



International Summit on the Teaching Profession

Reimagining Education, Realising Potential



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Foreword

The past year has seen generative artificial intelligence go mainstream - big time. Powerful generative AI models, cutting-edge large language models, and AI tools for everything from artwork, graphic design and music – even the release of an AI-generated Beatles song - demonstrate AI's rapid evolution and integration into everyday life. Education is part of this new world. Teenagers are already asking chatbots to help them compose essays, solve maths problems and much more. Teachers are using the same technologies to create lesson plans and grade the work of students. While using AI for learning poses significant challenges, establishing the knowledge, skills, attitudes and values that should be learned and taught in a world heavily shaped by AI is even more difficult. Education policy has struggled to catch up on both fronts.

With AI set to become even more powerful, alongside other developments like renewable technologies and digitalisation, education will need to adapt – quickly. The jobs of the future will require individuals who can create value through their creativity, critical thinking and collaborative spirit. The demand for innovative thinking will be greater than ever before. So how can we best foster 21st Century skills that empower all students to shape their own destinies and contribute meaningfully to society?

There is no simple answer. But as we stand on the precipice of a new era, we need to find bold and innovative solutions so students can realise their full potential. We need to ensure that every individual, regardless of background or circumstance, has access to relevant education. And in a world in which the kinds of things that are easy to teach and test have also become easy to digitise and automate, we need to develop learning environments that nurture the skills of the future.

The conventional approach in school is often to break problems down into manageable bits and pieces and then to teach students how to solve the different parts. But modern societies create value by synthesising different fields of knowledge, making connections between ideas that previously seemed unrelated. That requires being familiar with and receptive to knowledge in other fields.

In today's schools, students typically learn individually and at the end of the school year, we certify their individual achievements. But the more interdependent the world becomes, the more we need great collaborators and orchestrators. Innovation is now rarely the product of individuals working in isolation, but rather an outcome of how we mobilise, share and integrate knowledge.

The well-being of societies depends increasingly on people's capacity to take collective action. Schools therefore need to become better at helping students learn to develop an awareness of the pluralism of modern life. That means teaching and rewarding collaboration as well as individual academic achievement, enabling students both to think for themselves, and to act for and with others.

More generally, changing skill demands have elevated the role of social and emotional skills. They include character qualities such as perseverance, empathy or perspective taking, mindfulness, ethics, courage and leadership. These skills, in turn, intersect with diversity in important ways. They can help students live and work in a world in which people increasingly need to appreciate a range of ideas, perspectives and values, and collaborate with people of different cultural origins, often bridging space and time through technology.

The challenge is that developing these cognitive, social and emotional capabilities requires a different approach to learning and teaching. It also requires a different calibre of teachers. For now, countries can get away with low teacher quality if teaching is mainly about imparting prefabricated knowledge. When teacher quality is low, governments tend to tell their teachers exactly what to do and exactly how they want it done, using an industrial organisation of work to get the results they want. Today the challenge is to make teaching a profession of advanced knowledge workers, who work with a high level of professional autonomy and within a collaborative culture.

But such people will not work as exchangeable widgets in schools organised like rigid Taylorist factories, which rely mainly on administrative forms of accountability, and bureaucratic command-and-control systems to direct their work. To attract the best people, modern education systems need to transform the way schools are organised, to one in which professional norms of control replace bureaucratic and administrative forms of control.

Far too often, schools are divided and disconnected from the real world, with teachers and content split between subjects, and students separated according to their expected career prospects. Schools are designed to keep students inside, and the rest of the world outside; with a lack of engagement with families and a reluctance to partner with other schools. This kind of isolation, in a world of complex learning systems, will seriously limit potential.

In contrast, effective learning environments are constantly creating synergies and finding new ways to enhance professional, social and cultural capital with others. That's why the future needs to be integrated – with an emphasis on the inter-relation of subjects, the integration of students and fostering connections with other schools, businesses and the wider community. Instruction in the future needs to be more project-based; building experiences that help students think across the boundaries of subject-matter disciplines. This will make learning more closely related to real-world contexts and contemporary issues, and helps create innovative partnerships.

The way children are taught also needs to change. Currently, different students are often taught in similar ways. Now school systems need to embrace diversity with differentiated approaches to learning. The goals of the past were standardisation and compliance, with students educated in age cohorts, following the same standard curriculum, all assessed at the same time. The future is about building instruction from students' passions and capacities, helping students personalise their learning and assessments in ways that foster engagement and talent. It's about encouraging students to be ingenious.

Policy makers also need to consider their priorities. In the past, policy focused on providing education; now it needs to put the spotlight on outcomes, shifting from looking upwards in the bureaucracy towards looking outwards to the next teacher, the next school and the next education system. Administrations have usually emphasised school management; now the focus needs to be on instructional leadership, with school leaders supporting, evaluating and developing high-quality teachers and designing innovative learning environments. We need to move from a system centred on quality control, to a future focused on quality assurance.

The challenge is that this kind of system transformation cannot be mandated by government. A top-down approach would only lead to surface compliance. However, true systematic change cannot be built solely from the ground up, either.

So what needs to happen? Government plays a key role in building and communicating the case for change and articulating a guiding vision for 21st-century learning. It acts as stimulator and enabler; it can focus resources, encourage an innovative policy climate, and use accountability and reporting modifications to encourage new educational practice.

But educators need to do more too. Educational leaders need to identify key agents of change, champion them, and find more effective approaches to scaling and disseminating innovations. That is also about

finding better ways to recognise, reward and give exposure to success, to do whatever is possible to make it easier for innovators to take risks and encourage the emergence of new ideas.

AI will contribute to this transformation, potentially serving as a powerful tool for both teachers and students alike. In the past, schools were technological islands, with technology often limited to supporting existing practices, and students outpacing schools in their adoption and consumption of new technology. Now schools need to use the potential of technologies to liberate learning from past conventions and connect learners in new and powerful ways.

By harnessing the power of data and AI, educators can offer tailored recommendations and interventions, transforming the educational experience. Adaptive learning systems and intelligent tutoring platforms represent just a fraction of the tools being developed, offering targeted support and guidance both inside and outside the classroom. Digitalisation also promises cost efficiencies and time-saving benefits across various educational processes. From streamlined administrative tasks to automated grading systems, technology potentially optimises teachers' time, allowing them to focus on their students and enriching educational experiences.

There are, of course, important limitations to AI; and technology alone is not enough to transform education. It is also imperative to strike a balance between leveraging technology to enhance learning experiences and mitigating its negative impact on student focus and well-being. Data from the OECD's Programme for International Student Assessment (PISA) has already shown that the pervasiveness of digital devices tends to exacerbate distractions and hinder learning outcomes.

While capable of some degree of personalisation, AI also lacks the intuition and human touch of teachers. Unlike algorithms and automated systems, teachers possess empathy and emotional intelligence necessary to recognise when a student is struggling, both academically and emotionally. They can offer personalised support, encouragement and reassurance, tailoring their approach to meet the individual needs of each student.

Teachers also play a crucial role in fostering a sense of community and belonging within the classroom. They create a supportive learning environment where students feel safe to take risks, ask questions and express themselves freely. This human connection is irreplaceable and can significantly impact a student's overall well-being and academic success.

So how should educators navigate this digital landscape? The effective integration of digital technology into education demands a skilled and adaptable workforce. Teachers must possess the digital competencies necessary to harness technology effectively, from integrating AI into teaching to navigating complex digital ecosystems. To this end, countries are investing in professional development opportunities and other initiatives to enhance teachers' digital skills.

We must also remain vigilant against the spectre of algorithmic bias. Just as in other sectors, AI-driven systems in education have the potential both to mitigate inequalities by providing learners with better tailored learning opportunities and to perpetuate and even exacerbate existing inequalities. Whether it's through uneven performance across demographic groups or the replication of human biases, the consequences of unchecked algorithmic bias are profound, threatening to undermine the very foundations of fairness and equity in education. As the technology develops, so too must our safeguards against this risk and others, from cyber threats to data breaches.

Balancing the benefits of using educational data with privacy concerns requires a nuanced approach that combines technical solutions with robust governance frameworks. As AI and other advanced technologies become more prevalent in education, maintaining human oversight and ensuring equitable access to digital resources is crucial.

School life also needs to adapt to the changing environment. In today's knowledge-based economy, learning doesn't end with graduation; it is a lifelong journey. Yet, currently, adult learning systems vary

significantly across OECD countries, with those in greatest need often receiving the least training. As the pace of technological innovation accelerates and job requirements evolve, individuals must continually update their skills and knowledge to stay competitive in the workforce.

Governments and teacher organisations must therefore prioritise lifelong learning initiatives that empower individuals of all ages to pursue their educational goals. This includes expanding access to adult education programmes, promoting vocational training and apprenticeships, and incentivising continuous professional development for educators. Technological advancement and digital courses, such as micro-credentials, can help in this regard. By investing in peoples' futures, regardless of their age, we can ensure that all members of society have the opportunity to thrive in the 21st-century economy.

None of this is easy. But future-oriented policy making is vital, particularly given the immense challenges the world faces. As part of the sustainable development goals, UN member states vowed to provide all children with free, equitable and quality primary and secondary education by 2030. AI holds the potential to bring humanity a major step closer to this goal. But as of today, hundreds of millions of children still receive no education across the globe. We can't let education slip down the political agenda. Quality education is what breaks cycles of poverty, reduces inequality and empowers people to live healthier, sustainable lives. Education is the key to preparing individuals for the economy of tomorrow. In our fast-changing world, it's a challenge that policymakers must embrace.

A handwritten signature in black ink that reads "Andreas Schleicher". The signature is written in a cursive, slightly slanted style.

Andreas Schleicher,

Director for Education and Skills and Special Advisor on Education Policy to the Secretary-General

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1 The future of learning and implications for teaching

Pedagogies for future ready student competencies and outcomes

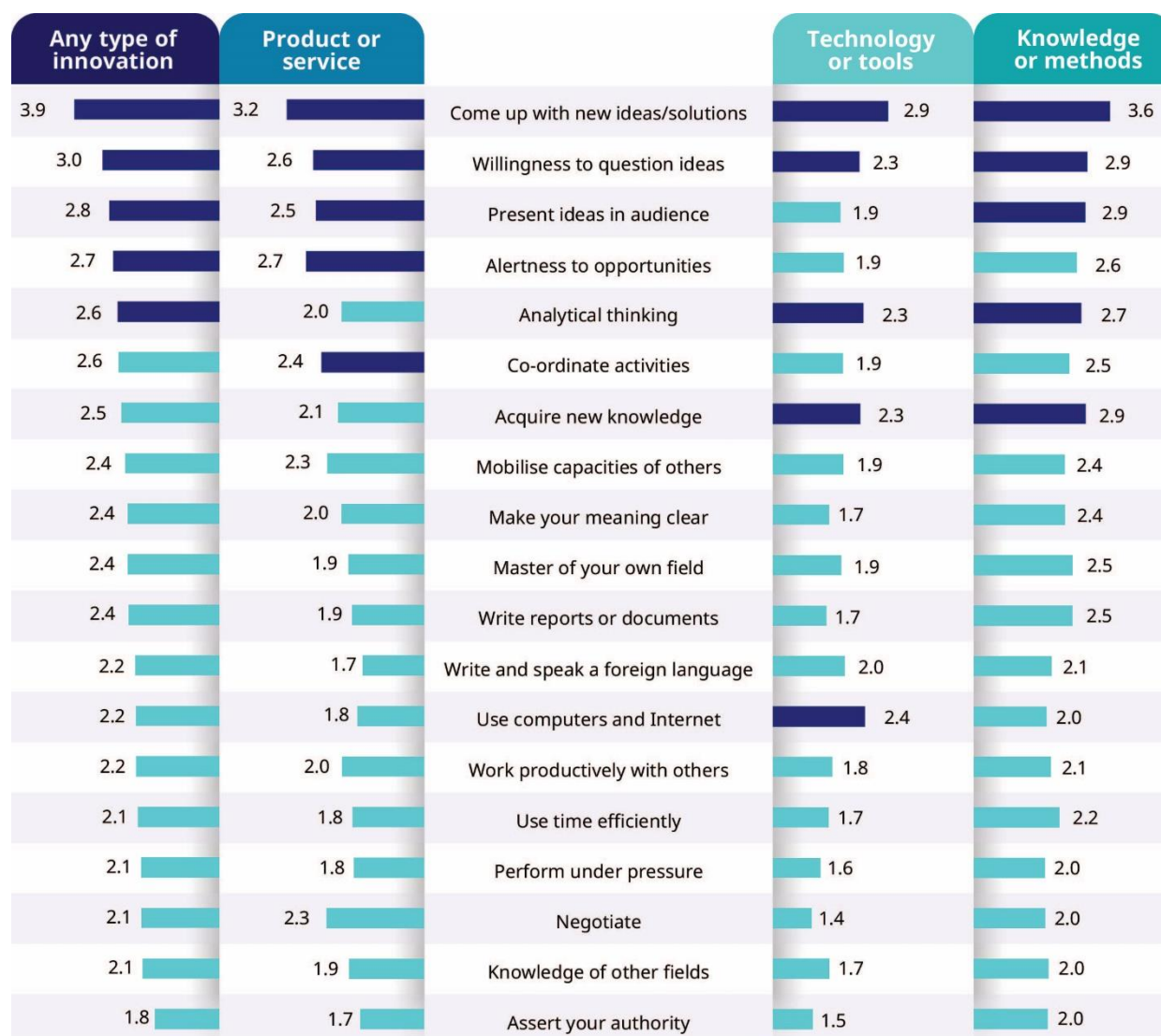
Students face a future filled with uncertainty and change. For education systems to continue to remain relevant, they must empower students to navigate these changes and succeed in the future by equipping them with the requisite knowledge, skills and values. Teachers are key enablers of this endeavour, and it is imperative that governments and teacher organisations collaborate to support teachers in exploring and enacting pedagogies, and designing learning environments that support student attainment of future-ready competencies, through policies, processes and teacher professional development.

This section will cover:

- What a future ready learner looks like
- Approaches to facilitate students' development of 21st Century Competencies (21CC)
- Ways to ensure that our educators have the skills and capacity to better support students in attainment of 21CC and other future-ready skills through a values-based education

For the most innovation-driven jobs – from AI to the creative arts to renewable technologies – employers are looking for employees that create value. Workers that are able to thrive in this environment are the ones that have the skills and mindset to ask questions, collaborate with others and think creatively. These skills can be taught and nurtured in the classroom, and require coherent pedagogical approaches. This doesn't necessarily require wholesale curriculum change or new resources: subtle changes to teaching methods can go a long way.

Figure 1.1. Future ready learners create new value



Notes: The five most critical skills are highlighted in dark blue for each type of innovation.

Odds ratios correspond to the likelihood of mentioning the skill as required for workers in innovative jobs, compared to workers in non-innovative jobs. Generalised odds ratio are computed from logistic regressions controlling for country and sector of activity.

Source: (Vincent-Lancrin et al., 2019^[1]), *Fostering Students' Creativity and Critical Thinking: What it Means in School*, Graph 2.1, <https://doi.org/10.1787/9d1cb429-en>.

OECD countries are increasingly driven by innovation. Workers are expected to contribute to change, to continually seek ways to leverage new technologies and ways of working to remain competitive. What's more, as digitalisation and artificial intelligence advance, the premium on creativity and critical thinking increases compared to routine skills, which are more susceptible to automation. In the World Economic Forum's *Future of Jobs 2023* report, companies considered creative thinking the second most important skill for workers, ranked only behind analytical thinking. Other research by companies like LinkedIn have found similar results (Petroni, 2019^[2])

But innovation isn't only important for the job market. The knowledge, skills, attitudes and values; insights, ideas, techniques, strategies and solutions that today's students develop will be key to solving many of the world's most pressing challenges—from climate change to poverty. These require the ability to put creative thinking into practice, working effectively with others to explore, analyse and implement new ideas. They also call on students to consider the interests of others. After all, to solve existential issues like climate change, we must develop the values and capabilities in today's generation to ensure that the interests of future generations are given full weight in our decisions (Cignetti and Fuster Rabella, 2023^[3]).

These ideas matter for education, too. Critical thinking acts as a powerful stimulus to learning itself, deepening students' absorption in their learning, activating higher order cognitive skills and stimulating emotional development and resilience. This was important in helping students navigate the complexities and challenges of COVID-19-induced remote learning by fostering adaptability, problem-solving, engagement, and emotional well-being.

Teachers have a critical role to play in nurturing these skills and behaviours among students. They can unlock student creativity by using teaching practices that encourage students to explore, generate and reflect upon ideas. They can build empathy by linking learning content to real-world scenarios and the lived experiences of students. They can help students develop the capacity to identify positive future outcomes and develop the judgment to arrive at those outcomes by promoting horizontal thinking across diverse areas of knowledge (OECD, 2023^[4]). In other words, teachers can help organise experiences, relationships and content in order to foster expanded ambitions for young people. This movement, which has been called "deeper learning, or "4-Dimensional Education", is centered around authentic, challenging learning tasks that are relevant to and engaging for the learner (Hannon, 2023^[5]).

It's no coincidence that high performing systems integrate formal guidelines and requirements related to teacher training on developing and assessing creativity and on developing or assessing student creativity directly. Having all three of these is uncommon. Fewer than 70% of jurisdictions surveyed have guidelines or requirements on developing students' creativity and requirements and guidelines for assessing student creativity are rarer still: only 44% of primary and 40% of secondary education systems reported having these in place (Cignetti and Fuster Rabella, 2023^[3]).

For another, creative thinking needs to be taught. This may sound obvious, but only 60% of education systems that took part in the 2022 PISA survey include references to creative thinking in all or almost all curricular subjects for primary education. The reasons for excluding it vary, but most survey responses flagged an overcrowded curriculum and insufficient teaching team, lack of assessment focus and lack of teacher training as the main barriers. Policies to promote the integration of creative thinking in the curriculum can lower these barriers.

More broadly, barriers to value creation in education for teachers encompass a range of systemic, institutional, and personal challenges. In addition to the above, a lack of support and recognition from school leadership and the community can demotivate teachers, while technological challenges and resistance to change impede the integration of new methodologies. Cultural and social barriers in classrooms also present obstacles to leveraging diversity as a strength. Overcoming these barriers requires a concerted effort involving policy reforms, increased investment in resources, professional development, and a cultural shift towards embracing innovation and diversity in education.

Teaching value creation doesn't necessarily require a radical curriculum change. Simple techniques can be employed in the classroom to build students' skills. For one, situating what students learn within a 'big picture' that illustrates the connections between different topics may help them to start thinking in a synthetic way (OECD, 2020^[6]). For example, environmental and sustainability education is a commonly articulated cross-curricular theme as part of the general goals of education and countries such as New Zealand have introduced new subjects specifically devoted to this subject.

Another simple technique is to move away from right/wrong questions wherever possible, giving students an open-ended prompt and encouraging them to offer a variety of solutions. Groupwork can also be an effective vehicle for creative thinking and helps students to develop a broader set of social emotional skills, too. In the 21st century, it is those relational aspects of teaching – mentorship, coaching, guidance – that will distinguish the most effective and successful teachers from their peers (OECD, 2019^[7]).

Korea has, since 2009, integrated a curriculum that not only enhances subject-based learning but also allocates nearly 10% of total school time to creative projects and activities (Vincent-Lancrin, 2013^[8]). This strategic approach aims to nurture a diverse set of value creation skills among students, including creativity in learning, communication and collaboration. Similarly, Singapore's educational framework, under its "Desired Outcomes of Education," places a significant focus on developing critical and inventive thinking alongside social and emotional competencies. By the conclusion of secondary education, Singaporean students are expected to emerge as resilient, innovative, and enterprising individuals. They are also trained to think critically and communicate their ideas effectively and persuasively, preparing them to tackle challenges and thrive in an ever-evolving global landscape.

Singing with Friends is a weekly initiative where 16-17 year-old students from the United World College of South East Asia (UWCSEA) collaborate with young adults from the Down Syndrome Association of Singapore (DSA). Launched in 2014, this programme utilises music to foster connections and celebrate song. Each session involves the UWCSEA students leading activities, including games and singing, with children who have Down Syndrome. The aim is to boost the confidence, musical abilities and communication skills of the children with Down Syndrome while simultaneously teaching the UWC students the importance of listening to and learning from the experiences of others.

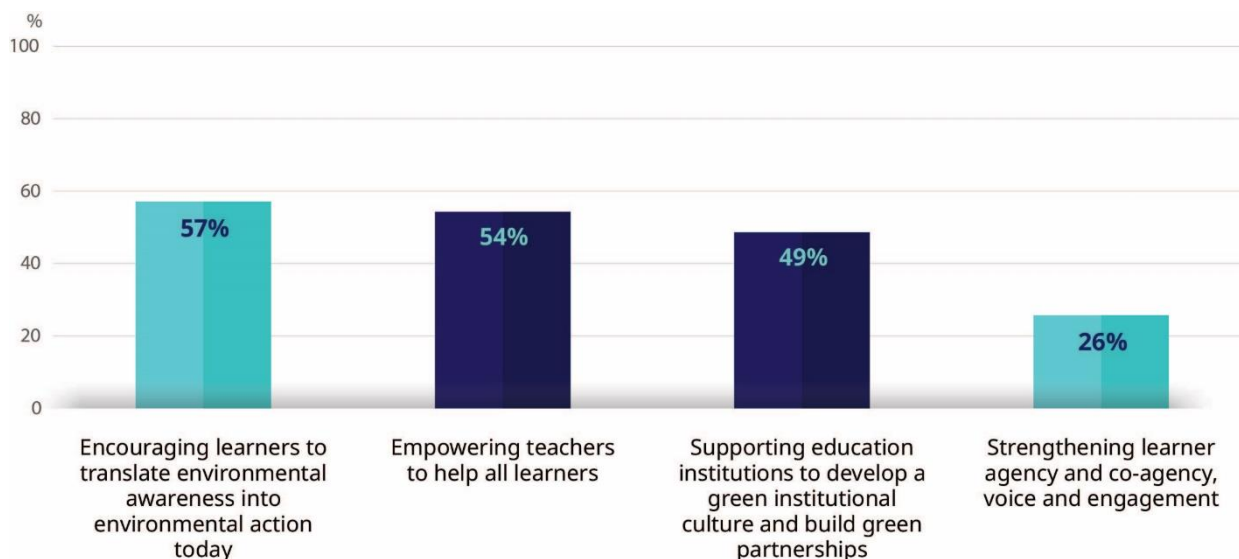
In Ontario, Canada, the Thames Valley District School Board's Rethink Secondary Learning project aims to prepare future ready learners. Its approach incorporates hands-on, experiential learning tailored to student interests, applying knowledge to real-life situations. A key initiative is the Greenhouse Academy, a 60 000-square-foot student-run learning space where students gain practical experience managing a greenhouse business. They tackle real-world problems, from choosing plants and designing layouts to budgeting and collaborating with local industries for resources like irrigation. Under teacher and staff mentorship, students learn to navigate business challenges, enhancing their independence and teamwork skills, and contributing value to their community and the business itself.

The bottom line

Creative thinking is recognized globally as a critical skill for the future, with education systems worldwide acknowledging its importance in curricula. Yet, simply revising curricula isn't enough to guarantee the development of creative thinking skills in students. A coherent approach is needed, ensuring that curricula, teacher training, and assessment methods are all aligned to foster an educational environment that truly supports and nurtures creativity.

In 2018, only one-third of OECD students were environmentally active. One of the most effective ways to turn awareness into action is by supporting the agency of young people, yet only a quarter of education systems prioritise strengthening learner agency and co-agency for the transition to greener and fairer societies. Shifting from teaching to mentoring, and creating a classroom culture that encourages student voice, exploration and responsibility can provide a fertile ground for the development of student agency (defined in the context of the OECD Learning Compass 2030 as the capacity to set a goal, reflect and act responsibly to effect change) (OECD, 2019^[7]).

Figure 1.2. Future ready learners are change agents



Source: (OECD, 2023^[9]), *Education Policy Outlook 2023: Empowering All Learners to Go Green*, Figure 2.1, <https://doi.org/10.1787/f5063653-en>.

Speaking at last year’s UN climate conference (COP28), former Irish President Mary Robinson said that “people in powerful positions must be prepared to step aside to make space for children and youth” (Robinson, 2023^[10]). Children and young people, she argued, have solutions to offer with regards to climate change mitigation and adaptation and it is only by enabling them to shape their own future that we will be able to unleash their potential.

Student agency plays an important role in addressing climate change. Students who have the capacity to take responsibility for their actions develop a strong moral compass that guides considered reflection, work with others and respect for the planet. It also helps in the classroom. Students who exercise agency are better able to navigate by themselves through unfamiliar contexts and find their direction in a meaningful and responsible way.

Climate change isn’t the only unprecedented territory that young people find themselves in today: artificial intelligence, the fracturing of the global political order and economic insecurity all require agency both as a goal and as a process to help learners navigate an ever-changing landscape (Stenalt and Lassesen, 2021^[11]).

When students actively participate in shaping their education by selecting what and how they learn, they can exhibit increased motivation and are more inclined to set specific learning objectives (OECD, 2019^[12]). This can not only enhance their enthusiasm for learning but also equip them with the essential ability to self-educate—a skill of lifelong value. This agency is applicable across various domains, including ethical

decision-making, social interactions, economic understanding, and creative work. For instance, exercising moral agency is critical for students to make decisions that acknowledge the rights and needs of others.

While a robust sense of agency aids students in achieving long-term objectives and overcoming challenges, it is imperative that they possess fundamental cognitive, social, and emotional skills. These skills are crucial for applying their agency effectively, benefiting both their personal development and society at large.

When it comes to climate change, most students are aware of the issues. In 2018, 79% of students across the 37 OECD countries in that year's PISA study said that they knew about the topic of climate change and global warming. But this does not necessarily translate into action. That same study found that only one-third of OECD students were environmentally active. And this has a socioeconomic dimension as well: the share of students displaying pro-environmental attitudes was 23 percentage points higher among economically advantaged students than disadvantaged students (OECD, 2022^[13]) 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.

The citizen-led MolenGeek initiative, which aims to provide an opportunity for employment, business creation or career building to anyone in the historically-deprived Molenbeek area of Belgium, regardless of their identity, doesn't rely on entry exams or any prerequisites. Recognising that these might exclude the most disadvantaged students, many of whom will have faced challenges with formal qualifications or testing, MolenGeek instead requires all entrants to develop their own project within the first six months of joining. This fosters the agency of students, empowering them to create their own roadmap to success while encouraging their creativity and problem-solving skills.

The educational environment is an important crucible for student agency. Teachers can stoke the fires of student agency by creating a classroom culture that encourages risk-taking and values each student's voice. Teachers can also model and promote a growth mindset, providing opportunities for students to make choices about their learning. Helping students to become aware of their own learning processes can enable them to set goals, monitor progress and adjust their strategies. Finally, authentic learning experiences that connect to students' lives and interests also play a crucial role.

To inculcate agency in students, teachers themselves need agency. This includes the skills to observe students' learning processes, make decisions based on these observations, implement actions, evaluate the outcomes, and learn from this entire cycle. A key aspect of this professional autonomy is the capability to defend classroom methods with a foundation in theoretical knowledge and critical reflection, along with a clear understanding of one's motivations and values in making decisions.

Norway uses mentors to help guide student teachers in planning and reflecting on teaching practices. These mentors are also responsible for aiding the student teachers in translating their theoretical knowledge gained at university into effective classroom teaching, as well as in supporting them to articulate and reflect upon their teaching decisions.

The Montessori system is a good example of a school system centred on students' inquisitiveness and problem solving around activity-based learning and play. The role of the teacher in this context is to prepare a suitable environment for these activities and to adapt this environment to the students' interests and needs as he or she grows.

Other education systems adopt similar philosophies of student-centred learning. Finland's HEI schools, for instance, are "grounded in the belief that early childhood is a time when children should be free to explore their interests and discover new things" (HEI Schools, 2020^[14]) As such, they integrate individualised learning that accounts for the different developmental phases, personality and attributes of each child. In doing so, they aim to build the confidence and self-determination of students: two essential characteristics of agency.

In British Columbia, Canada, completing a capstone project or a culminating activity is a necessary part of graduating from secondary school. This project is undertaken at the conclusion of higher secondary education as an innovative alternative to traditional exams in specific subjects. The project's format is a collaborative effort among the student, their mentor, and a teacher or supervisor, drawing insights from the student's Career Education course, mentorship experiences, and self-assessment documentation.

The capstone project aims to empower students to actively participate in demonstrating their knowledge, take responsibility, and work collaboratively, fostering their growth and social and emotional skills. The Ministry of Education and Childcare has seen benefits from these projects, such as enhanced academic performance in the final year of secondary school, heightened student motivation and engagement, more defined goals for after graduation and future careers and improved confidence and self-awareness.

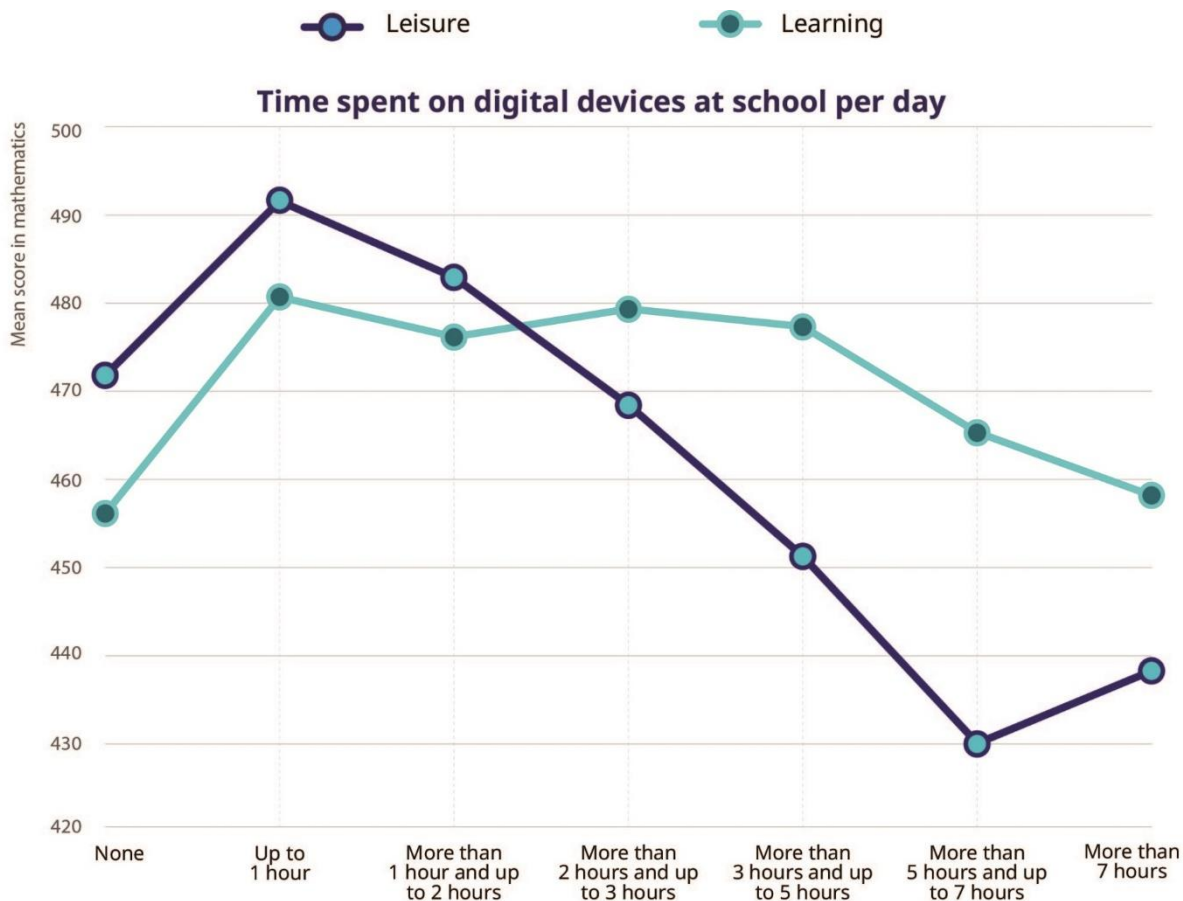
A case from Japan illustrates the potential of pairing learning and practice. In 2015, the country changed the laws to lower the voting age from 20 to 18, which led to a revision of the national curriculum standard for high schools to create a new civics subject, call “*Ko-kyou*” (OECD, 2020_[15]). *Ko-kyou* aims to not only teach students about democratic processes, it also seeks to develop the competencies to make decisions fairly, based on an analysis of facts and in consideration of perspectives. It includes discussions and work towards consensus building and social participation and the use of ideas that contribute to decision making, good judgment and basic public principles to solve real problems in society.

The bottom line

By integrating approaches that prioritize hands-on activities, real-world problem solving, and individualized learning paths, educators can foster environments that promote autonomy, creativity, and critical thinking. Such a shift requires a re-evaluation of curricular designs, teaching methods, and assessment practices to ensure they are flexible and responsive to students' diverse learning styles and paces. Professional development programmes can play a crucial role in equipping teachers with the skills and mindset needed to implement these changes effectively.

Even in schools with phone bans, 29% of students on average across the OECD reported using smartphones several times a day, with 21% using one every day or almost every day at school. The more students use digital devices for leisure during school hours, the lower their math scores. Even if students aren't using their own phones, they become distracted by their peers: 65% of students on average across OECD countries report being distracted by digital devices in at least some math lessons.

Figure 1.3. Future-ready learners are digitally resilient



Note : Differences between categories are all statistically significant (see PISA Results Volume II Annex A3).
 Source: (OECD, 2023^[16]), PISA 2022 Database, Volume II Annex B1, Chapter 5 (Figure II.5.14).

With more of our daily activities happening online, digital technology is transforming how we gather and apply knowledge. The digital skills workers learn are vital for adapting to a job market that is becoming transformed by digitisation, automation and artificial intelligence. But beyond employment, these skills are instrumental in closing social disparities (OECD, 2019^[12]). They offer a bridge for people from various backgrounds to access opportunities and resources that were previously out of reach. While mastering complex technology isn't mandatory for everyone, acquiring basic digital skills is crucial for everyone looking to thrive in the digital age, ensuring broader participation and reducing inequality.

The good news, as any parent of a teenager knows, is that most young people are acquiring digital skills at a pace that far outstrips their parents. In fact, research has shown that parents on average have higher digital literacy skills than their children only until the age of 12 (Byrne et al., 2016^[17]) By 15, most children

have surpassed their parents. Raised in an era where digital devices are ubiquitous, these teenagers navigate the online world with a technical ease that comes from lifelong exposure.

But as the digital environment comes to encompass more and more of the lives of young people, so do the threats. Evidence is mounting that the quality and frequency of social and emotional interaction among youth is declining, cyberbullying, exposure to violent and inappropriate content is on the rise, and many are becoming addicted to their devices (Winther et al., 2023_[18]).

Used for learning, digital devices have the potential to enhance learning outcomes. The latest PISA data show that students who spent up to one hour per day on digital devices for learning activities in school scored 14 points higher on average in mathematics than students who spent no time. As artificial intelligence advances, these benefits may multiply. AI has the potential to provide more personalized learning experiences, tailoring instructions to the needs and interests of individual learners (OECD, 2023_[19]) Augmented and virtual reality may allow learners, especially those in vocational education and training programmes, to develop practice-oriented skills in a safe environment which mimics the workplace.

Access to ICT infrastructure in schools is widespread in most OECD countries: by 2015, almost 9 in 10 students had access to computers in schools. Significant numbers of students remain on the other side of the digital divide, though. For example, in Jordan, Morocco, the Philippines, the Palestinian Authority and Thailand, only half or less of students felt confident or very confident about using a video communication programme. It's important that we close the gap (OECD, 2023_[19]).

But digital skill acquisition is only part of the story. For students to thrive in a digital world, they need to acquire the attitudes and values, such as self-discipline, self-motivation and critical thinking, to help them navigate what is often a confusing, alienating and even hostile online environment. On this front, many education systems are failing.

According to PISA, on average across OECD countries, 45% of students reported feeling nervous or anxious if their phones were not near them. This has effects that go beyond the well-being of young people: students who felt this way scored 9 points less in PISA tests than the average, across the OECD. They were also less satisfied with their lives, had less emotional control and were less resistant to stress.

65% of students reporting being distracted by using digital devices in at least some maths lessons. Digital distraction is not merely an inconvenience; it is associated with poorer learning outcomes, according to PISA. Students who report being distracted by peers using digital devices in some, most or every maths class score significantly lower in maths tests, equivalent to three-quarters of a year's worth of education. The rates in high-performing systems are far lower: just 18% of students in Japan and 32% in Korea reported this level of distraction.

Studies have shown that students who struggle academically often find it difficult to stay motivated with remote learning. Unlike their peers from wealthier families, they may lack the necessary support system to facilitate their education from a distance. As PISA 2022 found, more disadvantaged students than advantaged students reported that they had frequent problems with remote learning during COVID-19-related school closures. Addressing these challenges is critical to ensure that all students can keep up with their studies and maintain a connection with their schools during periods of remote learning.

Teachers have an important role in helping students acquire healthy online values and behaviours, and in helping them to navigate an ever-more complex digital world. This is borne out by our PISA data, which showed that in education systems where students reported that their teachers were available when they needed help, students tended to be more confident that they could learn independently and remotely if their school has to close again in the future. On average across OECD countries, students who had a more positive experience with remote learning – for example, students who agreed or strongly agreed that their teachers were available when they needed help – scored higher in mathematics and reported feeling more confident about learning independently if their school has to close again in the future.

Integrating home-based learning (HBL) as part of the regular school programme can also help students become self-directed, independent learners. Singapore has been offering around two HBL days for students each month, where schools determine the subjects and topics covered on HBL days and customise the support for student-initiated learning based on their students' interests and needs. Critically, students who require additional learning support or who do not have a home environment that is conducive to learning can return to school on HBL Days where they will be supervised by school personnel but will still have the opportunity to learn and organise their schedule independently.

When designing digital learning programmes, it's also important to remember that the practices of the classroom cannot simply be translated to the digital space. Simply placing a camera at the back of a classroom and recording a livestream of your lecture isn't likely to hold the attention of your students for very long – especially those that are already struggling. In fact, one study found that lower ability students who viewed livestreams of lectures performed approximately two percentage points lower than in the classroom setting, while those at the top of the ability distribution saw a two-and-a-half point gain (Hague, 2024^[20]).

Instead, online learning programmes that empower students to be self-directed, to collectively problem solve with their peers and to investigate global issues that matter to them may provide better learning outcomes while also fostering the kind of online value and behaviours that future-ready learners need. Bloomberg Philanthropies' Global Scholars programme is designed to let students create, share and discuss original content in virtual discussion boards with peers from around the world (Tiven et al., 2018^[21]). Instead of being graded on how well they can memorise facts, they are expected to complete assignments, post original work, and engage with fellow students.

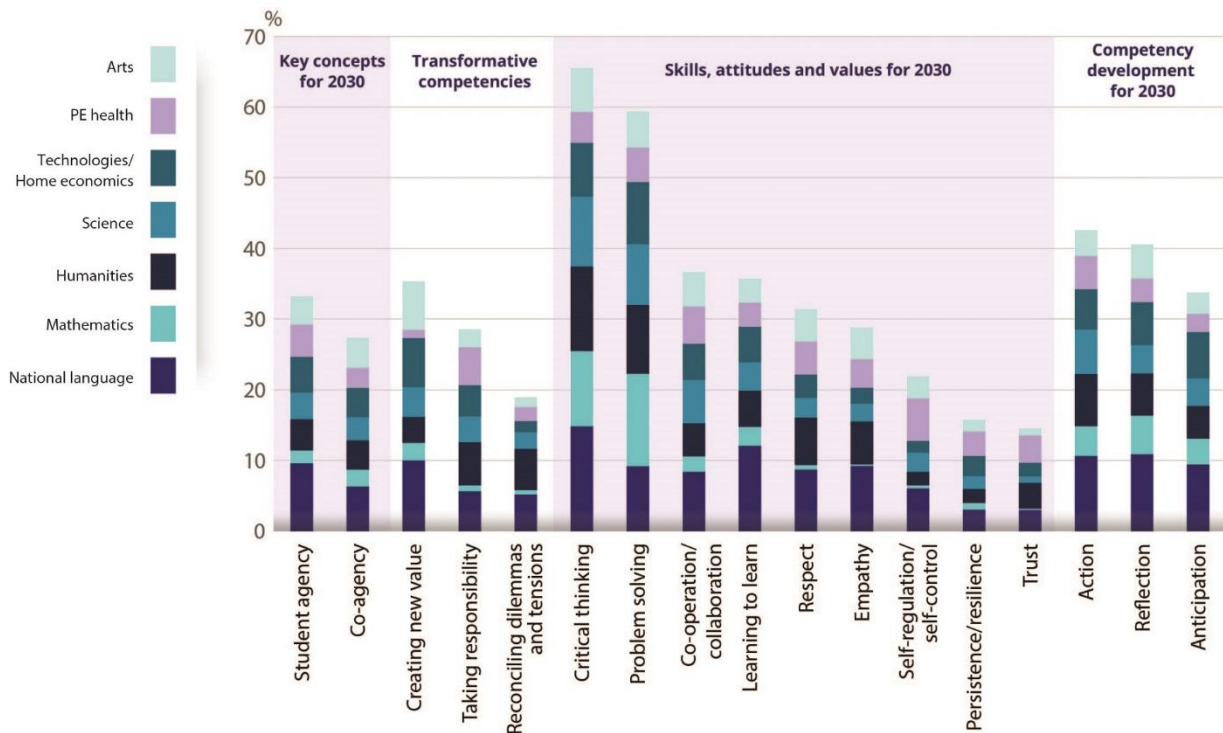
Many teachers listed digital infrastructure and connectivity, as well as teachers and school leaders' positive attitudes towards digital tools as necessary prerequisites for digital uptake in schools. Time is also an important resource that both students and teachers need to be able to explore and familiarise themselves with new digital tools. Additionally, teachers agreed that teacher training should prepare them to understand the underlying learning frameworks of these tools and give them indications on how to use them in effective ways (OECD, 2023^[19]).

The bottom line

Future-ready learners are digital learners but this requires more than merely acquiring technical skills; it involves cultivating healthy digital values and behaviours. Navigating the digital landscape with integrity, responsibility, and critical thinking is as crucial as mastering digital tools. Therefore, policy and educational frameworks should be designed to support this comprehensive view of digital literacy. By retaining a central crucial role for teachers within the digital landscape, integrating remote learning into everyday lessons in a structure and supported way, and shaping digital learning in such a way that empowers and motivates learners, educators can prepare students not just for the workforce, but for a life lived online.

In an increasingly volatile, uncertain, complex and ambiguous world, students need to be able to balance contradictory or seemingly incompatible logics and demands, and become comfortable with complexity and ambiguity. This requires a range of skills, including systems thinking and social and emotional skills. Yet most 15-year-olds report lower social and emotional skills nearly across all measures. The use of simulation exercises, peer learning and encouraging autonomy among students all play a role in fostering the skills needed to manage uncertainty.

Figure 1.4. A future ready learner can deal with uncertainty and change



Note: The averages include OECD countries/jurisdictions and partner economies participating in the Curriculum Content Mapping exercise. OECD countries and jurisdictions: Australia, British Columbia (Canada), Saskatchewan (Canada), Estonia, Greece, Israel, Japan, Korea, Lithuania, Northern Ireland (United Kingdom), Portugal and Sweden. Partner countries: China, Kazakhstan and the Russian Federation. Source: (OECD, 2020_[22]), *Curriculum (re)design A series of thematic reports from the OECD Education 2030 project*, Figure 8.

This moment in history is one of profound uncertainty, where competing ideas, ways of living and even fundamental matters of science and fact are swirling around an information landscape whose complexity and pace of change is outstripping our ability to navigate it. To adapt to complexity and uncertainty and be able to help shape a better future, every learner needs to be equipped with certain transformative competencies. These specific competencies enable students to develop and reflect on their own perspective, and they are necessary for learning how to shape and contribute to a changing world. Creating new value, taking responsibility, and reconciling tensions, dilemmas, trade-offs and contradictions are all examples of such competencies (OECD, 2020_[22]).

These skills matter in the classroom. By holding conflicting ideas in tension, students can acquire a deeper understanding of opposing positions, develop arguments to support their own position, and find solutions to dilemmas and conflicts (OECD, 2019_[23]). For example, a systems thinking approach, where students develop an understanding of how complex systems behave by studying real-life examples, such as the water-energy-food nexus or the energy system, can help students see various opportunities for making change within a system.

These skills matter in the workplace, too. Google's Project Oxygen programme, running since 2008, seeks to determine which skills are key to the performance of its best managers. It has consistently found that collaboration, self-management, communication and encouragement are in top place. In fact, only one of the top 10 skills is technical.

School is where we can learn and sharpen these skills. In many ways, schools are like giant petri dishes of social emotional learning, where students interact with their peers in formative ways. But teaching is as important. The effective teaching of social and emotional skills can positively affect students' success in school. Skills such as problem-solving, self-regulation, impulse control and empathy can help improve academic outcomes and reduce negative social behaviours such as bullying. This can lead to a virtuous circle: when a student believes in herself and is able to exercise self-control, her performance increases (Steponavičius, Gress-Wright and Linzarini, 2023^[24]). This in turn leads to further self-belief and so on.

And this is borne out by the data. A 2006 study of the 1979 US National Longitudinal Survey of Youth found that an increase in the measure of social and emotional skills – from the 25th to the 75th percentile of its distribution – was associated with a nearly 25 percentage point increase in the probability of being a four-year college graduate at age 30 (OECD, 2021^[25]). The OECD's own PISA data show that in 2022, on average across OECD countries, students that were curious or persistent scored around 11 points higher in math. Students who were better able to control their emotions or were stress resistant also outperformed their peers by around six points.

The good news is that many schools are teaching social and emotional skills. A 2019 study of American schools by the RAND Corporation found that nearly four in five principals listed the promotion of students' social and emotional skills as the top priority or among the school's top priority (Hamilton, Doss and Steiner, 2019^[26]). This was especially true for schools in lower-income areas. The bad news is that on many measures, young people seem to be struggling with social and emotional skill development.

OECD survey data on social and emotional skills show that 15-year-olds in all participating cities demonstrated lower social and emotional skills than 10-year-olds, and this is especially true for optimism, trust, energy and sociability. Developmental psychology provides some explanations for that, but on the other, these effects may be worsened by the often-stifling effect of secondary school on creativity and self-expression.

And there are other warning signs. In 2022 one in five students reported being bullied at least a few times a month, on average across OECD countries, with 8% being bullied regularly. For the victims of bullies, the consequences on academic performance can be severe. Students who are lonely, unhappy or frightened are unlikely to excel in a classroom. In systems that have lower incidences of bullying, especially among disadvantaged students, educational performance is better. It is important not to forget that bullies themselves are also often facing social and emotional issues and require support as well.

Most people aren't taught systems thinking in their education, making it hard for them to tackle systemic issues that impact their lives. To help teachers improve their skills in systems analysis and thinking, resources can be created to incorporate these topics into their teaching (OECD, 2023^[4]). These could range from comprehensive curricula for university, school, and adult education to modular teaching aids that teachers can adapt to their needs, including specific course materials. Practical tools for teachers and their students, such as qualitative methods, simulation games, and even quantitative methods, can provide further benefit. Encouraging teachers to explore systems thinking can be achieved by offering broad introductions that highlight its relevance to their teaching activities.

In Latvia, students enrolled in a media theory class are encouraged to reflect on how the media landscape in the country is defined by the system of donor-political relationships (World Economic Forum, 2023^[27]). They practice this skill by mapping all donations given to various political parties and analysing the political agendas of the respective parties. This helps them better understand the stated beliefs and values of political parties running for election and visualise how a complex interconnection of relationships influences

the political landscape, in turn helping students become more informed civic actors and providing them with the knowledge to enact positive change in their communities.

To effectively introduce social-emotional learning in classrooms, teachers must first master these skills themselves. When teachers model and teach social and emotional competencies, such as self-awareness, self-management, social awareness, relationship skills and responsible decision-making, they create a supportive learning environment that can improve academic outcomes. They also contribute to a positive classroom climate where students feel safe, supported, and engaged. This is conducive to learning and can reduce behavioural problems such as bullying.

For example, Peru's Escuela Amiga model offered teachers and principals a comprehensive year-long course, facilitated by psychologists, blending classroom instruction with practical activities such as role-playing and peer support (Guerra, Modecki and Cunningham, 2014^[28]) Participants, hailing from underserved communities, emerged with certificates and notably transformed their classrooms into calmer, more engaging spaces, employing innovative teaching methods. Beyond professional growth, teachers reported significant personal gains, underscoring the critical role of supportive learning environments in enhancing children's skill development.

To address the social and emotional issues facing young people, educators also need to better understand them. New Zealand deploys the *What About Me?* Survey, targeting students at upper secondary level, and uses the data and insights to inform decisions and policies which support well-being in schools around a range of dimensions, including physical, spiritual, family and mental health (OECD, 2023^[4]). In Finland, the educational system gathers information through the Youth Barometer, an annual survey of the values and attitudes of 15 to 29-year-olds in the country. By contributing to an understanding of young people's social and emotional context, the Youth Barometer provides educational institutions with an invaluable source of data to shape social and emotional learning.

Pedagogical methods can be adapted to utilize social-emotional skills for academic learning. Korea has shifted towards embedding social and emotional learning into education, notably through the 2009 introduction of Creative Experiential Learning (CEL) into curriculums (OECD, 2022^[29]) CEL encourages students to engage in extracurricular activities that foster creative thinking, autonomy, and hands-on learning across diverse areas such as multiculturalism, environmental sustainability, and financial education. By participating in self-regulated, club, volunteering, and career exploration activities, students enhance vital skills like creativity, self-regulation and cooperation, building a stronger sense of community and personal identity.

The bottom line

Future ready learners need strong socio-emotional skills. To build those skills, teachers need to act as much more than only traditional conduits of knowledge: they must serve as role models, guides and facilitators of a supportive learning environment. Policymakers have a role to play in ensuring teachers have the required training and support and by equipping them with the knowledge and data to better understand the world that their students inhabit. In doing so, we can enhance students' academic performance, improve relationships and prepare them for the challenges of the future.

2 Role of technology in transforming education

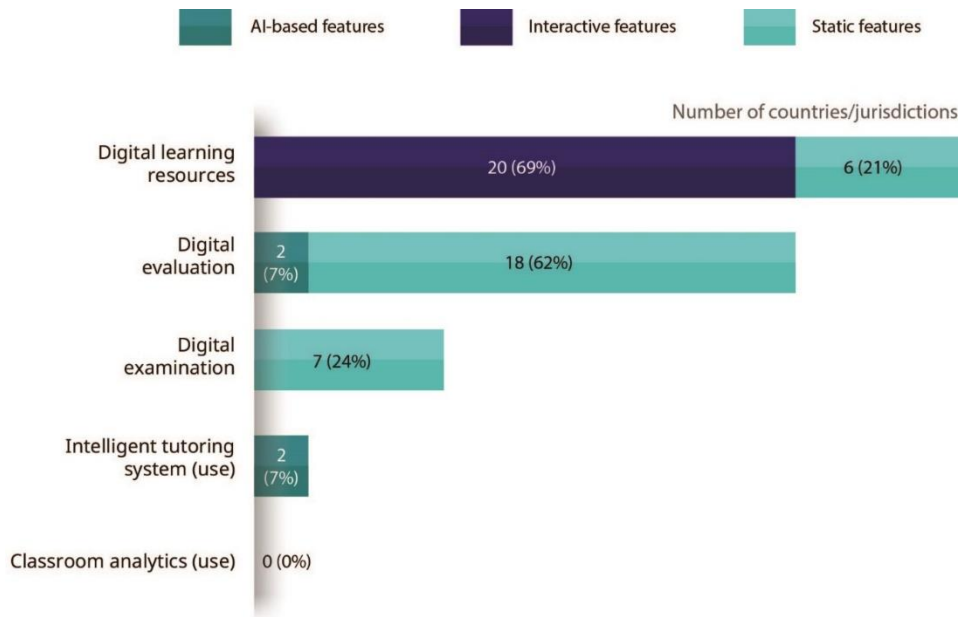
There is immense potential for technology to transform student learning in general education and vocational education and training. Technology can be harnessed to complement and augment current teaching and learning practices, and enhance support for learner-specific needs, interests and abilities. Central to these efforts are establishment of standards to ensure proficient and safe use of technology in teaching and learning environments, and teacher professional development that empowers educators to embrace technology as a transformative tool in their practice.

This section will cover:

- How technology can be leveraged in both general education and vocational training to create more customised learning and assessment experiences that cater to students' learning needs
- Identify and explore ways to develop students' digital literacies and technological skills
- Professional development for educators, and standardisation of e-pedagogy practices across schools

Most digital learning and teaching resources provided by public authorities and used in the classroom remain static, such as non-interactive digital textbooks, video content, and past exam questions. The lack of engagement with AI-based digital learning resources may be a missed opportunity to provide more individualised teaching and learning. Intelligent tutoring systems, which could allow students to overcome some of their misconceptions and master procedural knowledge, and other types of smart technology are still rarely available.

Figure 2.1. The age of personalised digital learning is coming, but slowly



Note: N=29.

Source: (OECD, 2023^[19]), *Digital Education Outlook 2023: Towards an Effective Digital Education Ecosystem*, Figure 1.4.
<https://doi.org/10.1787/c74f03de-en>

Digitalisation offers the potential to personalise education, enhancing individual learning journeys without compromising the social and collective nature of education. This approach involves collecting data specific to each student or similar students, using the information to provide tailored recommendations, and, in some cases, implementing interventions under human supervision (Molenaar, 2021^[30]). Such personalisation can inform instructional decisions, career advice, and the design of targeted educational interventions, relying on extensive data to identify and apply relevant characteristics shared among students. Rapid advances in artificial intelligence hold significant promise with respect to personalised learning and education.

AI applications in education, such as adaptive learning systems and intelligent tutoring systems, are showing promise in enhancing pupil learning by offering personalised content and support tailored to each student's knowledge and areas for improvement. These digital tools not only determine the next topics pupils should focus on but also consider individual learning styles, self-regulation, motivation and effort, making them useful both in and out of the classroom for homework, private tutoring, and lifelong learning (OECD, 2021^[31]). Although currently too costly for widespread educational use, social robots could potentially offer adaptive learning through natural language and engage students as peer learners, adding a new dimension to personalised education (Belpaeme and Tanaka, 2021^[32]).

AI in education can offer diagnostic insights to teachers and school leaders using data gathered for both learning interactions and administrative purposes. AI models utilise standardised assessments or teacher-

assigned grades to develop learning growth models for pupils, comparing their progress with similar students. This enables a range of recommendation tools. Schools often receive this data through dashboards, allowing them to interpret it and, if necessary, act to enhance student performance. Predictive models can also signal when a student's progress deviates from expected patterns, prompting potential interventions. Furthermore, AI-driven early warning systems, using diverse data such as absence patterns, can indicate pupils at risk of dropping out, including those not previously identified as at risk by school staff. Ultimately, it is up to human intervention to act on these AI-generated insights (Bowers, 2021^[33]).

Many countries offer career and study guidance services. These services assist students in navigating their education system and its various tracks, as well as in preparing for the transition into the workforce. Many of these services operate on digital platforms, offering interactive features like personality tests to match students' tastes and preferences with suitable occupations and services. While this offers a degree of customisation, there is potential for further personalisation by incorporating students' observed strengths and interests within the education system to provide more tailored advice. This requires the collection of data not only about the individual about whom the advice is given, but other subjects as well. This also requires being able to link data and build digital systems that can reuse relevant information.

Digital tools, while promising for enhancing education, are not flawless. Similar to human intelligence, advanced tools may have limitations, and can err in the advice or recommendations they offer to students, teachers, and parents. It's important to recognise these limitations and ensure they operate under competent human supervision.

For instance, AI-based digital tools may perform unevenly across different demographic groups. An intelligent tutoring system might be more effective for girls than boys, for example, potentially widening or narrowing the achievement gap between them. Similarly, speech-to-text software could be more accurate for White English speakers than for Black English speakers, benefiting only a portion of the population. In other words, an AI tool might show high performance for the general population but fail for certain groups, placing them at a significant disadvantage. While humans are the source of these biases, machines programmed with these biases can replicate them systematically and automatically, potentially magnifying their impact compared to individual human biases.

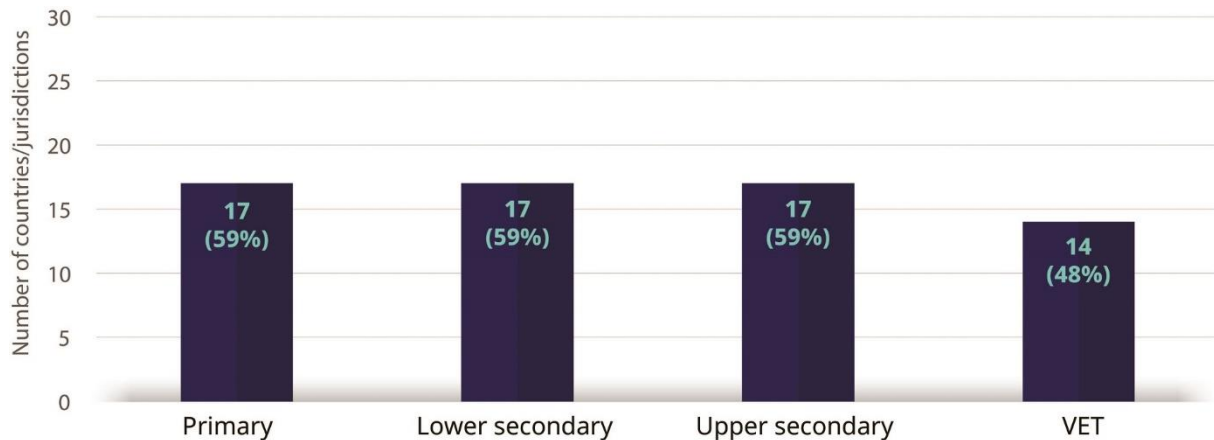
Algorithmic bias has manifested in many sectors, including ones with potentially grave consequences like justice or finance (O'Neil, 2016^[34]). While education has been somewhat insulated from this trend, relying less on automated advice for its critical decisions, recent findings by Baker (2023^[35]) suggest that even educational tools are not immune. These tools, pivotal in shaping futures through support services, admissions, and disciplinary actions, have shown a troubling tendency to perform differently across diverse groups. The implication is clear: in the halls of learning, where fairness should be paramount, the risk of bias is not just theoretical but a pressing concern that could fundamentally alter lives.

The bottom line

Digitalisation and AI promise to transform education by personalising learning experiences, tailoring content and interventions to each student's unique needs, and enhancing decision-making in educational settings. AI applications, including adaptive learning and intelligent tutoring systems, support individualised learning paths and can offer diagnostic insights for teachers to improve student performance. However, these technologies also face challenges, such as the potential for algorithmic bias that may affect different demographic groups unevenly, and the high costs that currently limit widespread use. Despite these obstacles, the integration of AI in education presents opportunities for more targeted career guidance and lifelong learning support, although it necessitates careful human oversight to manage biases and ensure equitable benefits for all students.

A digital transformation cannot take place unless access to stable, high-speed Internet is ubiquitous and until teachers and students have the necessary training to use digital systems. Most students within OECD countries now have access to internet at home and in the school environment, but there is significant variability in the quality of internet connections at school between countries. Slightly more than half of jurisdictions who participated in the 2023 Digital Education Outlook survey cited expanding internet access as a policy priority for the next five years.

Figure 2.2. Digitalisation can expand access to learning but better-quality internet and training are needed



Source: (OECD, 2023^[19]), Digital Education Outlook 2023: Towards an Effective Digital Education Ecosystem, Figure 6.3.

<https://doi.org/10.1787/c74f03de-en>

The digital revolution is reshaping education, broadening access to learning materials and opportunities. Educational platforms and massive open online courses (MOOCs) exemplify how digital resources can surpass local offerings, providing universal access to superior learning materials. Unlike traditional textbooks, digital resources can be scaled up easily, offering every student within an educational system access to a wide array of materials under teacher supervision or for independent study. This digital shift mirrors an ideal world where students have unlimited access to textbooks, a scenario impractical under traditional resource limitations.

Moreover, personalisation tools in education are bridging the achievement gap. Adaptive technologies, which tailor learning to individual student needs, have been shown to help students with varying levels of prior knowledge catch up. For instance, a study in Maine, USA, found that students using adaptive learning software for math homework outperformed their peers, with the greatest gains seen in those with lower initial math skills (Murphy et al., 2020^[36]; Roschelle et al., 2016^[37]). This indicates that technology can narrow the educational divide.

Equally, digital technologies are championing equity by supporting students with special needs and accommodating different learning styles. For example, technology has simplified the diagnosis and remediation of learning difficulties like dysgraphia. Innovations such as AI-enabled speech-to-text services, automatic subtitles, and smart technologies offer blind, visually impaired, deaf, or hard-of-hearing students better access to learning materials and the ability to complete educational tasks on par with their peers. Moreover, digital tools are facilitating socio-emotional learning for autistic children, demonstrating the profound impact of technology in making education more inclusive and equitable (OECD, 2021^[31]).

Technology holds the potential to advance equity and support nations in their policy efforts towards this equity goals. AI-based early warning systems exemplify how technology can offer personalised educational

services to prevent student dropouts, demonstrating the broader capability of digitalisation to tailor interventions and address inequalities. This shift towards individualised services allows countries to target students based on local needs, moving beyond traditional school- or neighbourhood-focused equity policies.

But the COVID-19 pandemic has highlighted significant disparities in access to digital connectivity and tools within education systems, underscoring the digital divide (Thorn and Vincent-Lancrin, 2021^[38]) (Vincent-Lancrin, Cobo Román and Reimers, 2022^[39]). The unequal access to quality internet and modern digital devices poses a challenge to equal opportunities and equity in education. As Frago (2023^[40]) points out, the provision of suitable hardware is a foundational requirement for digital transformation in education, a focus for many countries' investment and digital strategies.

Another obstacle is the uneven distribution of advanced technology across regions. The responsibility for selecting digital tools varies, with local governments and schools often making these decisions. This can lead to disparities in the digital resources available to students and teachers, potentially widening the achievement gap between richer and poorer areas. Unless governments intervene to ensure a baseline of digital tools for all schools, digitalisation may exacerbate inequalities (OECD, 2023^[41]).

Moreover, disparities in teachers' digital competencies within countries present a further challenge. Despite the forced adoption of digital tools during the pandemic increasing familiarity among educators, variations in their confidence and willingness to integrate digital resources into teaching persist, highlighting the need for ongoing support and training.

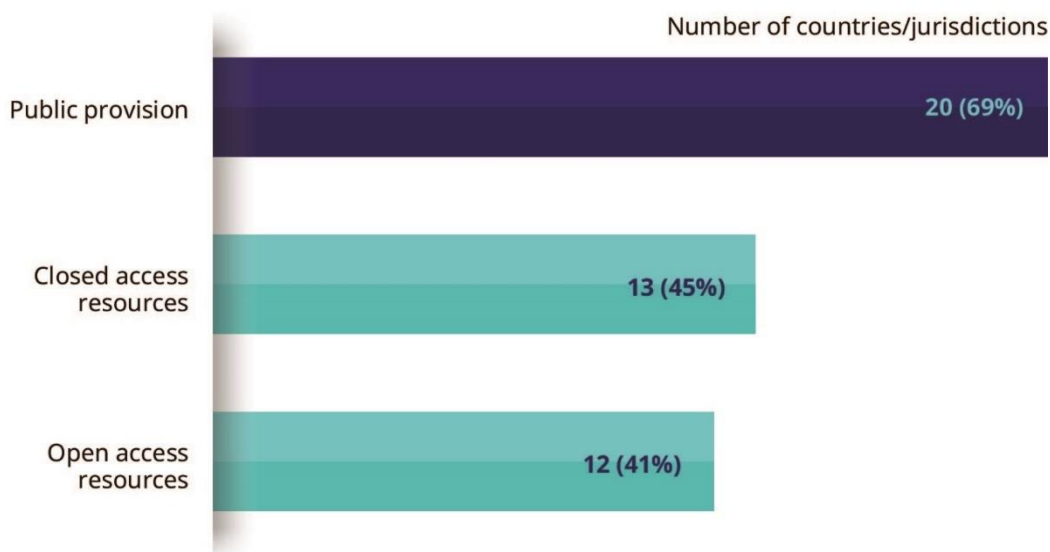
The impact of digitalisation on bridging the educational divide between high- and low-income regions remains uncertain. While it demands ongoing investment in hardware and digital tools, which many countries find challenging, it also offers unprecedented access to knowledge in underserved areas. Innovations like low-bandwidth generative AI models support learning globally, irrespective of economic status. Experience from middle-income regions demonstrates digitalisation's potential to enhance education without advanced technologies in classrooms. For instance, in Gujarat, India, digital attendance tracking significantly reduced student and teacher absenteeism (Vincent-Lancrin and González-Sancho, 2023^[42]). Digitalisation, therefore, represents a step-by-step journey towards improving education, provided its implementation is purposefully aligned with solving specific issues.

The bottom line

The digital revolution is transforming education, enhancing access to quality learning materials and personalised learning opportunities for more and more students. Yet unequal access to connectivity and modern devices are challenging the equity of opportunities in education. Disparities in digital resource distribution and teacher digital competencies further exacerbate these challenges, underscoring the need for government intervention and ongoing support. While digitalisation presents opportunities to democratise access to knowledge worldwide, its success hinges on continuous investment in infrastructure, adaptation to local contexts, and innovative solutions like mobile-accessible generative AI.

Most countries provide publicly digital resources to support the teaching or professional development of their teachers, either nationally or at the sub-governmental level. Some also provide the resources as open-access resources such as YouTube videos or MOOCs, even though the materials specifically cater to educators' professional development. While most countries estimate that most of their schools have access to and frequently use digital teaching and learning resources, the extent and effectiveness of this varies significantly. Currently, the choice and use of those resources is only informed by teachers' knowledge. With more data integration, the choice digital resources could be informed by recommendation tools that consider information about their students.

Figure 2.3. Digital technology can improve the quality and efficiency of teaching



Note: Public provision is noted for central and sub-governmental levels (when typical at the sub-governmental level). Closed and open access resources are not mutually exclusive. N=29.

Source: (OECD, 2023^[19]), *Digital Education Outlook 2023: Towards an Effective Digital Education Ecosystem*, Figure 5.4.

<https://doi.org/10.1787/c74f03de-en>

Digital technology is enhancing the quality of education by providing teachers with feedback and insights into their students' needs, potentially highlighting areas where individuals may require additional support or are at risk of underperforming. These tools, leveraging past data and comparisons, enable educators to refine their instructional methods and tailor their approaches to specific students or classes. Similarly, digitalisation expands access to a vast range of digital learning resources for teachers, from open educational resources to dedicated platforms, facilitating lesson planning and peer collaboration at minimal cost.

Emerging classroom analytics offer another dimension of support, focusing on improving teaching strategies by analysing classroom dynamics rather than individual students. These technologies provide real-time and retrospective feedback on teaching practices, from managing classroom activities to personal engagement, thereby offering professional development opportunities tailored to each teacher's practice (Dillenbourg, 2021^[43]).

Moreover, digital technology promises cost efficiencies in various educational processes. For instance, digital student application systems, particularly for higher education, have shown significant savings, as

demonstrated by Korea's National Education Information System, which saved USD 237 million annually. Other areas of potential savings include the use of blockchain for verifiable credentials and the streamlined collection of statistical information through administrative data, reducing redundant data entry.

Digital tools also promise to optimise teachers' time, automating time-consuming tasks like grading essays or administrative duties. This shift allows teachers to concentrate on enriching educational experiences, focusing on individual student needs, and pursuing their professional development, ultimately benefiting student learning and wellbeing.

A robust digital education system integrates human and machine elements, involving students, teachers, school leaders, and administrators adept at using and improving digital tools and enforcing relevant regulations. The effective use of digital resources by these stakeholders is crucial, emphasising that digital competencies extend beyond technological skills to include educators' ability to integrate digital tools, including AI, into their teaching. With an increasing focus on "AI literacy," countries are promoting the development of teachers' pedagogical digital skills through various national guidelines, although the effectiveness of these guidelines in enforcing standards remains a question.

Countries employ different strategies to enhance teachers' digital competencies, with most having national guidelines for pre-service teacher training, but fewer for in-service teachers. Encouraging the development of digital skills in teachers and students alike is seen as essential, yet the formal assessment of these competencies is rare, highlighting a need for stronger incentive structures.

To address this, countries could consider formal evaluations of teachers' digital skills as part of qualification processes, link digital competence expectations to accreditation of teacher training programs and promote professional development through career advancement opportunities that recognise digital skills. Formally recognising digital skills development, possibly through certification or micro-credentials, could motivate teachers, provided these incentives are meaningful for career progression and compensation (Foster, 2023^[44]).

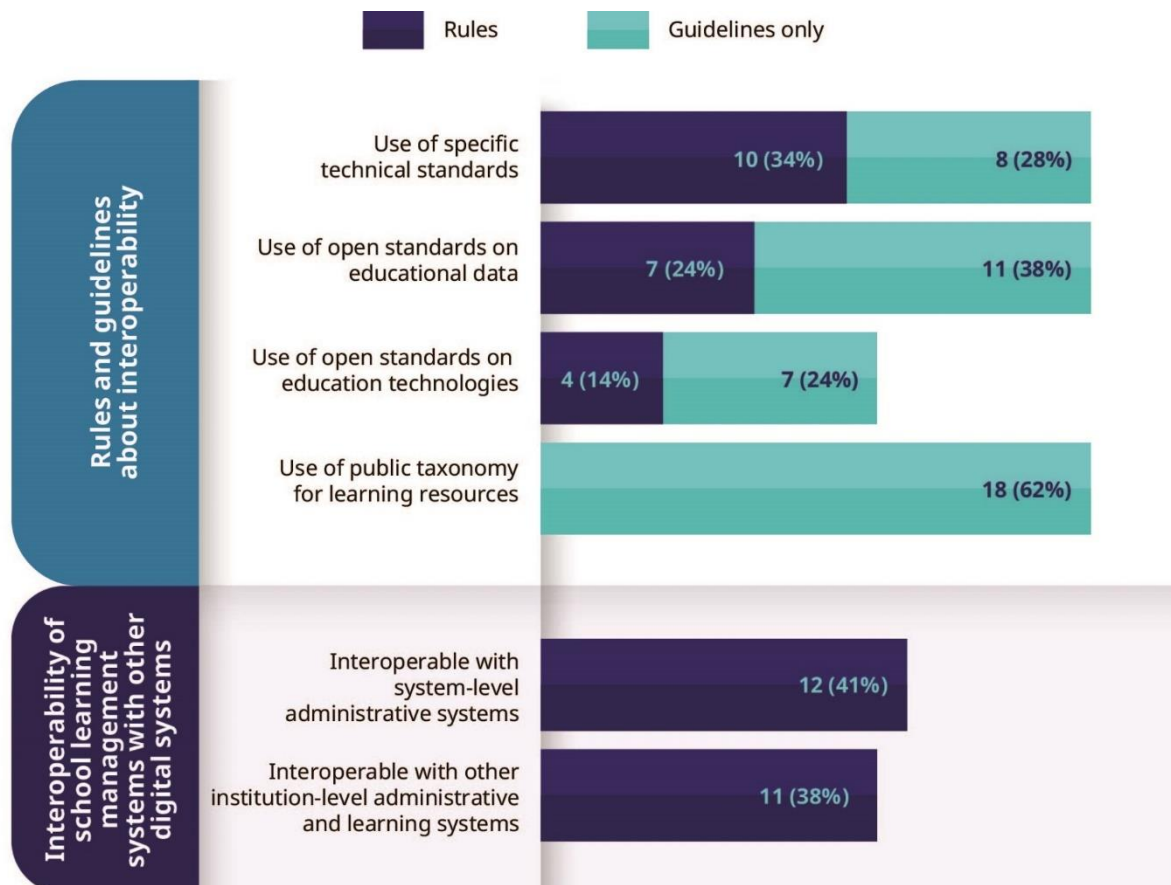
Even within countries, many elements of education such as teacher professional development or procurement are often delegated to sub-national levels of government. Decentralisation has some benefits, including making education more responsive to local reality and empowering local government. At the same time, however, it can exacerbate sub-national inequality and lead to inefficiencies. Centralising some elements of digital education governance, such as standards setting, procurement, interoperability or teacher professional development, can support economies of scale and greater coherence.

The bottom line

The rapid pace of development of AI-enabled technologies raises new challenges for all professionals, and this is also true for teachers and other education practitioners. The effective use of AI in education depends on a trained and qualified workforce. While most initial teacher education programmes include some introduction to digital tools for learning, the use of and critical engagement with digital resources in teaching should be mainstreamed in all subjects in initial teacher education programmes, so that teachers feel at ease with the use of digital tools in the learning scenarios they offer their future students. Teachers' AI literacy should be cultivated, so they understand AI techniques, can critically assess AI productions and recommendations, and creatively use AI in their teaching.

Most OECD countries have published a new or updated digital education strategy since 2020, but these strategies are more around big topic areas rather than around educational objectives and how they can be achieved using digital tools. A digital transformation of education will require countries to identify more specific purposes of digitalisation. For instance, around two-thirds of countries and jurisdictions recommend the use of some taxonomy for tagging learning resources, but further effort for developing international standards on content (rather than type of resource) could be made.

Figure 2.4. A systems approach is needed to unlock the full potential of digital education



Note: N=29. The left panel figure shows how many countries use rules or guidelines to encourage different types of interoperability. Ten countries mandate that some systems use specific technical standards (usually to be interoperable with system-level digital systems), while 8 encourage it through guidelines. The right panel figure shows countries where school learning management systems are most commonly interoperable with either system-level digital tools or institution-level digital tools.

Source: (OECD, 2023^[19]), *Digital Education Outlook 2023: Towards an Effective Digital Education Ecosystem*, Figure 1.6.

<https://doi.org/10.1787/c74f03de-en>

Shaping an effective and equitable digital transformation in education requires a dual focus: facilitating digital change and mitigating its risks. Digitalisation must serve clear educational goals, such as personalisation, inclusivity for students with special needs, and enhancing social diversity. Despite the update of digital education strategies by most countries since 2020, there's a gap in aligning these with specific educational aims and leveraging digital tools for their achievement.

Effective governance involves ensuring access to a digital ecosystem that supports these goals, boosts confidence in using digital tools, protects personal data, addresses digital inequalities, and encourages the development of useful and affordable educational technologies. Key policy measures include promoting interoperability, enhancing privacy and data protection, utilising public procurement strategically, and

establishing institutions to oversee digital education implementation, aiming to tackle various challenges simultaneously.

Interoperability enhances the consistency and exchangeability of data across different systems, streamlining processes by reducing the need for manual data re-entry, reformatting, or transformation. This facilitates more cost-effective and rapid delivery of information, supporting decision-making and actions. Without interoperable tools, data sharing becomes prone to errors and inefficient, consuming more time and resources. Therefore, interoperability is crucial for improving both the efficiency and effectiveness of digitalisation in education (Vincent-Lancrin and González-Sancho, 2023^[45]).

Achieving system-wide interoperability in education requires adopting shared standards for technology, including technical specifications, data definitions, and system architecture models. It may also necessitate aligning organisational processes and establishing a legal framework to enable innovative use of educational data. Transitioning to a cohesive technology and data ecosystem involves addressing legacy systems with outdated standards, raising awareness of interoperability benefits, creating incentives and mandates for standard adoption, ensuring systems are sustainable and adaptable, and leveraging international initiatives.

Accurate data on interoperability in education is scarce without comprehensive school surveys. Only a few countries have established mandatory interoperability standards for their administrative systems or for the semantic interoperability of digital learning resources. Currently, less than a third of countries report widespread interoperability between school learning management systems and other digital tools at the system or institution level, indicating significant room for improvement towards a fully effective digital education ecosystem.

While imposing regulations on technical interoperability may not be the best approach, there are growing technical solutions that promote interoperability. Governments can do more to enhance semantic interoperability for both administrative and educational content. Approximately two-thirds of countries recommend using taxonomies for organising learning resources, yet there's a need for more international standards focusing on content to further this effort.

Robust privacy and data protection measures are crucial for digital transformation in education, addressing potential risks and fostering trust in the use of data and AI. Protecting personal data against cyber threats and shielding children from inappropriate content are key components that require technical and human vigilance. The digitalisation of education, offering more personalised learning experiences, necessitates the careful handling of personal education records, which introduces privacy and security challenges.

All countries enforce privacy and data protection laws applicable to education, with many having specific regulations for educational data. Implementing a risk management framework that balances the benefits of educational data use with privacy concerns is essential. This approach involves moving beyond the unrealistic goal of eliminating all privacy risks to focus on managing data access, sharing, and use, combining data-focused and governance-focused strategies for better privacy protection. For instance, addressing biases and improving fairness in education may require the collection of personal data. In a fast-changing digital environment, some measure of flexibility in terms of regulation and guidance may be required to maintain the appropriate balance between innovation and protection.

Despite the existence of guidelines on privacy and data protection, active monitoring of their implementation in schools is rare. Privacy awareness campaigns and training are increasingly used to strengthen safeguards. Moreover, the potential for sharing data collected by commercial providers under data protection laws could lead to more innovation in digital education tools and resources. This underscores the need for a balanced approach to data governance that ensures privacy while enabling the beneficial use of educational data (Vincent-Lancrin and González-Sancho, 2023^[46]).

As technology advances, automating decisions and collecting sensitive data like biometrics, the need for technology governance in education grows. This governance might involve obligations for using automated

decision-making, restrictions on certain technologies, and requirements for transparency and expert examination of algorithms. As of 2024, few OECD countries regulate the use of technology and algorithms in education, with France being a notable exception, emphasising the need for explainable AI and restricting certain uses. The emergence of generative AI has prompted some countries to draft guidelines, with France and Korea moving towards specific regulations and the European Union progressing towards an AI Act that will enforce stricter controls on AI in high-risk sectors, including education.

A key principle in these guidelines is maintaining human oversight in AI decision-making to mitigate errors and biases, ensuring that humans have the final say, especially when AI performance is imperfect. This approach also advocates for providing non-digital alternatives to support inclusivity and offer opt-out options where feasible.

The bottom line

In the evolving landscape of digital education, countries are striving to balance the advancement of technology with the safeguarding of equity and privacy. Despite updates to digital strategies since 2020, there remains a significant disconnect between these strategies and their execution towards specific educational goals like personalisation and inclusivity. Interoperability is a critical factor in enhancing the efficiency and effectiveness of digitalisation in education, yet less than a third of countries report comprehensive interoperability within their educational systems. Moreover, as digitalisation deepens, robust privacy and data protection become paramount to protect personal data and ensure trust in the use of AI and data within educational contexts. While guidelines exist, the implementation and monitoring of these privacy measures are often lacking. With the rise of advanced technologies, including AI, the call for greater regulation, transparency, and human oversight in decision-making processes is growing louder. This underscores the need for a balanced approach that fosters innovation and ensures privacy and equity in the digital transformation of education.

3 Fostering partnerships to support lifelong learning

Developing relevant skills is paramount for staying competitive and adaptable in an ever-evolving world. As technology advances and industries transform, the demand for specialised skills continues to shift. Equipping oneself with these skills enhances employability and can also foster innovation and problem-solving capabilities, in some cases, crucial for addressing global challenges. Lifelong learning is a key part of this; enabling people to cultivate skills and continue to contribute meaningfully to societies.

Despite its importance, several challenges hinder the widespread adoption of lifelong learning. These include affordability and the availability of educational resources, as well as motivational barriers, such as lack of awareness or perceived relevance of learning opportunities. People can also face time constraints or competing priorities, making it challenging to engage in continuous learning.

That is why partnerships are so important. Partnerships can play a pivotal role in overcoming barriers to lifelong learning and support a culture of continuous education. Collaboration among educational institutions, employers, governments, non-profit organisations and the wider community can create synergies and leverage resources to expand access to learning opportunities. Cooperating with partners can also help tailor programmes to diverse learner needs and enhance the quality of educational experiences.

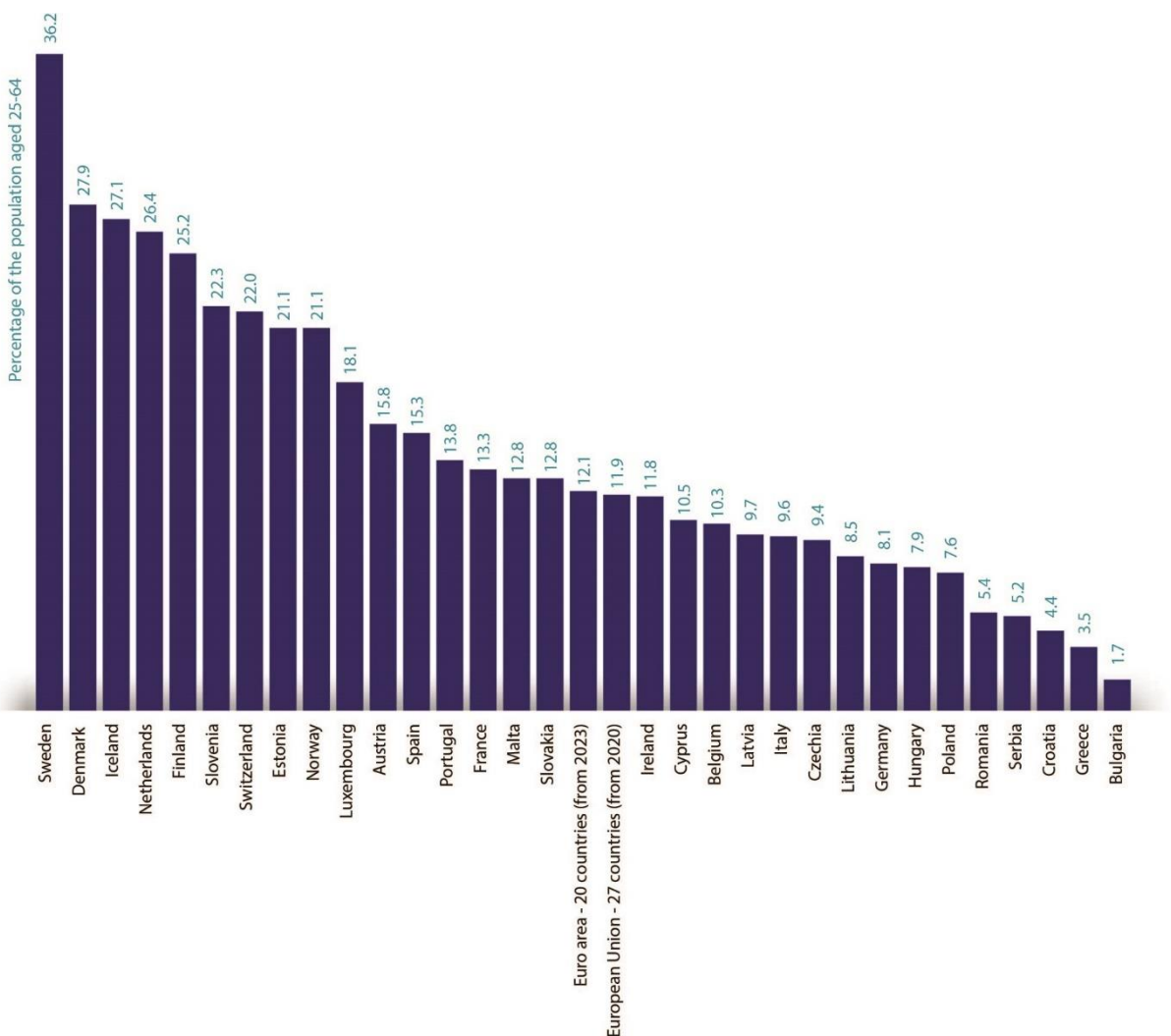
This section will cover:

- Cultivating diverse partnerships with industry and the wider community to maximise student potential
- Supporting school, student and teacher advancement by leveraging private sector collaborations, such as with tech companies
- Empowering educators with collaboration skills to unlock the maximum value of partnerships

Enhancing adult learning is crucial, particularly due to digitalisation and automation within the workforce. It's essential for adults to adapt by acquiring new digital skills and, in certain cases, undergo reskilling due to job displacement resulting from technological advancements. Adult education and training should not only enhance employability but also foster innovation, promote social equity and bridge the digital skills divide. In 2022, the proportion of individuals aged 25 to 64 in the EU engaging in education and training within the preceding four weeks rose by 2.8 percentage points compared to 2020, also surpassing the levels seen in 2019 before the onset of the COVID-19 pandemic (Eurostat, 2023^[47]).

Figure 3.1. Future ready learners are change agents

Participation rate in education and training (previous 4 weeks), 2022



Source: (Eurostat, 2023^[47]) Adult learning statistics. https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Adult_learning_statistics&oldid=568260.

Investing in lifelong learning is vital to empowering people to enhance their skills, regardless of whether they are currently employed or not. It is also important for adapting to changes in job markets, especially due to the green transition, digitalisation and automation, and because of demographic shifts that indicate a decrease in the number of young individuals entering the workforce in many countries (OECD, 2023^[48]).

These overarching trends are already reshaping labour markets significantly, and forecasts indicate that skill requirements will continue to evolve rapidly in the coming decades.

Adult learning can therefore be a powerful tool for enhancing job opportunities, as well as promoting innovation and bridging skill gaps. It includes any purposeful learning activity, like formal classes, informal learning or training sessions. While the 20th century prioritised global literacy enhancement, it is perhaps more important to now focus on lifelong learning and equal opportunity, with the goal to improve knowledge and skills continuously for all.

Currently, adult learning systems differ considerably across OECD countries but what is common is that those with the greatest needs are often the ones receiving the least training. Across the EU, the share of people aged 25 to 64 engaged in learning activities varies significantly.

In 2022, about 11.9% of adults in the EU participated in education or training in the previous four weeks, according to Eurostat (2023_[47]). Countries like Sweden, Denmark, the Netherlands, and Finland have higher participation rates (25% or higher), while Croatia, Greece and Bulgaria have the lowest rates (below 5 %).

There are many reasons for inequalities in adult learning participation, including socioeconomic disparities, limited access to resources, cultural attitudes and discrimination. Women tend to participate more than men, and younger people are more likely to participate than older ones. Those with higher education levels are also more likely to engage in adult learning activities. Creating more equitable outcomes requires comprehensive strategies, including policy interventions, community outreach, financial aid and the promotion of inclusivity.

The formal education system offers quality-assured training programmes with recognised accreditation, a key strength distinguishing it from non-formal education avenues. However, despite this advantage, adult participation in formal education remains notably low, which is often attributed to its rigid structure and the lengthy time commitments involved.

For example, 83% of first-time entrants into tertiary education in all OECD countries are aged under 25. However, there are wide differences across countries in how common it is to enter tertiary education for the first-time later in life.

Only 4% of first-time entrants in Belgium, and just 1% in Japan, are 25 or older. In contrast, more than 30% of first-time entrants in Colombia, Sweden, Switzerland and Türkiye are 25 years or older (OECD, 2023_[48]). This illustrates the fundamental differences in pathways into tertiary education that exist across countries, and the varying roles that tertiary education can play in lifelong learning.

Education doesn't guarantee a job, nor does it assure a desired career path. However, statistics consistently demonstrate that higher education correlates with lower unemployment rates. It also equips individuals with the adaptability needed to navigate different career paths.

While education doesn't erase all societal disparities, it significantly contributes to equalising opportunities. Higher levels of educational attainment are associated with positive economic, labour-market and social outcomes. Highly educated people tend to be more socially engaged, have higher employment rates and relative earnings. They are also more likely to participate in lifelong learning (OECD, 2023_[49]).

Although OECD countries have seen increased competition rates in tertiary education, marginalised groups such as low-income and immigrant children can often struggle in primary and secondary education. Leveraging their potential through lifelong learning could inject valuable innovation into our economies.

Early intervention is pivotal. Pre-school initiatives yield enduring benefits, as evidenced by OECD findings that indicate better academic performance among 15-year-olds with pre-school experience. However, a significant portion of OECD students still lack fundamental literacy skills, hindering their future learning. Many of these could benefit from lifelong learning opportunities.

Certain groups, such as immigrant students for example, can face pronounced challenges, often trailing behind native counterparts in reading proficiency. This underscores the necessity for accessible programmes to break the cycle of disadvantage perpetuated in low-educated families and impoverished communities. As long as low income equates to a lower education level, societal potential will be lost.

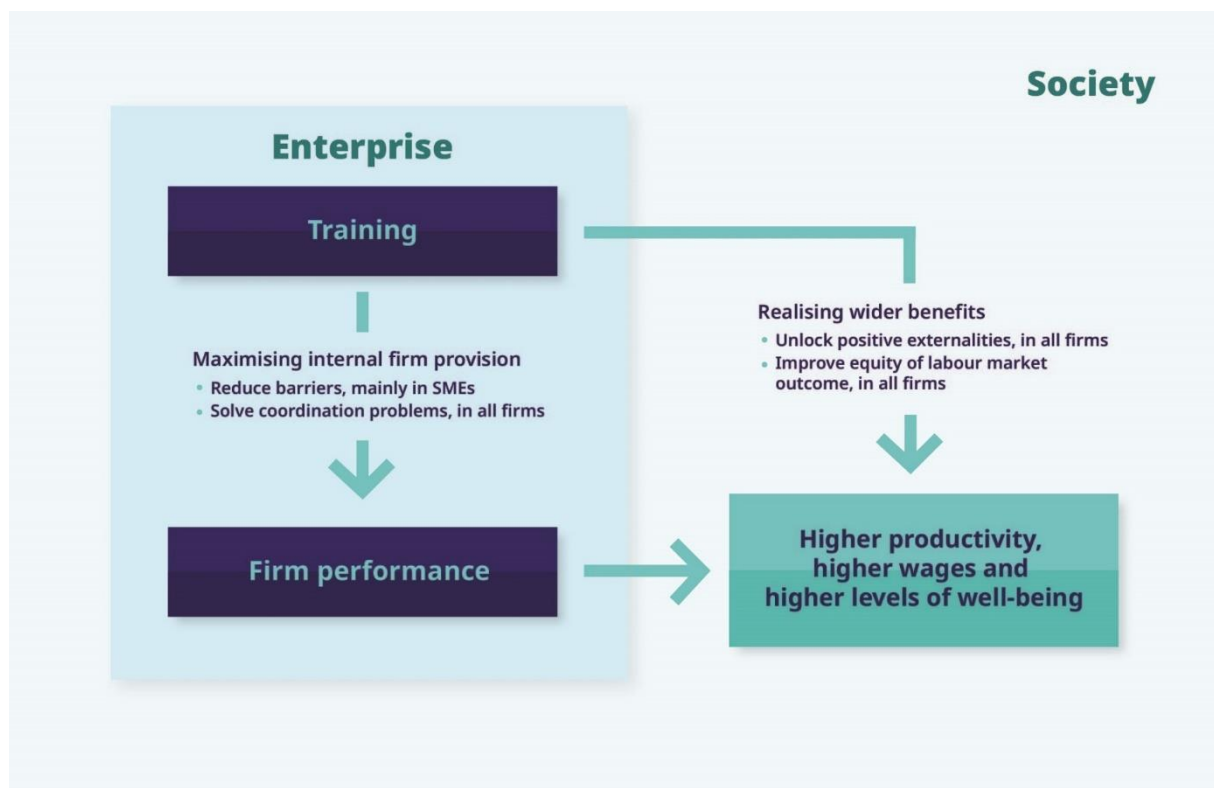
Goal 4 of the Sustainable Development Goals (SDGs) underlines the global commitment to providing inclusive and equitable quality education (United Nations, 2018^[50]), promoting lifelong learning opportunities for all individuals, and emphasising the significance of adult education in achieving this aim. The EU has set a target for 60% of adults to participate in training every year by 2030, reflecting the importance of lifelong learning in today's rapidly evolving world. By supporting adult learning, policy makers will foster personal and societal advancement, which will also support broader sustainable development objectives.

The bottom line

Investing in adult learning is crucial for adapting to changing job markets, demographic shifts and technological advancements. Despite increased competition in tertiary education, marginalised groups often face many barriers, highlighting the importance of lifelong learning initiatives for equitable opportunities. Some countries are setting targets for adult participation in education and training, aligning with global goals for inclusive and equitable education and sustainable development.

The OECD conducted a review of training policies, analysing existing research and gathering further evidence from 100 case studies from Austria, Estonia, France, Ireland and Italy. Even before the onset of the COVID-19 pandemic, numerous enterprises were falling short in providing adequate training to optimise their productivity and contribute to overall economic performance (OECD, 2021^[51]). Public support could play a crucial role in addressing the lack of training opportunities, potentially resulting in heightened productivity, increased wages and enhanced levels of well-being.

Figure 3.2. Barriers to supporting training in the workplace



Source: (OECD, 2021^[51]) *Training in Enterprises: How can enterprises be supported in providing more and better training for all?*, <https://www.oecd.org/skills/policy-brief-training-enterprises-2021.pdf>.

Enterprises invest in learning opportunities to help their workforce adapt to technological advancements, integrate new employees, ensure workplace safety and maintain competitiveness. They play a crucial role in helping adults acquire new skills and knowledge and it's essential to support enterprises in offering more effective training programs. If not, a lack of participation in training poses a threat to long-term growth in productivity, wages and well-being.

In 2020, 67.4% of companies employing 10 or more persons in the EU were considered 'training enterprises', according to Eurostat (2022^[52]). This means that their staff either participated in continuing vocational training (CVT) courses or in another form of CVT, such as guided on-the-job training. However, there were big variations between countries. For example, more than 90% of companies in Latvia and Sweden provided some form of CVT compared to 18% in Romania and Greece. One challenge to supporting training is that many enterprises lack the capacity to provide adequate learning opportunities. This is particularly true for small and medium-sized businesses, which face various barriers such as lack of time, financial resources and relevant information. OECD case studies suggest that lack of time appears to be the most important impediment to training provision. This includes both a lack of time on the side of

employees due to productivity pressures and the rigid organisation of work schedules – in particular in the manufacturing industry – and lack of time on the side of human resource functions to organise training.

Coordination issues within firms also hinder training efforts. For example, if there is a disconnect between management and employees over the share of the costs and benefits of training. Evidence from case studies shows that in around two in three enterprises, employees have a voice in training decisions, which can result in better provision of training, but also that line-managers are often gate-keepers when it comes to accessing training.

Furthermore, firms often overlook the broader benefits of training, such as increased innovation and improved well-being, which can positively impact both individuals and society as a whole. Certain groups of employees, such as younger, higher-skilled, and higher-paid workers, tend to receive more training opportunities, leading to inequalities in workforce development.

To address these challenges, policymakers can use a range of strategies to support training in enterprises. These include providing information and guidance to businesses, building their capacity to deliver training effectively, offering financial incentives, directly providing training programmes, and implementing regulations to ensure minimum training standards are met.

Each approach has its advantages and drawbacks, so policymakers need to carefully consider which combination of strategies would be most effective in supporting training initiatives. Ultimately, supporting firms in providing high-quality training should be a priority, as it can help reduce barriers, improve coordination and enhance equity in the labour market.

To help guide their decision-making process, the OECD has put together a list of key questions that should be considered when planning interventions to support training in enterprises:

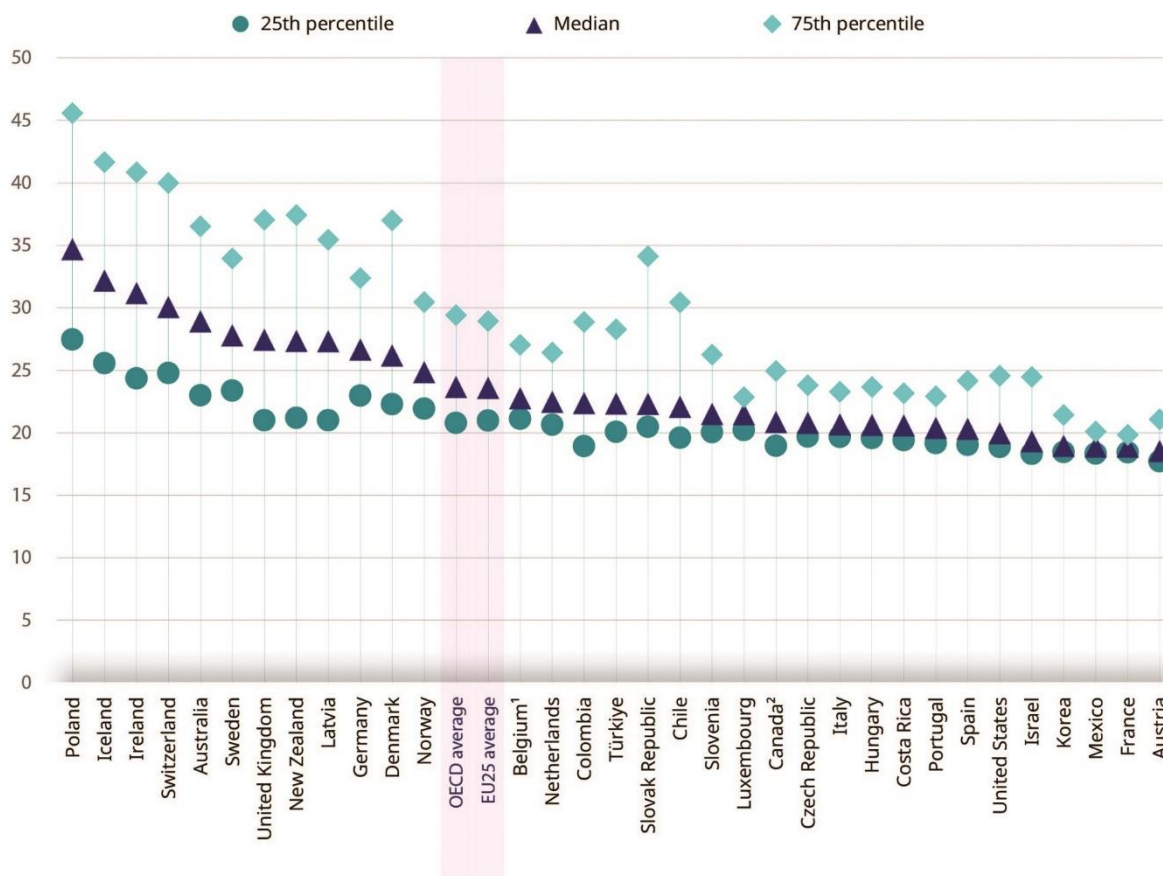
1. Is there a need for intervention? What is the evidence of underprovision of training? Are there any barriers for enterprises that need to be addressed? Do enterprises face co-ordination problems? Are there any wider societal and economic benefits that intervention may achieve?
2. What learning opportunities should be supported to achieve the policy objectives? Which skills are needed to improve the productivity and competitiveness of firms? Which training/learning modes are most effective? Can this be taken into account in the procurement process?
3. What instruments are most appropriate to achieve the given objectives? Do different instruments need to be combined to reach these objectives?
4. Should specific types of enterprises or groups of individuals be targeted with the intervention? Which ones? What is the rationale for this?
5. What similar interventions have been tried in the past here or in other countries? What have they achieved? How convincing is the evidence on their achievements?
6. How will enterprises find out about the intervention? Is there a need for outreach and awareness raising activities? How can access to the support be made as easy as possible?
7. How will the success of the measure be evaluated? Is there a need for an evaluation strategy and funding for an independent evaluation?

The bottom line

Enterprises invest in learning opportunities to adapt to technological advancements, integrate new employees and maintain competitiveness. However, many face barriers like lack of time and resources, which hinders effective training provision. Policymakers can address these challenges by offering information, capacity building, financial incentives and regulations to support training initiatives (OECD, 2021^[51]).

Vocational education and training (VET) is an important bridge between education and the labour market. But to fully harness its potential, many VET systems must undergo change. This involves aligning with employer needs, broadening the scope of programmes beyond narrow occupational focuses to include versatile, transversal skills, and promoting lifelong learning for adults as well as young people.

Figure 3.3. Vocational training: a bridge between education and work



1. Short-cycle tertiary data refer to the Flemish Community of Belgium only.

2. Year of reference differs from 2021. Refer to the source table for more details.

Countries are ranked in descending order of the median age of new entrants to short-cycle tertiary programmes.

Source: (OECD, 2023^[48]), *Education at a Glance 2023: OECD Indicators*, OECD Publishing, Paris, <https://doi.org/10.1787/e13bef63-en>.

Lifelong learning initiatives can be effective when developed in collaboration with partners outside of traditional education spheres. This shift reflects a broader understanding of student learning, encompassing partnerships with parents, higher learning institutions and industry stakeholders. Recognising the importance of these partnerships, educational institutions are increasingly fostering collaborations to enrich student learning experiences, including for older students.

A key aspect of this is vocational education and training (VET), which is already a cornerstone within the educational frameworks of most OECD countries (OECD, 2023^[53]). Offering a more practice-oriented alternative to traditional academic routes, VET equips individuals with tangible, job-ready skills, eases the transition from classroom to workplace and helps meet the demand for skilled labour. The popularity of vocational programmes is evident in the numbers enrolled; 44% of upper secondary students opt for vocational education across OECD countries (OECD, 2023^[48]).

However, misconceptions persist about VET, with some viewing it as a fallback option for struggling students rather than a proactive choice paving the way for promising career paths. Some programmes prioritise immediate job placement over long-term employability, while others pigeonhole students into narrow career trajectories with limited opportunities for future growth or skill enhancement. To address these issues, educational systems must prioritise the enhancement of VET programmes, ensuring they align with the evolving needs of businesses and individuals across all sectors.

For VET learners to become effective lifelong learners, they should be equipped with solid foundational skills that allow them to engage in further learning. One way to do this is through the promotion of work-based learning. Integrating classroom teachings with practical work experience bridges the gap between theory and application, offering invaluable insights into real-world scenarios. Workplaces can help foster both technical and socio-emotional skills by allowing students to learn from experienced colleagues while engaging with the latest equipment and technologies pertinent to their field. Moreover, the practical nature of real-world scenarios facilitates the cultivation of soft skills such as conflict resolution.

By integrating practice-oriented training within work environments, the financial burden of schooling can be alleviated, as equipment is often costly and quickly becomes obsolete. Additionally, a robust emphasis on work-based learning within vocational education can help alleviate shortages in teaching personnel. Furthermore, this approach establishes vital bridges between educators and the world of work, forging connections between students and potential employers.

Despite the benefits, such work-based learning programmes are not yet prevalent in many countries, largely due to insufficient cooperation between the private sector, educational institutions and policymakers. In fact, only 45% of upper secondary vocational education students in 2021 were enrolled in schemes with significant work-based components, on average across OECD countries (OECD, 2023^[48]). The percentage varies widely between countries. In six countries - Denmark, Hungary, Ireland, Latvia, Switzerland and Germany - at least 85% of VET students pursue such programmes, where at least a quarter of the course is work-based learning. However, in seven countries - Romania, Sweden, Estonia, Belgium, Bulgaria, Israel and Spain - less than 10% of students opt for combined school- and work-based VET.

Some countries with a small share of students in combined school- and work-based programmes are making efforts to expand the use of work-based learning. Countries like Estonia and Romania have witnessed a significant rise in the number of students enrolled in such programmes since 2015 following reforms. By offering a variety of educational options tailored to the needs and aspirations of people, countries can ensure a smoother transition from education to employment and support learning later in life.

Another way to facilitate lifelong learning is to enhance pathways from VET to higher education. This enables individuals to continually upskill or reskill throughout their careers. Yet, despite the potential, many VET programmes still lack access to tertiary education, hindering lifelong learning opportunities. This matters for the attractiveness of VET, as without progression opportunities some people might not consider VET as an option. It matters for equity, as nobody should be locked out of further learning because of a choice made in initial schooling. It is also important for lifelong learning, as access to tertiary education can allow VET graduates to upskill or reskill during their careers. Overall, there are significant disparities in adult learning systems across OECD and accession countries; often, those with the greatest learning needs receive the least training (OECD, 2023^[54]).

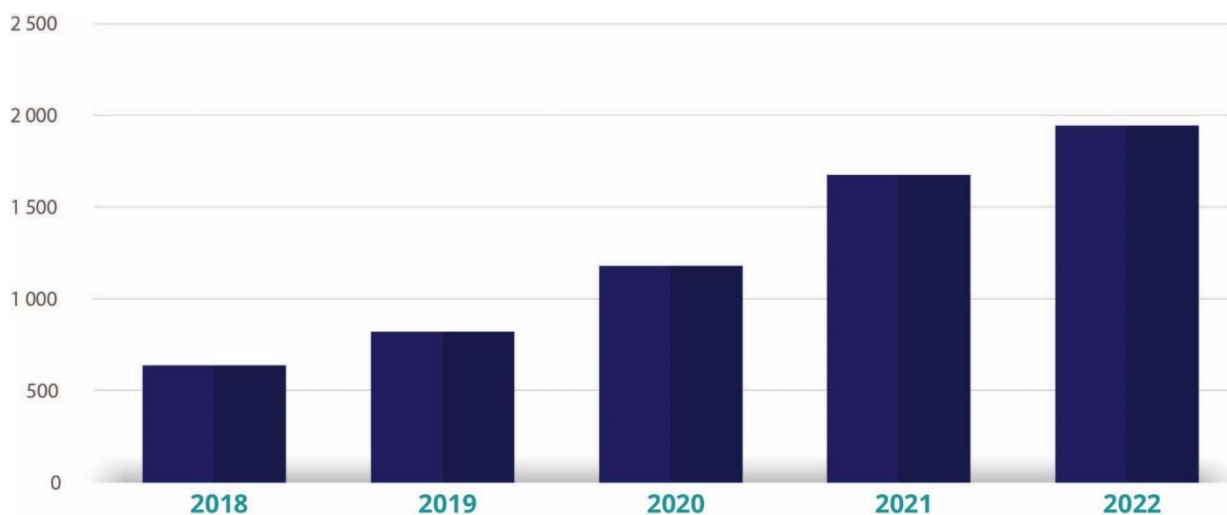
To address these challenges, countries must strive to create more flexible and inclusive tertiary-level programmes. Some countries have been progressively adjusting their tertiary-level programmes to enhance flexibility and accommodate a broader range of students' skills and learning styles. This includes creating more pathways between upper secondary and tertiary programmes, including vocational upper secondary programmes, and diversifying the types of programmes available to first-time tertiary students, such as short-cycle tertiary, bachelor's or long first degrees at master's level.

The bottom line

Collaborative partnerships between educational institutions, industry stakeholders and other stakeholders are essential for effective lifelong learning initiatives, particularly in VET programmes. VET provides practical, job-ready skills and opportunities for upskilling and reskilling, yet misconceptions persist, hindering their appeal and accessibility. To address this, countries must enhance VET programmes, promote work-based learning, and build the right conditions for engaging in further learning, ensuring inclusive and effective lifelong learning opportunities for all.

Comprehensive data on the number of micro-credentials offered in OECD countries is not available, however a tripling of micro-credentials offered on the five major online learning platforms (such as Coursera and FutureLearn) from 600 in 2018 to 1 900 in 2022 suggests a growing prevalence in recent years (OECD, 2023^[55]). Smaller, more targeted and modular in nature, they may also support social inclusion by broadening the definition of what, how and where knowledge, skills and credentials may be acquired.

Figure 3.4. Are micro-credentials a ‘game changer’ for lifelong learning?



Note: The figure shows the number of micro-credentials offered on Coursera (MasterTracks, Professional Certificates, Specializations and University Certificates), edX (MicroBachelors, MicroMasters, Professional Certificates, Professional Education and XSeries), FutureLearn (Academic Certificates, ExpertTracks, Micro-credentials and Programs), Kadenze (Programs) and Udacity (Nanodegrees).

Source: (OECD, 2023^[55]), “Micro-credentials for lifelong learning and employability: Uses and possibilities”, *OECD Education Policy Perspectives*, No. 66, OECD Publishing, Paris, <https://doi.org/10.1787/9c4b7b68-en>.

The term “micro-credentials” has swiftly spread across the world, and its burgeoning prominence owes much to higher education institutions and education technology firms. Education and training institutions are increasingly offering micro-credentials by rebranding and restructuring their existing programmes and by creating new programmes, often through partnerships with other institutions, industries and learning platforms. A growing number of large technology companies, other private companies and non-profit organisations are also offering micro-credentials. According to Class Central, an aggregator of online courses, the number of micro-credentials offered on five major learning platforms increased from around 600 in 2018 to 1900 in 2022.

This surge in micro-credentials has garnered substantial governmental and intergovernmental backing. In Europe, for example, micro-credentials have become focal points in policy discussions, with the Council of the EU endorsing a recommendation in June 2022 for member states to cultivate a vibrant micro-credential ecosystem by the end of 2023.

Many EU countries are actively piloting micro-credential initiatives and deliberating on adapting national frameworks to accommodate them. Similarly, in the Asia-Pacific region, the UNESCO Asia and Pacific Regional Bureau of Education is actively researching national use cases to inform policymakers. In Canada, the Council of Ministers of Education has established a dedicated working group to synchronise micro-credential efforts across provinces and territories.

Advocates of micro-credentials perceive them as versatile innovations brimming with potential benefits. The growing interest from governments, technology giants and educational institutions are, in part, due to the pressing need to upskill and reskill the workforce. Micro-credentials are seen as a tool to equip displaced workers and those facing job automation with relevant skills, effectively bridging the gap between market demands and available expertise. Additionally, they are expected to enhance the employability of enrolled students, aligning their skill sets with market needs.

Moreover, micro-credentials respond to policymakers' calls for greater flexibility and learner-centric approaches in higher education and vocational training. They offer targeted learning experiences and facilitate modularisation, catering to diverse individual needs in both initial education and lifelong learning endeavours - a crucial aspect in the face of aging populations.

Furthermore, micro-credentials are hailed as instruments for fostering social inclusion by expanding access to education and vocational training, particularly for marginalised populations. By empowering learners with market-relevant skills, they not only enhance employability but also bolster overall well-being and civic engagement. Some nations even explore their potential in bolstering internationalisation and student mobility, envisioning a future where micro-credentials streamline academic recognition across borders. They also serve as bridges between vocational and higher education sectors, offering alternative pathways to advanced degrees and improving completion rates through modular enrolment and stacking.

Despite the enthusiasm surrounding micro-credentials, empirical evidence of their impact remains scarce. Still, some evidence is emerging that in the right circumstances, acquiring certain targeted short-term credentials can have a positive impact on the chances of being employed. In Canada, for example, the proportion of learners with bachelor's degrees employed in low value-added service industries fell by more than half in the years after they completed a short-duration credential (OECD, 2023^[55]). In the European Union, research has found that in the manufacturing sector, some micro-credentials can support progression from entry level jobs to technician and engineering level roles (Pouliou and Pouliakas, 2023^[56]).

Addressing financial barriers to accessing micro-credentials is important. While support exists for unemployed individuals, those from low-income backgrounds or marginalised groups often face limited options. To bridge this gap and entice learners who might otherwise miss out on educational advancements, governments and education providers are crafting innovative funding initiatives. Take, for example, the Google Career Certificate program, which has empowered over 200 000 individuals since its inception, with over half lacking a bachelor's degree. Key to its success is Google's commitment to financially support disadvantaged learners, exemplified by its USD 100 million fund launched in 2022.

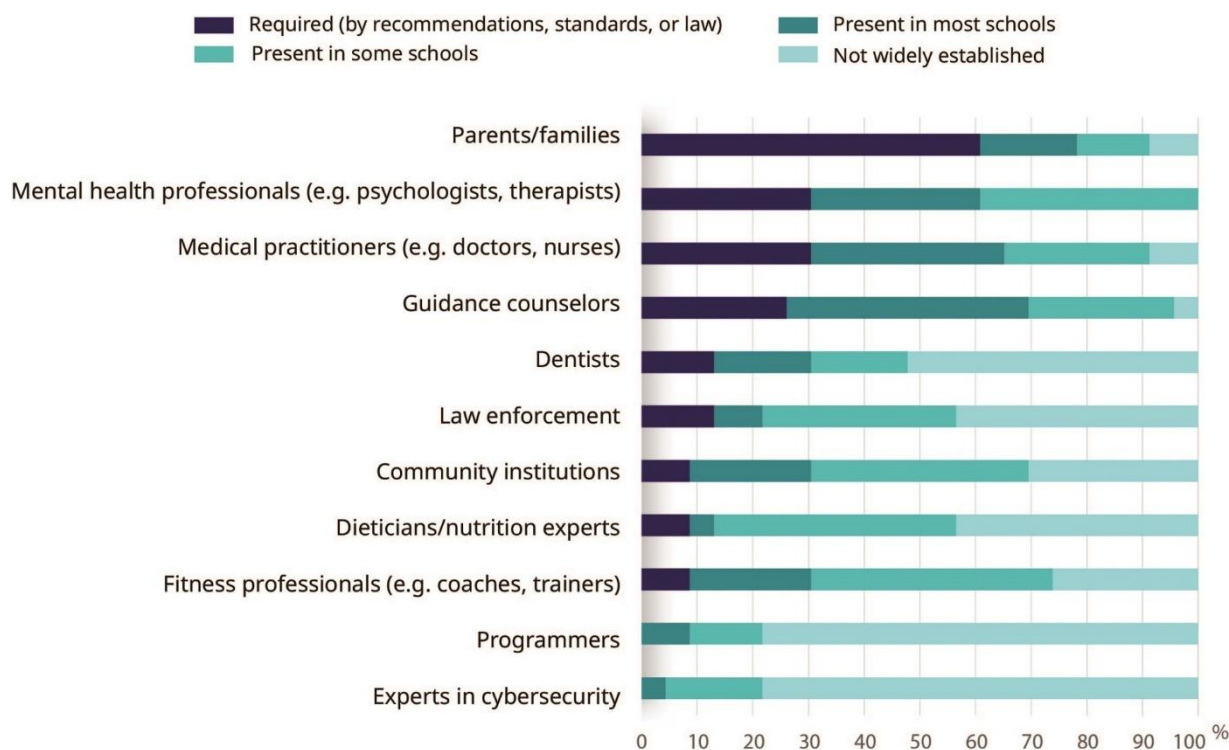
Similarly, governments worldwide are stepping up to support micro-credentialing endeavours. Singapore, for instance, covers up to 70% of course costs for citizens and permanent residents, with even greater assistance for older individuals, SME employees and those with disabilities. Meanwhile, the UK plans to extend its loan scheme to encompass modular learning units, ensuring lifelong learning remains financially feasible for all.

The bottom line

The growth of micro-credentials is being propelled by collaboration between higher education institutions, technology firms and countries. Some governments are actively endorsing and implementing micro-credential initiatives to address workforce needs and promote lifelong learning. Despite the potential benefits, challenges such as financial barriers persist, and some governments are providing support to ensure equitable access to the courses (OECD, 2023^[55]).

Partnerships between education providers and the wider community are crucial for enriching the educational experience (Burns and Gottschalk, 2019^[57]). They bring diverse perspectives, resources and expertise into the learning environment, enhancing students' understanding of the outside world. Collaborating with external actors, such as businesses, nonprofits and community organisations, provides opportunities for hands-on learning and skill development beyond the classroom. However, there are significant disparities in the frequency of these partnerships across various sections of the community.

Figure 3.5. Transforming schools into community hubs



Source: (Burns and Gottschalk, 2020^[58]), *Education in the Digital Age: Healthy and Happy Children*, Educational Research and Innovation, OECD Publishing, Paris, <https://doi.org/10.1787/1209166a-en>.

Partnerships help foster a lifelong learning ecosystem, promoting continuous skill development. We have already discussed vocational training programmes, but university-industry research collaborations and community-based initiatives tailored to local needs can also have significant beneficial impacts. Schools are now expected to collaborate more broadly with other educational levels, the labour market, technology providers, and even provide a range of social services that go beyond their traditional educational mission.

These kinds of diverse partnerships are already an educational reality in many schools within OECD countries - but it varies widely (Burns and Gottschalk, 2019^[57]). For example, partnerships with mental health professionals are often present in schools compared to partnerships with cybersecurity experts. Educational establishments should consider expanding partnerships with a broader range of actors in the community. A case in point, partnering with tech firms could grant schools access to advanced tools, helping to bridge classroom learning with real-world applications through software platforms, mentorships and internships.

The growing focus on partnerships necessitates a re-evaluation of the role of teaching. This includes an increasing emphasis on relational aspects of professionalism that complement core knowledge and teaching skills. As the concept of lifelong learning gains traction in societies, teachers need to be empowered to expand their knowledge and skills in this area. This will support their professional growth and also enhance the learning experiences of their students. Framing the development of lifelong learning skills for children and young people as an equity strategy is crucial, especially since many groups of students currently have limited access to lifelong learning opportunities in the workplace.

How can we systematically improve cooperation between schools and teachers? A part of the answer is 'ambition loops': agreed objectives across schools, the educational sector and the wider community that, if achieved, reinforce each other and create positive change. OECD research has identified a number of ambition loops to support interdisciplinary learning and working, including supporting lifelong learning (McGrath, 2023^[59]). One such loop ensures that schools provide teachers with organisational support, such as time and space, to use shared knowledge to support students' learning as they transition into and from schooling. For example, by providing time in the curricula for teachers to draw on student experiences outside of the school in a systematic way, such as learning a language on an app or through an exchange, and creating a space for children to reflect on what they have learned.

To this end, what should the schools of the future look like? Imagine a school, as a vibrant anchor within its community, weaving together families, various educational sectors and other relevant parts of society. The goal would be to cultivate prosperity for both students and the community at large. The community, in turn, plays a crucial role in supporting and valuing the work of teachers. This mutual respect and recognition would uplift the teaching profession, fostering a sense of pride and respect within society.

Going further, schools could be more than just a community hub and potentially embrace a broader spectrum, encompassing health, well-being, technology and ethics. Crucially, the school could also be central to lifelong learning initiatives, bridging the gap with non-formal learning opportunities and nurturing the ability to learn continuously. It is just one vision for the school of tomorrow and it would only be achieved through greater partnerships.

The bottom line

Partnerships among educational institutions, industry and the community are crucial for fostering lifelong learning ecosystems and continuous skill development. Schools must broaden collaborations to include various stakeholders, from mental health professionals to tech firms, to enhance learning experiences and bridge the gap between education and real-world applications. Empowering teachers to embrace lifelong learning and interdisciplinary approaches, supported by organisational structures and community engagement, is vital for transforming schools into vibrant hubs that promote prosperity and lifelong learning opportunities for all.

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International Summit on the Teaching Profession

Reimagining Education, Realising Potential

Students face a future filled with uncertainty and change. For education systems to continue to remain relevant, they must empower students to navigate these changes and succeed in the future by equipping them with the requisite knowledge, skills, attitudes and values. Teachers are key enablers of this endeavour, and it is imperative that governments and teacher organisations collaborate to support teachers in exploring and enacting pedagogies, and designing learning environments that support student attainment of future-ready competencies, through policies, processes and teacher professional development.



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