potential. Through the lens of education policy implementation, this chapter therefore investigates:

- The current role of the education sector as a key enabler in the transition towards greener and fairer societies, as perceived by education ministries. This includes an assessment of the importance attributed to the education sector by other stakeholders and the level of perceived collaboration between ministries and these stakeholders on various issues.
- How the education sector can be better positioned as a strategic actor, examining the desired collaborations of education ministries and identifying factors that could enhance the strategic role of the education sector.

For each policy area, this chapter analyses responses from education ministries participating in the *EPO Survey 2023*, as well as relevant policy initiatives. This analysis leads to some policy pointers to guide policy makers' short-term efforts to advance the agenda set out in the *Declaration on Building Equitable Societies Through Education* (OECD, 2022[5]).

The education sector is a key enabler for the transition towards greener and fairer societies, currently with room to do more

For change to be both viable, effective and continuous, education must take a prominent position in both long-term strategic planning and short-term actions aimed at broader economic and social transformation. Education is instrumental in equipping countries and economies with the competencies necessary to adopt and implement sustainable development approaches today and in the future. It holds significant potential at all levels of society, extending beyond its immediate purview (OECD, 2023[6]):

- At individual level, education has the power to transcend diverse social, economic, and cultural backgrounds, shaping our behaviours, beliefs, skills, values, and knowledge. These factors influence the way we consume, the education or training opportunities we later undertake, the jobs we do, and our lifestyles in general, including the causes we champion. In this way, education can also foster a common "big picture" or shared purpose that guides our collective actions towards greener and fairer societies (Bolstad, 2020[7]; OECD, 2021[8]; OECD, 2021[8]).
- In our communities, whether through formal, non-formal, or informal means, education can extend beyond traditional classrooms and learning processes to inspire collective actions like volunteering and community service, while also influencing business practices. Consequently, education has the potential to shape local economies and community life in profound and tangible ways.
- At system-level, education can shape global economies and drive citizens' commitment to political agendas, including funding commitments and policy priorities for broad-based transformation (OECD, 2023[6]). By bridging the realms of research, policy, and action, education facilitates the diffusion of new technologies throughout society, altering the range of opportunities available.

Additionally, education, as noted by Sarabhai and Vyas (2017[9]), plays a comprehensive role in pivotal stages of policy making, beginning with aspects leading to and stemming from decision making. It provides the necessary training, capacity-building, and evidence generation required to support policy implementation and scalability. Furthermore, education contributes to communication, dissemination, and engagement processes that enhance policy impact, extending beyond specific policy measures. Finally, the lessons collected from evaluative exercises conducted provide valuable educational opportunities. This positions education as a critical ally for policymakers in promoting sustainable policy changes.

Education can also bolster community resilience by offering various resources—technological, curricular, and pedagogical—that empower individuals to engage in complex adaptive decision making and continuous learning (Feinstein and Mach, 2019[10]). This, in turn, equips societies to anticipate, maximise learning, and address social challenges resulting from shocks and disruptions (e.g. natural disasters or pandemics) or accelerated longer-term trends (e.g. the implications of new technologies, or equity-related dynamics) (see Chapter 1).

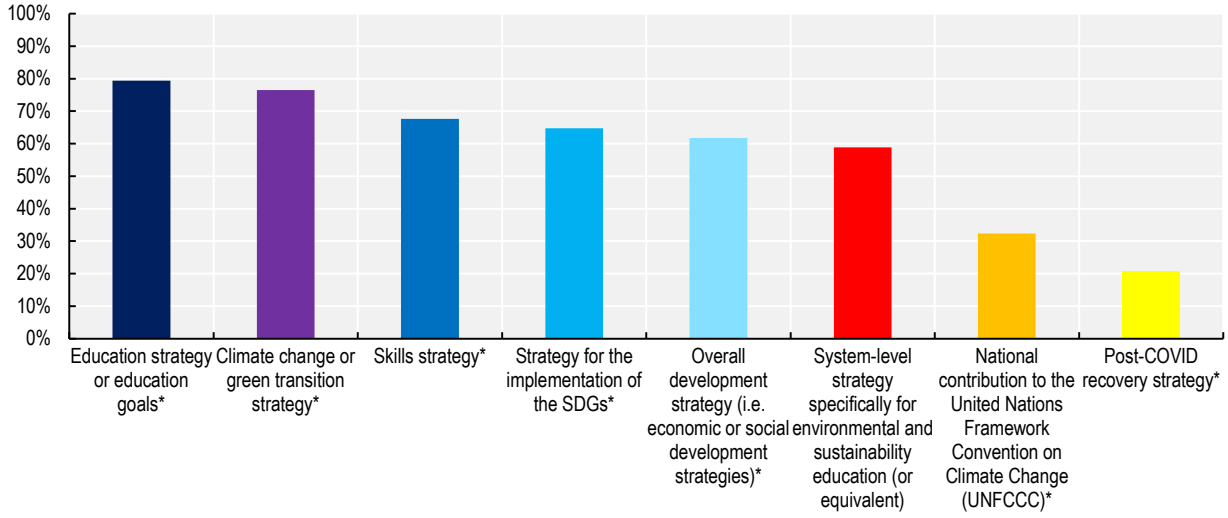
This section analyses mechanisms in place to facilitate these processes, explores collaboration between education ministries and other stakeholders, and provides examples of policy initiatives.

Countries and economies often have multiple and connected measures in place

A precondition for education to gain relevance in the transition to greener and fairer societies is the integration of environmental and sustainability objectives into the governance structures of educational systems. The majority of education ministries within participating education ministries that responded to the *EPO Survey 2023* reported implementing various measures related to environmental and sustainability education. These measures are often incorporated into national or jurisdiction-level frameworks (Figure 4.3).

Figure 4.3. Strategic measures in place for defining education's role in the transition to greener and fairer societies (2023)

Percentage of participating education systems reporting the following measures in place at national/jurisdiction-level



Note: [*] Environmental and sustainability education (or equivalent) is incorporated into these at either national-/jurisdiction-level. Figure prepared with responses from 36 education systems.
Source: OECD (2023[11]), *Education Policy Outlook National Survey for Comparative Policy Analysis 2023: Empowering All Learners to go Green.*

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Among the strategic measures surveyed, a large share of education ministries reported that environmental and sustainability education is incorporated into education strategies/education goals, as well as climate change or green transition strategies (with 79% and 76% of education ministries reporting these for both types of strategic measures). This finding aligns with reports from education systems in the Programme for International Student Assessment, where almost 90% of students where in schools where school principals reported that their formal curriculum includes aspects of climate change and global warming (OECD, 2023[6]). Additionally, more than half of participating education ministries reported the presence of both policy measures. Furthermore, around 60% of education ministries reported the existence of strategic measures related to skills development, strategies for implementing Sustainable Development Goals (SDGs), or overall development strategies.

Responses from participating education ministries show variations among education systems. Specifically, Colombia, France, Greece, and Korea are the only reporting that all eight surveyed instruments are in place. In contrast, only about half of the participating education ministries indicated having at least four of these instruments. Notably, education ministries from the Netherlands and Northern Ireland (United Kingdom) did not report any of these national measures, primarily due to governance arrangements. Instead, they implement other targeted efforts within the education system.

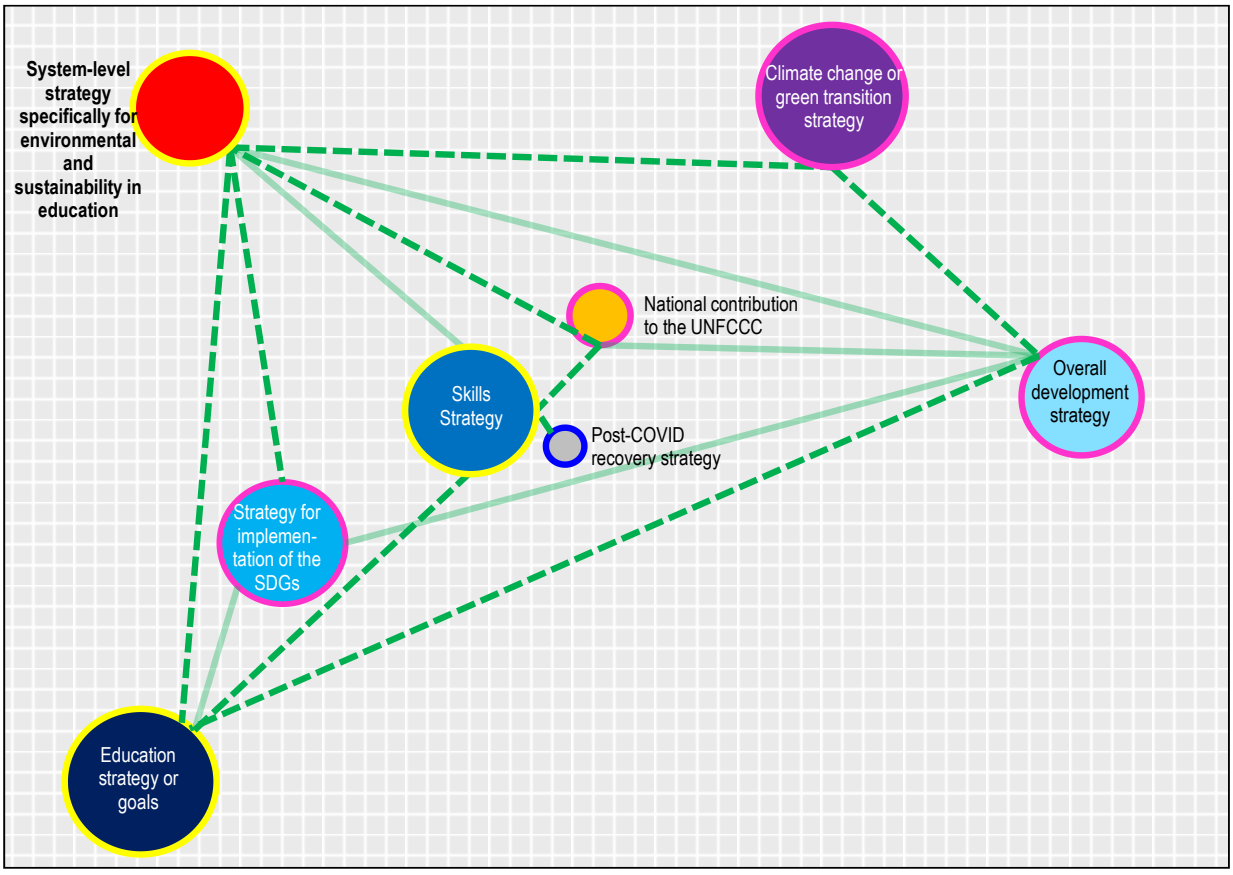
System-level strategies dedicated to environmental and sustainability education (or equivalent) are relatively common, with approximately 59% of participating education ministries reporting their implementation. However, analysis shows that these strategies tend to be more connected with other efforts within education ministries, exhibiting correlations above 0.33 with at least 6 other surveyed instruments. In contrast, other surveyed instruments typically have correlations above 0.33 with a maximum of 3 instruments (see Figure 4.4).

Countries with these strategies in place often incorporate other cross-sectoral (in pink contour) or education and skills-specific (in yellow contour) strategies. Conversely, post-COVID-19 recovery strategies (response-specific efforts, in blue contour) are more commonly implemented in countries and economies where a Skills Strategy is also in place. This emphasises the need for further exploration of system-level strategies specifically dedicated for environmental and sustainability in education. Understanding how synergies between these and other types of instruments can be promoted will help education systems operate more efficiently, extend their focus beyond curriculum or other goals, and enhance their societal impact in creating greener and fairer societies.

Moreover, analysis for this chapter reveals that government measures to facilitate the transition to greener and fairer societies can differ widely in scope, depending on the context. These measures may aim to establish common objectives within the education sector or across government sectors, define detailed roadmaps for various stakeholders, or provide specific guidance on actions. Additionally, these measures often interconnect as shown earlier, such as follow-up measures aligned with the Sustainable Development Goals. Notable examples include the **French Community of Belgium**'s Transversal Ecological Transition Plan for the Wallonie-Brussels Federation (Ministry of The Wallonia-Brussels Federation, 2021[11]), the **Flemish Community of Belgium**'s Energy and Climate Plan 2021-2030 and the Flemish Sustainable Development Strategy 4 (Government of Flanders, 2023[12]) (Government of Flanders, 2021[13]), and **Bulgaria**'s National Climate Change Adaptation Strategy and Action Plan (Dale and Zhekova, 2019[14]).

Figure 4.4. System-level strategies specifically for environmental and sustainability education appear key driving instruments across participating education systems

Correlations of instruments most typically put in place according to reports from education ministries



Note: The graphic shows the most common combinations of instruments typically put in place within countries or economies. The size of the bubble indicates the share of education ministries reporting the instrument is in place. Correlations above 0.33 are marked by connecting lines and doted lines show correlations above 0.5. All correlations were positive. Figure prepared with responses from 36 education systems.
Source: OECD (2023[1]), Education Policy Outlook National Survey for Comparative Policy Analysis 2023: Empowering All Learners to go Green.

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Other noteworthy examples with a strong emphasis on education and targeting a broader population include initiatives in **Estonia**, the **Netherlands**, **Sweden** and **Ireland**. Estonia's Environmental Education and Awareness Plan 2023-2025, jointly led by the Ministry of Education and the Ministry of the Environment, focuses on the entire population (Estonian Ministry of Environment & Estonian Ministry of Education, 2023[15]). The Netherlands has aimed to take a comprehensive approach, aligning long-term objectives, such as enhancing labour market productivity growth through the integration of technology across all education levels, with practical short-term goals. These include addressing emerging shortages in technology and information communication technology (ICT). Initiatives like hybrid learning, the training of hybrid teachers, and investments in technology promotion aim to produce over 1 million ICT-skilled workers by 2030, concurrently contributing to greenhouse emission reduction by that year (Adriaansens et al., 2023[16]). Furthermore, its Catalyst for Lifelong Learning is promoting an ecosystem of green lifelong learning, as shown in Chapter 3.

Similarly, in Sweden the National Agency of Higher Vocational Education and Training (VET) has prioritised programmes supporting the 2030 Sustainable Development Agenda, as part of a mandate from

the government to contribute to these goals. The higher VET scheme is an example of a field targeted by such initiatives. Ireland has developed national strategies for sustainable development spanning various education levels. These strategies are included in documents such as the Statements of Strategy 2021-2023 and the Second National Strategy on Education for Sustainable Development (Irish Department of Education, 2021[17]; Irish Department of Further and Higher Education, Research, Innovation and Science, 2021[18]; Irish Department of Education, 2022[19]).

Most of the measures implemented by countries and economies emphasise the need for greater coherence and collaboration across different sectors to harness synergies. For example, **Iceland**'s Climate Action Plan, a culmination of collaborative efforts involving various stakeholders, including youth climate activists, underscores the significance of transparency, consultation with local authorities and stakeholders, and the establishment of clear objectives (Icelandic Ministry for the Environment and Natural Resources, 2020[20]). Similarly, **Romania**'s National Strategy for Research, Innovation, and Smart Specialization 2021-2027 advocates for participation and has been shaped through extensive consultations using a Dynamic Argumentative Delphi (DAD) approach, involving approximately 2 350 participants in at least one field of the survey (Romanian Ministry of Research, Innovation and Digitalization, 2021[21]). These initiatives underscore the importance of comprehensive approaches and inclusive, multi-stakeholder collaboration to drive progress toward greener and fairer societies.

Analysis of overall measures collected for this report suggests that while a broad range of instruments reported by participating education ministries promote cross-sectoral collaboration, they could further strengthen lifelong learning, socio-economically, culturally sensitive specifications. Such specifications could enhance their adaptability to specific contexts.

To provide further context regarding collaborative efforts in applying these instruments, the section below explores education ministries' perceptions of their capacity to collaborate with various stakeholders.

Ministries of environment stand out as strong perceived partners of education ministries, while collaborations with other actors could be strengthened

How do education ministries perceive support and collaboration with other actors in the transition to greener and fairer societies? According to responses from participating education ministries in the *EPO Survey 2023*, both the perceived importance that other actors assign to the education sector and the extent of collaboration between the ministry of education and these actors tend to align. The gap is larger for other ministerial or government actors, where only 44% believed that these actors attach high importance to the education sector and 68% reported at least moderate collaboration, probably because of the diversity of this group.

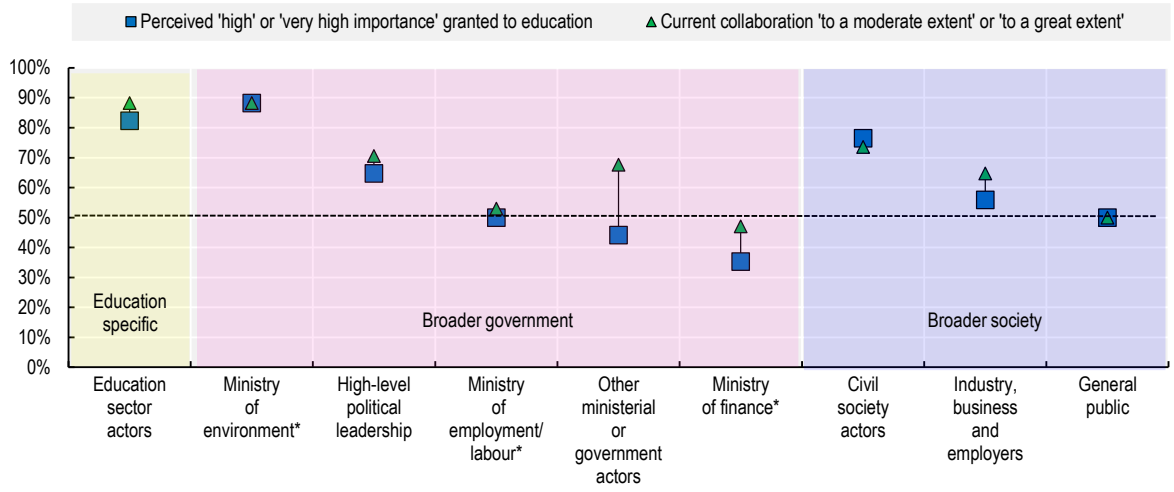
In the responses to the *EPO Survey 2023*, ministries of the environment emerge as highly supportive actors, surpassing education-specific actors in perceived importance and collaboration. Approximately 88% of participating education ministries considered ministries of the environment attach high importance to the education sector’s role, with also 88% reporting high collaboration in the transition to greener and fairer societies. Civil society actors also stand out, with 76% perceiving high importance and 74% reporting extensive collaboration (Figure 4.5).

Conversely, a relatively lower share of participating education ministries believe they receive support from actors from the world of work, which are traditionally closely associated with the education sector. Only about half of them consider the ministry of employment/labour (or equivalent) to attach high importance to the education sector (50%), or that collaboration with them occurs at least to a moderate extent (53%). Slightly more education ministries report this for industry, business, and employers, with 56% and 65%, respectively. Only the ministries of education of Latvia, Estonia, New Zealand, Greece, Portugal, Scotland (United Kingdom) and Sweden, reported at least a sense of high importance provided and at least

collaboration to a moderate extent with both of these actors. Notably, only Estonia, Greece and Sweden reported a sense of high importance and high collaboration with both of these actors.

Figure 4.5. Beyond education-specific actors, the ministries of environment are seen as particularly strong collaborators of education ministries compared to other actors (2023)

Percentage of education ministries reporting how different actors perceive the role currently played by the education sector and the extent of collaboration with those sectors in the transition to greener and fairer societies



Note: Actors are ranked by descending order of 'High importance' to 'Very high importance'Figure prepared with responses from 34 education systems.
Source: OECD (2023[1]), *Education Policy Outlook National Survey for Comparative Policy Analysis 2023: Empowering All Learners to go Green*

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These actors play critical roles in shaping the education sector's actions and impact. To promote a coherent lifelong learning perspective in the transition to greener and fairer societies, governments should explore strategies to enhance synergies between the education sector and the workforce.

Additionally, opportunities for broader impact beyond the education sector are apparent. Only about half of participating education ministries believe the general public and, particularly, ministries of finance attach high importance to the education sector's role and collaborate to a moderate extent in the transition to greener and fairer societies. Only Estonia, Romania, New Zealand, Greece and Sweden reported at least a sense of high importance and at least moderate collaboration with both of these actors. Estonia, Romania and Sweden further reported that these two actors assign very high importance to the education sector, with collaboration at a significant extent.

These actors also hold substantial influence over the education sector's actions. Ministries of finance can magnify the scope of education ministries' initiatives, while strong relations with the general public are essential for ensuring long-lasting social, cultural, and economic impact of efforts for change.

Education ministries tend to collaborate more with other actors during the design of policies related to the transition to greener and fairer societies, but less during their implementation or evaluation

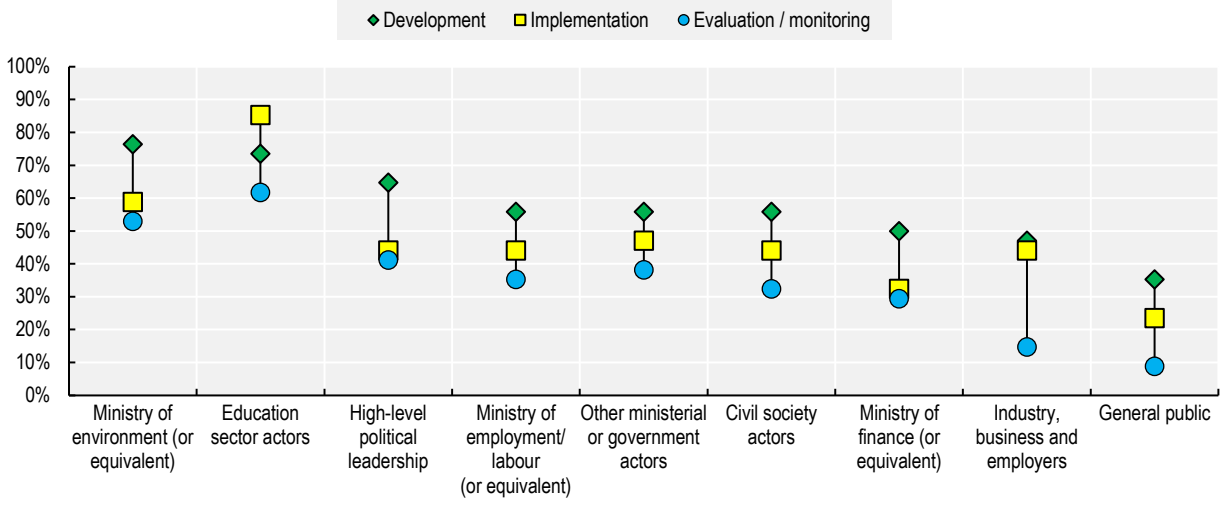
Effective collaboration with relevant actors throughout the policy process is crucial for education policies to have a greater impact. The nature of engagement can vary significantly, influenced by factors such as the level of involvement, communication flows, normative or pragmatic participation, objectives, and more. Similarly, the quality of participation depends on societies going beyond mere toolkits to focus on processes that empower, promote equity, build trust, and facilitate learning among identified stakeholders (Viennet and Pont, 2017[22]; Reed, 2008[23]). While empirical evidence on participation processes is limited, these principles should apply to both individuals and institutions. Responses from education ministries in the *EPO Survey 2023* indicate that achieving effective collaboration remains a shared challenge.

The survey inquired about the extent of collaboration with various actors (e.g. high-level political leadership, ministry of employment/labour, other government actors, civil society, ministries of finance, industry, business, employers, and the general public) during policy development, implementation, and evaluation related to the transition to greener and fairer societies.

Education ministries reported more frequent collaboration with other actors during policy development (67% on average), followed by less during policy implementation (54% on average), and even less during policy evaluation (42% on average). During policy development, Greece, Hungary, Kazakhstan, Latvia, the Netherlands, New Zealand, Romania, Sweden and England (United Kingdom) reported collaborations with all nine surveyed actors. Furthermore, a large majority of participating education ministries, with available data, reported collaborations with at least half of these actors during this policy stage (see Figure 4.6). Ministries of environment once again emerged as key collaborators during policy development, with 76% of education ministries referencing their involvement, closely followed by education sector actors (74%) (see Figure 4.7).

Figure 4.6. Education ministries' collaboration with other actors tends to decrease past the development process (By type of actor, 2023)

Percentage of education ministries (or equivalent) reporting collaborations with other actors on matters related to the transition to greener and fairer societies, by moment when they commonly take place



Note: Data ranked by percentage of education systems reporting that collaborations with other actors commonly take place during policy design. Figure prepared with responses from 34 education systems.
Source: OECD (2023[1]), *Education Policy Outlook National Survey for Comparative Policy Analysis 2023: Empowering All Learners to go Green.*

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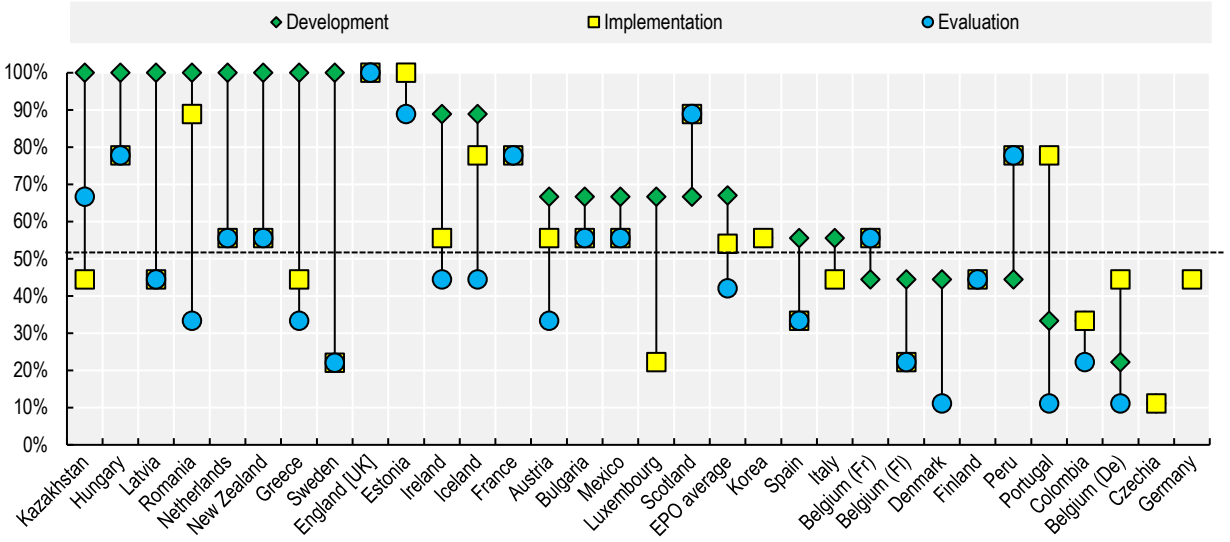
Figure 4.7. Education ministries' collaboration with other actors tends to decrease past the development process (By country or economy, 2023)

Percentage of education ministries (or equivalent) reporting collaborations with other actors on matters related to the transition to greener and fairer societies, by moment when they commonly take place



Note: The percentage of collaboration during 'policy development', 'policy implementation', 'policy evaluation', is measured as the share of collaborations reported by participating education ministries with the nine actors included in the survey, during the respective policy stages (excluding 'not known' or 'not applicable'). Figure prepared with responses from 31 education systems.
Source: OECD (2023[11]), *Education Policy Outlook National Survey for Comparative Policy Analysis 2023: Empowering All Learners to go Green.*

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Collaboration during policy implementation related to greener and fairer societies tends to happen to a lesser extent, except for education sector actors, with whom 85% on average reported collaboration. Collaborations with ministries of the environment (reported by 59% of education ministries) were the only other large collaborations during this policy stage. Estonia was the only country reporting collaboration with all actors during policy implementation. France, Hungary, Iceland, Peru, Portugal, Romania, and Scotland (United Kingdom) were among the education ministries that reported collaborations with at least two-thirds of the actors during this stage.

In the same way, collaboration for policy evaluation processes ranged from 62% on average with education sector actors to only 9% with the general public. Ministries of education in Estonia, England (United Kingdom), France, Hungary, Peru, Portugal, and Scotland (United Kingdom) reported collaborations with at least two-thirds of the education actors during this stage. These findings suggest that there is room for education ministries to develop evaluation processes that effectively capture a broader range of experiences in their policy efforts, facilitating more strategic decisions in the future.

Across the three stages of the policy process considered in the *EPO Survey 2023* (development, implementation, and evaluation), the extent of collaboration reported by ministries is lower than anticipated. This highlights the need for education ministries to seek ways to strengthen dialogue with these actors, enabling the development, implementation, and evaluation of policies that are more relevant, useful, and impactful for society as a whole. Further analysis can also provide insights into how these reported collaborations take place and their potential for impactful engagement.

Education systems need to pursue more strategic collaborations with other actors

In the modern context, education transcends its traditional role as a transmissive agent—simply transmitting knowledge and values to learners, often based on a fixed curriculum. Instead, it must embrace its transformative potential as a means through which learners of all ages co-construct new knowledge, engaging with it to shape democratic and sustainable societies. This transformative role, particularly in the post-industrial age, requires meaningful engagement between the education sector and other sectors. Education should not only facilitate critical thinking and action but also promote democratic, participatory, evidence-based dialogues that encourage diverse forms of collaboration that facilitate the transition to greener and fairer societies. These dialogues should also enable reflection on the global implications of decisions, transcending people's own societies (Jickling and Wals, 2008[24]; Tilbury et al, 2002[25]; Tilbury et al, 2002[25]).

In practice, this calls for democratic, participatory processes that operate both laterally, engaging various government sectors and actors in meaningful ways, and vertically, providing relevant formal and informal social stakeholders with the opportunity to contribute, depending on the specific policy context (Viennet and Pont, 2017[22]). Furthermore, the practical constraints that education ministries face daily make collaboration with all actors, at all times, unrealistic. Therefore, it is valuable to discern where collaboration tends to occur more frequently and where involving additional actors could yield greater impact.

The following section explores with whom education ministries currently engage in broader collaborations, identifies areas where they desire more collaboration, and explores potential facilitators of such collaboration, based on their perspectives.

'Climate change' is a key topic of collaboration for education ministries with most actors

Collaborations involving various actors in the transition to greener and fairer societies were examined across several topics, including climate change, biodiversity, water, air, soil quality, sustainable production, renewable energy, and disaster risk reduction. Education ministries from countries such as France, Germany, Greece, Kazakhstan, Peru, Romania, and Türkiye frequently reported collaborations with different actors across these topics. Germany was the sole entity reporting collaboration with all actors across all surveyed topics. Notably, climate change emerged as the primary focus of collaboration, although the extent of collaboration varied among different actors (see Figure 4.8).

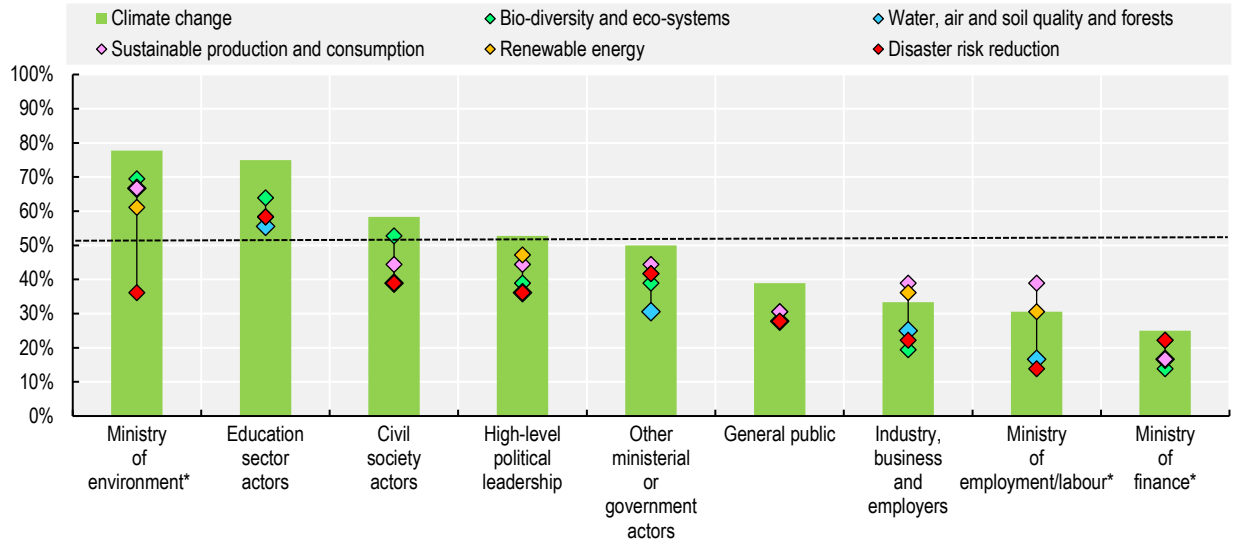
Across these topics, education ministries commonly cited their ministries of environment as key collaborators, followed by education sector actors and civil society actors. Collaboration with high-level political leadership, other ministerial or government actors, and the general public was reported less frequently. Moreover, collaboration with industry, businesses, employers, ministries of employment, and particularly ministries of finance was relatively limited.

A higher share of participating education ministries tended to report a greater range of actors with whom at least moderate collaboration happens on aspects related to sustainable production and consumption. Still, there is potential for increased collaboration, particularly in areas traditionally linked to certain actors. Education ministries could benefit from stronger collaboration with industry, businesses, employers, and ministries of employment/labour, which are closely related to sustainable production and consumption.

Furthermore, ministries of finance play a pivotal role in supporting the implementation of a policy measure, or even its scaling up. For this actor, collaborations appear very targeted, such as in **Finland**, where this takes place in the context of funding allocated to specific programmes.

Figure 4.8. Climate change appears a topic of relatively broader collaboration between the education sector and other actors, compared to other topics (2023)

Percentage of education ministries reporting collaborations by topic and actor on matters related to the transition to greener and fairer societies



Note: Some markers have been resized to allow visibility where data is similar. Figure prepared with responses from 34 education systems.
Source: OECD (2023[1]), Education Policy Outlook National Survey for Comparative Policy Analysis 2023: Empowering All Learners to go Green.

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Other noteworthy examples highlight existing collaborations in education and sustainability. Current efforts to support aspects related to the transition towards greener and fairer economies include collaborations with specialised agencies or foundations working on aspects of sustainable development, such as in **France**, with over 20 partnerships signed between 2021-22 by the education ministry and multiple agencies.

Coordination among national and subnational levels was also reported by **Germany** or **Colombia**. In Germany, this collaboration has allowed the Federal Ministry of Education and Research (BMBF) to produce an interim report regarding the implementation of the ESD in the German education system. To produce it, analysis of over 2 300 documents was carried out, including educational plans, curricula, and sustainability reports. Findings from this report point that although some references to ESD exist in these documents, the integration is still not widespread or explicit. The document calls for a more systematic and long-term approach to integrating ESD into the education system and the importance of active support from educational authorities for successful implementation (German Federal Ministry of Education and Research, 2020[26]).

Looking beyond education, in Colombia, the Inter-Institutional Technical Committees of Environmental Education (CIDEA, 2014) operate within subnational jurisdictions to support the implementation of the national Policy for Environmental Education at regional level. Acting as subnational platforms, they establish plans of action for this and promote collaboration between different sectors, including education institutions and civil society, on aspects related to environmental education. Along with guiding the contextualisation of the national environmental education policies at regional level, tasks carried out by the CIDEA may vary as well (e.g. keeping track of the projects and institutions undertaking environmental education projects; providing guidance for the development of related initiatives; or establishing communication strategies (CDA, 2023[27]) Moving forward, the CIDEA need to balance the challenge of helping local level institutions go beyond siloed approaches and connect as a community to national goals,

while remaining sensitive and relevant to local needs (MInistry of Environment and Sustainable Development of Colombia and Ministry of National Education of Colombia, 2003[28]).

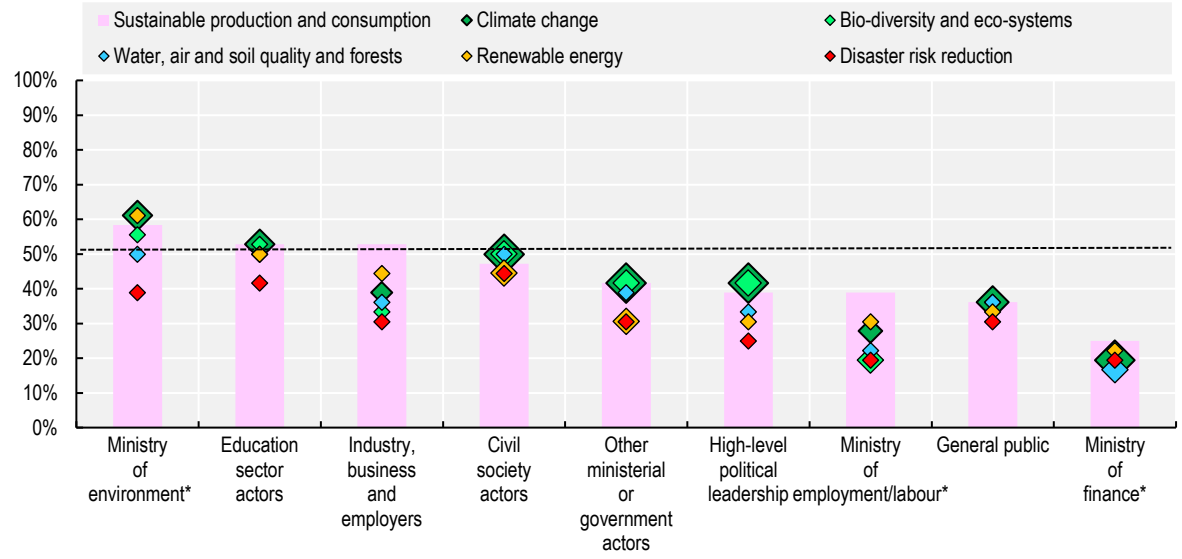
More targeted collaborations engaging education and external actors also happen in **Austria**, the **French Community of Belgium** and **Luxembourg**. In Austria, the FORUM Environmental Education (FORUM Umweltbildung) is a joint project of the Federal Ministry of Climate Action, Environment, Energy, Mobility, Innovation and Technology and the Federal Ministry of Education, Science and Research. The FORUM has the objective of developing different types of tools and materials, for further engagement in aspects related to ESD on topics defined every year. Although education and youth actors within the sector are in principle the main beneficiaries of these activities, they may also be open to the broader public (FORUM Umweltbildung, 2023[29]). A similar effort exists in Luxembourg, where the ministries of Education, Environment, Co-operation and Civil Society actors collaborate on a yearly basis for the organisation of a national fair on topics related to ESD that involves actors of civil society (Coalition Parties of Luxembourg, 2018[30]).

Education ministries desire more collaboration on 'sustainable production and consumption'

The *EPO Survey 2023* also inquired about education ministries' preferences for greater collaboration in transitioning towards greener and fairer societies. "Sustainable production and consumption" emerged as the topic where most education ministries expressed a need for enhanced collaboration across various actors. Over 50% of education systems desired more collaboration in this area, particularly with ministries of environment, education sector actors, civil society, and industry, businesses, and employers (see Figure 4.9).

Figure 4.9. Education ministries wish to enhance collaboration with other actors

Percentage of education ministries reporting a desire for greater collaboration by topic and actor on matters related to the transition to greener and fairer societies



Note: Data are ranked from highest to lowest values on 'desired collaboration' in sustainable production and consumption. Figure prepared with responses from 34 education systems.
Source: OECD (2023[1]), *Education Policy Outlook National Survey for Comparative Policy Analysis 2023: Empowering All Learners to go Green.*

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“Climate change” also ranked as the second most prominent area for which education ministries sought increased collaboration. In this domain, more than half of participating education ministries wished to collaborate further with their ministries of environment, education sector actors, and civil society. Austria, the Flemish and German Communities of Belgium, Colombia, Czechia, Greece, Iceland, Ireland, Korea, Latvia, Mexico, Peru, Portugal, and Scotland (United Kingdom) reported similar preferences for all these actors.

However, in the same way, preferences for increased collaboration did not always match in topics where synergies could be beneficial. For instance, despite the potential relationship between "Renewable energy" and "Sustainable production and consumption," education ministries did not express the same extent of desire for collaboration in both areas.

Figure 4.10 shows the disparity between where education ministries see a need for more collaboration and where they currently collaborate. "Industry, business, and employers" consistently stood out as actors for whom ministries expressed a higher desire for collaboration compared to perceived ongoing collaboration across all surveyed topics. The gap between desired and perceived current collaboration with industry, business, and employers was especially pronounced in the "Sustainable production and consumption" and "Biodiversity and eco-systems" categories, with a difference of around 15 percentage points. However, the gap between current and desired collaboration with "Ministries of employment/labour" was minimal (maximum 6 percentage points difference) on topics related to "Water, air, and soil quality and forests."

Education ministries shared several reasons for the desire to collaborate more with other actors. **Latvia**, **Estonia**, and **Italy** expressed interest in collaborating on skills development, research, dissemination, and building awareness. The **Flemish Community of Belgium** aimed to develop a broader vision, including ESD competencies through collaborations between sustainability education actors and those working on technical aspects related to Green skills/competencies. **Korea** referred to collaborations with high-level leadership in defining mid to long-term visions. Greater collaboration was also seen as essential to optimising mobility around schools (**French Community of Belgium**), enhancing the interinstitutional skills strategy (**Bulgaria**), and improving articulation across education levels (**France**).

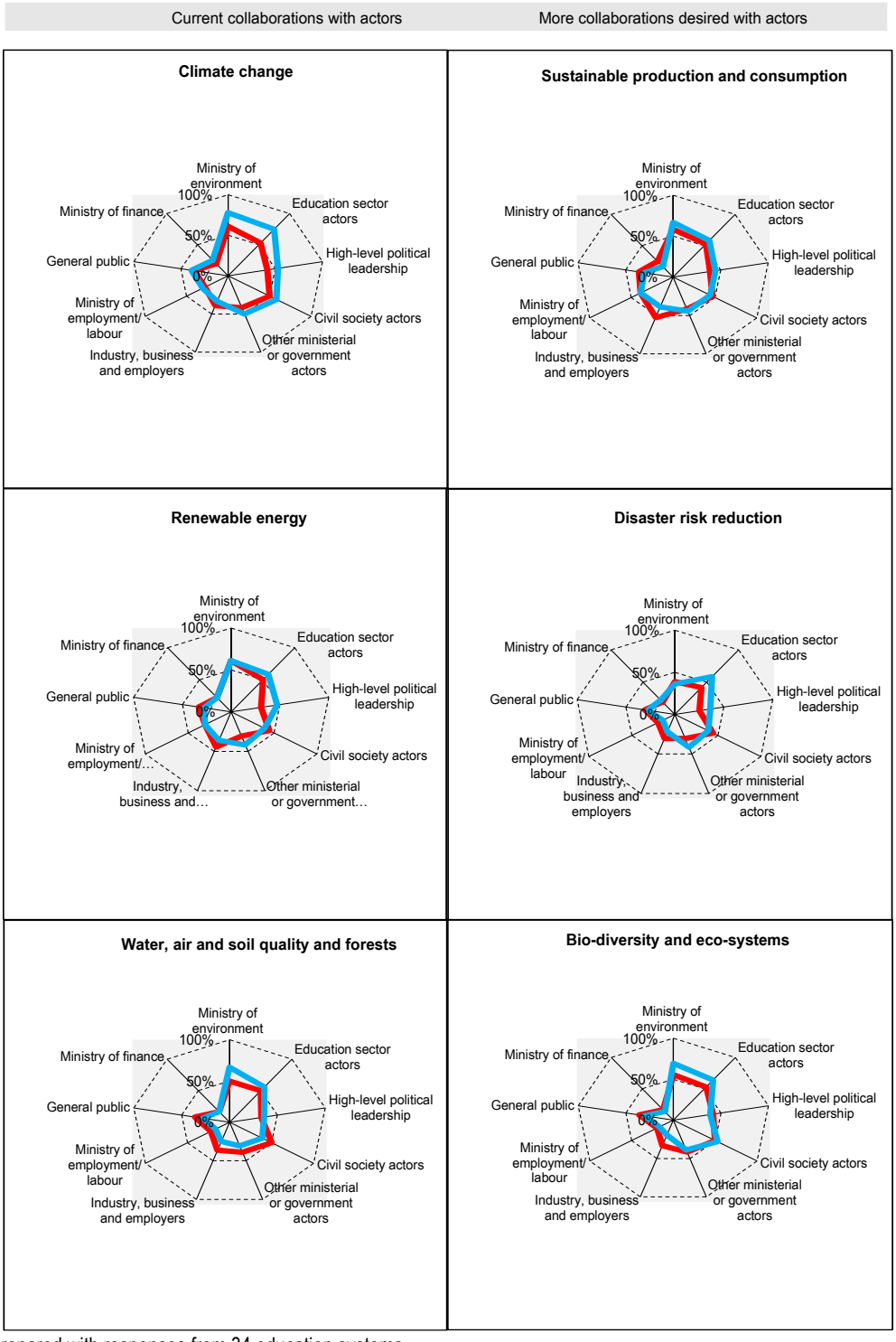
Education ministries can benefit from strategically considering with whom to enhance collaboration based on specific topics to achieve more impactful education measures over short-, mid-, and long-term periods. For example, on aspects related to sustainable production and consumption and renewable energy, greater shares of ongoing and desired collaboration expressed by ministries would have been expected with their industry, business and employers, their ministries of employment/labour, or their ministries of finance. However, across these topics, fewer than half of countries tended to express this.

Moreover, topics related to "Disaster risk reduction" appeared to receive less priority, with less than half of participating education ministries (44%) desiring more collaboration with civil society actors. Recent global shocks, such as the COVID-19 pandemic and natural disasters, highlight the need for preparedness approaches in education systems to address crises effectively.

In the same way, polycrises are also likely to increase as climate change exacerbates. Education ministries could benefit from developing preparedness approaches that help increase quality and relevance of education and training approaches in the context of broader desired societal transformation at the same time (OECD, 2021[8]; WEF, 2023[3]; UNICEF, 2023[31]) (see Chapter 1). Governance arrangements also play a role, with the relevance of high-level political leadership varying in centralised and decentralised education systems. In more decentralised systems, lateral actors like other ministerial or government actors, civil society, and the general public may become more critical for collaboration. However, regarding the general public, it is concerning that fewer than half of education ministries on average expressed ongoing or desired collaboration across the surveyed topics.

Figure 4.10. Comparing current and further desired collaboration on aspects related to the transition to greener and fairer societies (2023)

Percentage of education ministries reporting current collaboration or more desired collaboration, by actor and topic



Note: Figure prepared with responses from 34 education systems.
Source: OECD (2023[11]), *Education Policy Outlook National Survey for Comparative Policy Analysis 2023: Empowering All Learners to go Green.*

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Education ministries see high-level backing and capacity as important factors of influence, but ongoing or desired collaborations may not be aligned

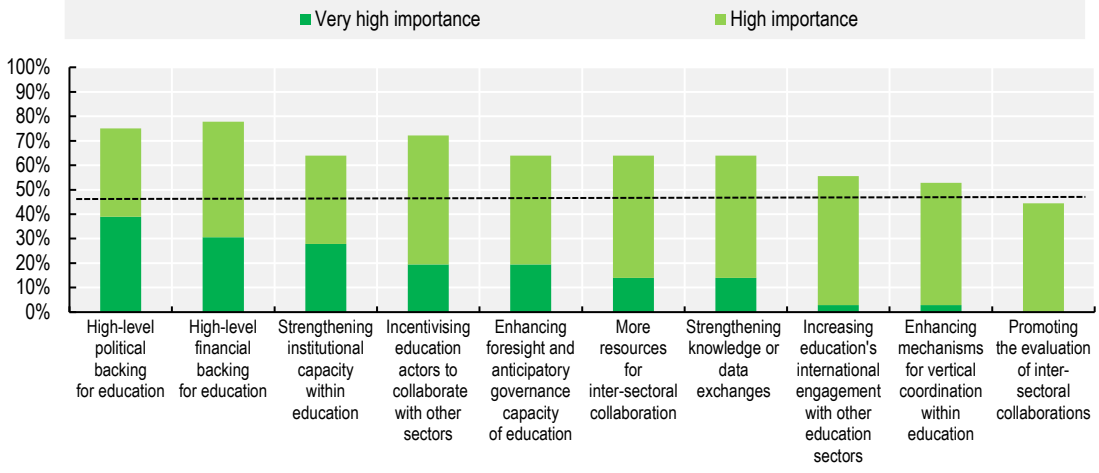
Education ministries were also asked about factors that could elevate the role of the education sector and support collaboration with other actors in transitioning to greener and fairer societies. The top three factors they identified on average as of great importance related to high-level backing for education in both political (39%) and financial (31%) terms, as well as strengthening institutional capacity within education (28%). Some pointed out that good initiatives may fail without the necessary financial and human resources, including the time required for implementation. Figure 4.11 provides a sense of their preferences.

About 19% of participating education ministries also emphasised the need to incentivise education actors to collaborate with other sectors and enhance foresight and anticipatory governance capacity within education. Foresight and anticipatory governance capacity were seen as crucial for proactive decision making and changing mindsets in planning processes.

Interestingly, although a high share of education ministries referred to the importance of high-level financial backing, only 14% of education ministries considered having more resources for inter-sectoral collaboration and a similar share mentioned strengthening knowledge or data exchanges to be of very high importance. They also referred to the importance of coherence beyond education institutions to foster innovation in educational settings and support the implementation of education for sustainable development practices. As pointed out by one participating education ministry, within schools the joint design of a learning environment that encourages reflection and action for sustainability is an important leverage for ESD.

Figure 4.11. High-level backing and institutional capacity are among the top factors to enhance the role of the education sector

Perceptions from ministries/organisations on important factors in helping to elevate the role of the education sector and support collaboration with other actors on matters related to the transition to a green and fair society



Note: For 'very high importance', participating education ministries could only select a maximum of three factors. Data is ranked according to the share of education ministries reporting a factor as of "very high importance". Figure prepared with responses from 32 education systems.
Source: OECD (2023[11]), Education Policy Outlook National Survey for Comparative Policy Analysis 2023: Empowering All Learners to go Green.

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In contrast, only 3% of participating education ministries mentioned increasing education's international engagement with other education sectors or enhancing mechanisms for vertical coordination within education as a factor of very high importance. In the same way, none referred to promoting the evaluation of inter-sectoral collaborations as being of very high importance. Interestingly, only 50% of education ministries considered promoting the evaluation of inter-sectoral collaboration processes as of at least high importance. This was also the factor which the highest share of education ministries identified as of low or moderate importance (41%) among those surveyed. Being able to learn from experiences of inter-sectoral collaborations could be a matter of further attention to education ministries. Those who did prioritise evaluation tended to focus on enhancing foresight and anticipatory governance capacity and mechanisms for vertical collaboration as well. Examples of these ministries are the Flemish and German-speaking Communities of Belgium, Colombia, Estonia, Latvia, New Zealand, Peru, as well as Scotland (United Kingdom) and Northern Ireland (United Kingdom).

The responses indicated a need for better alignment between priorities and ongoing and desired collaborations with actors who could support the education sector. While a large share of education ministries referred to high-level financial backing and providing more resources for inter-sectoral collaboration as highly important in their contexts, these areas had very little ongoing or desired collaboration with high-level political leadership and ministries of finance, as expressed earlier in this chapter. Responses from education ministries suggest they are aware of the importance of cross-sectoral collaboration to help education become more strategic. Moving forward, they could benefit from mapping priority areas and collaborations beyond the education sector to promote synergies.

Some policy lessons emerge on how education systems can increase their strategic importance for the transition to greener societies

Recent data and analysis from responses to the *EPO Survey 2023*, along with these and other policy experiences to help the education sector play a more strategic role in the broader societal green transformation offer some lessons to help guide education systems' efforts in 2024.

1. Governments, including education ministries, should consciously prioritise elevating the strategic importance of the education sector for the transition to greener societies.

- Education plays a crucial role in fostering greener and fairer societies, influencing individuals, communities, and policy processes. Given the urgency of transitioning to greener and fairer societies today and the cross-sectoral support that education can provide, it is essential to potentialise this role.
- In the context of strategic instruments for this transition, including dedicated system-level strategies for environmental and sustainability education, ensuring high-level political and financial backing for education to facilitate exchanges with other sectors is crucial, as indicated by education ministries. However, responses to the EPO Survey 2023 show that governments and education systems need to be more attentive to possible collaborations to make this happen.

2. Align priorities and collaborations by mapping ongoing and desired partnerships with various actors and domains, such as on sustainable production and consumption or climate change, identifying other related priorities.

- Governments should ensure that national priorities align with ongoing and desired collaborations. In the EPO Survey 2023, 'Sustainable production and consumption' and 'Climate change' emerged as top priorities for education systems, yet less than 50% of participating education ministries reported ongoing collaborations with most actors surveyed on these topics.

- Education ministries should map collaborations to assess where to allocate efforts more efficiently (e.g. collaborations with including industry, business and employers, the Ministry of Employment, or the Ministry of Finance).
- Additionally, in a context of increasing future policrises associated with the challenge of climate change, priorities such as disaster preparedness also require the attention from education ministries (see also Chapter 1).

Build the capacity of the education sector to understand the key challenges and opportunities of transitioning to greener and fairer societies and driving transformative change.

- The EPO Survey 2023 identified strengthening institutional capacity within education and incentivising education actors to collaborate with other sectors as crucial factors related to this transition. The education sector must enhance its capacity to comprehend the evidence behind these challenges and increasingly engage with other actors through formal, non-formal or informal learning. Exploring possibilities for training, research and infrastructure will be essential (see Chapters 2 and 3).
- Similarly, governments need to facilitate knowledge and data exchange within and beyond education related to education for sustainable development. Survey responses suggest that these are areas that receive little attention or are seen as less relevant by education ministries.

Examine which incentives and conditions within the education sector facilitate collaboration for green transformation according to the priorities established.

- Governments should assess the conditions that hinder or enable education actors' engagement in aspects related to the transition to greener and fairer societies and provide incentives that emphasise it as a transversal objective. This includes revising the existing instruments in place to assess what related existing or new incentives can establish this transition as a transversal priority as well as the resources needed to facilitate cross-government collaboration. Establishing dedicated funding mechanisms, staffing, and digital platforms to facilitate collaboration across government departments is essential.

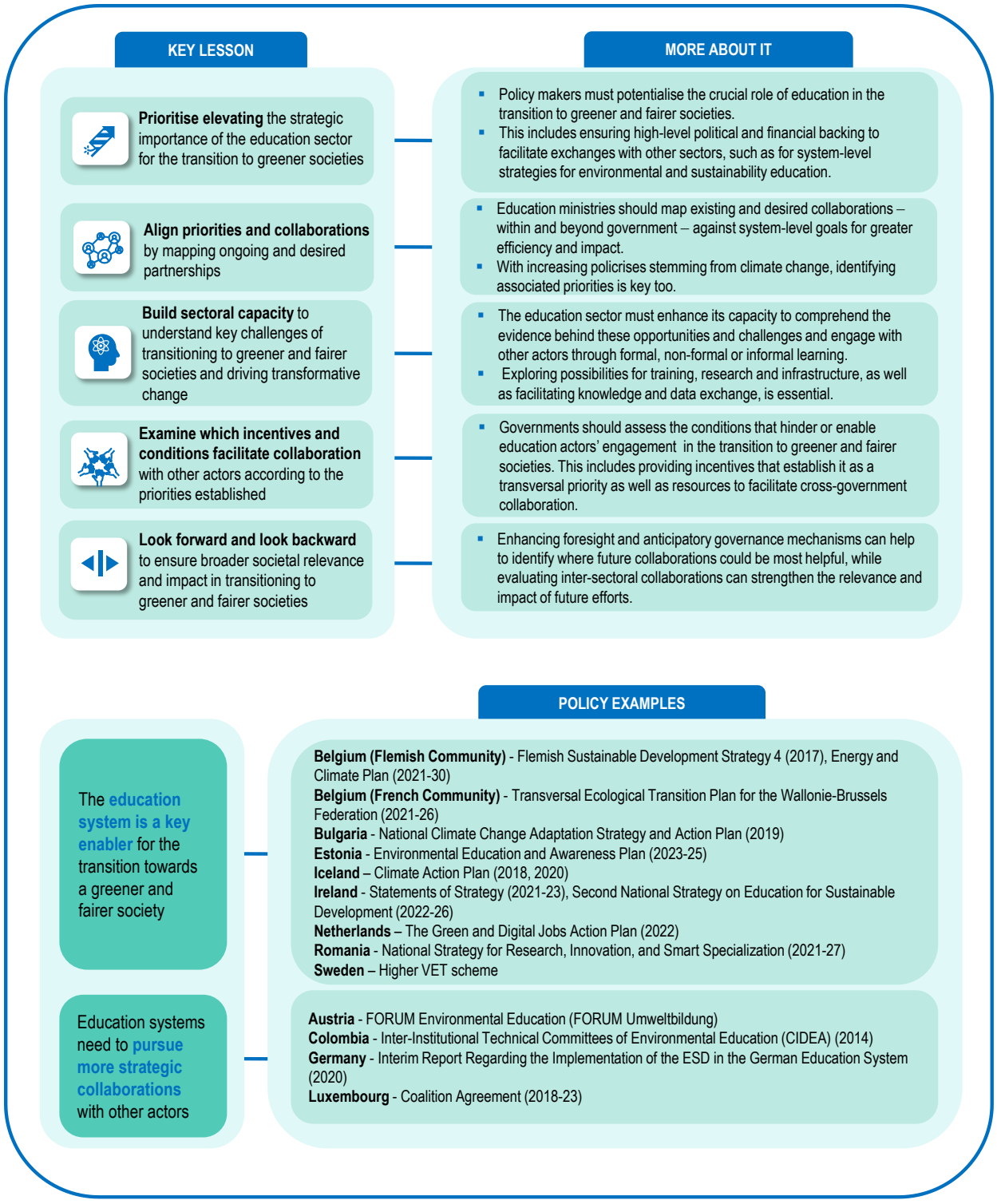
Look forward and look backward to ensure broader societal relevance and impact of the education sector's efforts in transitioning to greener and fairer societies.

- In the EPO Survey 2023, only 50% of education ministries considered evaluating inter-sectoral collaboration processes to be of at least high importance and none considered it of very high importance. Prioritising evaluations of inter-sectoral collaborations on aspects related to the transition to greener and fairer societies, along with the sharing of knowledge and data, is critical to enhance the relevance, impact and value for money of ongoing and future efforts.
- Education ministries should also enhance foresight and anticipatory governance mechanisms to identify where future policy efforts and collaborations can be most helpful for the transition to greener and fairer societies, such as in the implementation or reform of instruments and enhancing synergies to support this transition.

Key messages

In 2024, policy lessons and examples of policy efforts identified in this chapter can help education actors elevate the importance of the education sector (see Figure 4.12).

Figure 4.12. Summary of policy lessons on how education systems can increase their strategic importance for broader societal green transformation



Source: OECD (2023[1]), *Education Policy Outlook National Survey for Comparative Policy Analysis 2023: Empowering All Learners to go Green.*

References

Adriaansens, M. et al. (2023), *Action Plan on Green and Digital Jobs*, https://open.overheid.nl/documenten/ronl-a245a47c3d74e4bc8d2781bc835add45eb9efcd2/pdf. [16]

Bolstad, R. (2020), *Opportunities for education in a changing climate: Themes from key informant interviews*, New Zealand Council for Educational Research, https://doi.org/10.18296/rep.0006. [7]

CDA (2023), *Comités Interinstiucionales de Educación Ambiental CIDEA [Inter-Institutional Committees for Environmental Education CIDEA]*, https://cda.gov.co/es/ninos-y-adolescentes/cidea (accessed on 23 October 2023). [27]

Coalition Parties of Luxembourg (2018), *Coalition Agreement 2018-2023*, https://gouvernement.lu/fr/publications/accord-coalition/2018-2023.html. [30]

Dale, N. and S. Zhekova (2019), *National Climate Change Adaptation Strategy and Action Plan*, https://www.moew.government.bg/en/climate/international-negotiations-and-adaptation/adaptation/. [14]

Estonian Ministry of Environment & Estonian Ministry of Education (2023), *Keskkonnahariduse ja -teadlikkuse tegevuskava 2023-2025 [Environmental Education and Awareness Plan 2023-2025]*, https://kliimaministeerium.ee/rohereform/keskkonnateadlikkus/keskkonnahariduse-ja-teadlikkuse-tegevuskava-2023-2025 (accessed on 18 October 2023). [15]

Feinstein, N. and K. Mach (2019), "Three roles for education in climate change adaptation", *Climate Policy*, Vol. 20/3, pp. 317-322, https://doi.org/10.1080/14693062.2019.1701975. [10]

FORUM Umweltbildung (2023), *FORUM Umweltbildung*, https://www.umweltbildung.at/ (accessed on 18 October 2023). [29]

German Federal Ministry of Education and Research (2020), *Zwischenbilanz zum Nationalen Aktionsplan Bildung für nachhaltige Entwicklung [Interim Assessment of the National Action Plan on Education for Sustainable Development]*, https://www.bne-portal.de/SharedDocs/Publikationen/de/bne/zwischenbilanz-zum-nationalen-aktionsplan-bildung-fuer-nachhaltige-entwicklung.pdf. [26]

Government of Flanders (2023), *Vlaams Energie- en Klimaatplan 2021-2030 [Flemish Energy and Climate Plan 2021-2030]*, https://publicaties.vlaanderen.be/view-file/56259. [12]

Government of Flanders (2021), *Vlaamse Strategie Duurzame Ontwikkeling 4 [Flemish Sustainable Development Strategy 4]*, https://beslissingenvlaamseregering.vlaanderen.be/document-view/61A09A14364ED90008000146. [13]

Icelandic Ministry for the Environment and Natural Resources (2020), *Aðgerðaáætlun í loftslagsmálum [Climate Action Plan]*, https://www.stjornarradid.is/library/02-Rit--skyrslur-og-skrar/Adgerdaaetlun%20i%20loftslagsmalum%20onnur%20utgafa.pdf. [20]

Irish Department of Education (2022), *ESD to 2030: Second National Strategy on Education for Sustainable Development*, https://www.gov.ie/en/publication/8c8bb-esd-to-2030-second-national-strategy-on-education-for-sustainable-development/. [19]

Irish Department of Education (2021), *Statement of Strategy 2021-2023*, https://assets.gov.ie/136245/0f16238d-ce2e-4da9-8511-a871327b4e2d.pdf (accessed on 18 October 2023). [17]

Irish Department of Further and Higher Education, Research, Innovation and Science (2021), *Statement of Strategy 2021-2023*, https://www.gov.ie/en/organisation-information/3f066-statement-of-strategy-2021-2023/#:~:text=The%20strategy%20sets%20out%20the,ensure%20nobody%20is%20left%20behind (accessed on 18 October 2023). [18]

Jickling, B. and A. Wals (2008), "Globalization and environmental education: looking beyond sustainable development", *Journal of Curriculum Studies*, Vol. 40/1, pp. 1-21, https://doi.org/10.1080/00220270701684667. [24]

MInistry of Environment and Sustainable Development of Colombia and Ministry of National Education of Colombia (2003), *Educación Ambiental: National Policy [Environmental Education: National Politics]*, https://www.uco.edu.co/extension/prau/Biblioteca%20Marco%20Normativo/Politica%20Nacional%20Educacion%20Ambiental.pdf. [28]

Ministry of The Wallonia-Brussels Federation (2021), *Le Plan transversal de Transition écologique (2021 - 2026) [The Transversal Ecological Transition Plan (2021 - 2026)]*, https://www.federation-wallonie-bruxelles.be/transition-ecologique-en-federation-wallonie-bruxelles/le-plan-transversal-de-transition-ecologique-2021-2026/. [11]

OECD (2023), *Education Policy Outlook National Survey for Comparative Policy Analysis 2023: Empowering All Learners to go Green*. [1]

OECD (2023), *How can education systems support today the transitions towards greener and fairer economies and societies in Latin America?*. [6]

OECD (2022), *Climate Tipping Points: Insights for Effective Policy Action*, OECD Publishing, Paris, https://doi.org/10.1787/abc5a69e-en. [2]

OECD (2022), *Declaration on Building Equitable Societies Through Education, OECD/LEGAL/0485*, https://legalinstruments.oecd.org/en/instruments/OECD-LEGAL-0485. [5]

OECD (2021), *Education Policy Outlook 2021: Shaping Responsive and Resilient Education in a Changing World*, OECD Publishing, Paris, https://doi.org/10.1787/75e40a16-en. [8]

Reed, M. (2008), "Stakeholder participation for environmental management: A literature review", *Biological Conservation*, Vol. 141/10, pp. 2417-2431, https://doi.org/10.1016/j.biocon.2008.07.014. [23]

Romanian Ministry of Research, Innovation and Digitalization (2021), *Strategia Națională de Cercetare, Inovare și Specializare Inteligentă 2022-2027 [National Strategy for Research, Innovation and Smart Specialisation 2021-2027]*, https://www.mcid.gov.ro/wp-content/uploads/2022/12/strategia-na-ional-de-cercetare-inovare-i-specializare-inteligent-2022-2027.pdf. [21]

Sarabhai, K. and P. Vyas (2017), "The leapfrogging opportunity: The role of education in sustainable development and climate change mitigation", *European Journal of Education*, Vol. 52/4, pp. 427-436, https://doi.org/10.1111/ejed.12243. [9]

Tilbury et al (2002), *Education and sustainability: responding to the global challenge*, IUCN, https://portals.iucn.org/library/sites/library/files/documents/2002-002.pdf. [25]

UNICEF (2023), *Prospctects for Children in the Polycrisis - A 2023 Global Outlook*, https://www.unicef.org/globalinsight/media/3001/file/UNICEF-Innocenti-Prospects-for-Children-Global-Outlook-2023.pdf. [31]

United Nations Climate Change Secretariat (2018), *Executive Summary of the United Nations Framework Convention on Climate Change*, https://unfccc.int/resource/climateaction2020/media/1308/unfccc_spm_2018.pdf. [4]

Viennet, R. and B. Pont (2017), "Education policy implementation: A literature review and proposed framework", *OECD Education Working Papers*, No. 162, OECD Publishing, Paris, https://doi.org/10.1787/fc467a64-en. [22]

WEF (2023), *Global Risks Report 2023*, https://www3.weforum.org/docs/WEF_Global_Risks_Report_2023.pdf. [3]

Education Policy Outlook 2023

EMPOWERING ALL LEARNERS TO GO GREEN

In 2024, education and training systems have a 'unique potential' to build the foundations of equitable, sustainable societies. In the OECD National Survey for Comparative Policy Analysis 2023: Empowering Learners to go Green, 90% of participating systems identified environmental sustainability as a key priority for 2024. There is no trade-off between addressing the biggest challenge facing people and the planet and responding to other external shocks and long-term evolutions, especially since these will only become increasingly interdependent. This implies empowering lifelong learners, institutions and education systems with the agency required to act, today. Building on the OECD's Framework of Responsiveness and Resilience in Education Policy, survey responses from 36 education systems and international policy analysis, this report explores how education systems can: 1) translate learners' awareness into environmental action; 2) provide learners with experiences to shape the green economy; and 3) position education as a strategic sector for the green transition. By exploring these areas, the report aims to support countries to follow up on the goals established by the 2022 OECD Declaration on Building Equitable Societies Through Education. The report is part of the Education Policy Outlook series—the OECD's analytical observatory of education policy.

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