5 Digital inequalities and child empowerment

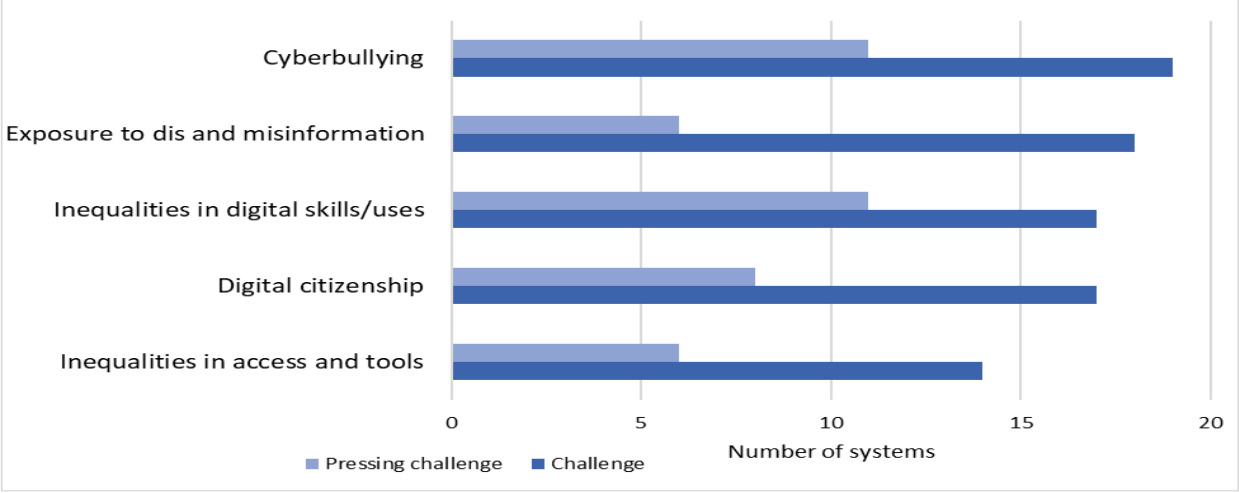
This chapter gives an overview of some challenges faced by OECD countries regarding children and digital inequalities. Despite a narrowing gap in terms of access to digital tools and the Internet, inequalities are persistent and pervasive. Many children in OECD countries lack adequate access to digital tools and the Internet that can impede their participation in an increasingly digital world. Furthermore, disparities in digital skills are stark and some students risk being left behind. Mitigating these disparities is a key policy objective in many education systems, as is supporting all children to safely navigate the digital environment while minimising risk of harm.

Mitigating digital inequalities is a policy priority in OECD countries

The links between social and digital inclusion are clear. Offline disadvantage has implications for disadvantage in digital environments and vice versa. This is because digital inequalities re-integrate 'into social structure, rejecting the strict opposition between online and offline spheres of activity' (Calderón Gómez, 2020, p. 3[1]). This means that digital inequalities can reinforce and amplify existing social inequalities, and that digital exclusion contributes to social exclusion (Reisdorf and Rhinesmith, 2020[2]). Individuals who can seize digital opportunities are likely to have advantages over those who are digitally disadvantaged, and digital exclusion tends to map onto different types of offline disadvantage (Robinson et al., 2015[3]).

Mitigating digital inequalities is a social imperative not only to minimise social exclusion, but also so that children can benefit from digital learning opportunities including informal learning (Ferguson et al., 2014[4]). The United Nations (UN) High-level Panel on Digital Co-operation has underscored that digital tools can be leveraged to help achieve the Sustainable Development Goals. To do so, it argues that a multistakeholder approach must be used to promote digital inclusion and equality for all (UN High-Level Panel on Digital Cooperation, 2019[5]). Reducing digital inequalities and promoting a digital environment that is safe for all children is high on the policy agenda in OECD education systems. This was a main finding that emerged in the 2018 iteration of the 21st Century Children Policy Questionnaire (Burns and Gottschalk, 2019[6]), and was also identified in the 2022 iteration (see Figure 5.1). OECD education systems in both survey cycles reported that challenges such as inequalities in digital skills and uses, and inequalities in access were pressing policy challenges, alongside various digital risks.

Figure 5.1. Pressing digital technology challenges in OECD education systems



Note: 22 systems responded to this item
Source: Questionnaire (2022)

Digital inequalities discussions have become more nuanced, advancing to the point that many scholars have moved beyond a dichotomous description of "haves and have-nots". The "digital divide" in the singular as a term is seen by some as outdated, and many scholars refer to divides plural, "digital inequalities" or "levels of digital divides" which provide a more nuanced understanding of the complex digital inequalities landscape (for an overview, see (Gottschalk and Weise, 2023[7])). This section will explore some of these nuances and give an overview of policy and practice in some OECD countries to mitigate the digital inequalities that can hinder the empowerment of children.

Please mind the gap (in access to digital tools and the Internet)

Despite high rates of connectivity in many OECD countries and a narrowing gap in access to digital tools and the Internet, inequalities within and between countries persist. Even in countries that are considered affluent and technologically advanced, there are differences in physical and material[1] access (van Deursen and van Dijk, 2018[8]). Inequalities in access were highlighted in the Questionnaire (2022) as a policy challenge by OECD countries throughout compulsory education, and in the ECEC in a Digital World policy survey in early childhood education and care (ECEC) settings as well (OECD, 2023[9]).

Using 2019 European Union – Statistics on Income and Living Conditions (EU-SILC) data, Ayllón and colleagues (2023[10]) report that 5.4% of school-aged children in Europe were digitally deprived. This means that they lived in a household that cannot afford to have a computer and/or that they co-habit with adults who cannot afford to provide an Internet connection. Rates in OECD members ranged from 0.4% in Iceland and 0.7% in Estonia to 11.6% in Hungary (Ayllón, Holmarsdottir and Lado, 2023[10]). Post pandemic rates of digital deprivation could be lower due to an emphasis by OECD governments on establishing programmes to support Internet and device access in particular for low-income groups. According to the International Telecommunication Union (ITU) 98% of young people (aged 15-24) in high-income countries used the Internet in 2023 versus 93% of the rest of the population (ITU, 2023[11]).

In terms of gaining access to the digital environment, in the majority of countries a higher proportion of households can afford Internet access than can afford a computer. Access to devices and the Internet is one side of the story, whereas ensuring this access is adequate or fit for purpose is more complicated. For example, in the United Kingdom, the 2021 Ofcom survey of households with children (0-17) showed that 99% of these households had Internet access and used it in the home and that the majority of children used a tablet or mobile device to access the Internet (Ofcom, 2022[12]). However, more than one-third of young children (primary school-aged) did not have access to an adequate device for learning at home. This was also the case for 17% of secondary school-aged children (Ofcom, 2022[12]).

Nowadays access to digital tools and the Internet has become a critical part of learning and participating in society. A systematic review reported a positive relationship between home Internet use and academic achievement in 17 studies, and a negative relationship in only 2, with improved outcomes for both students from low and high-income backgrounds (Daoud et al., 2020[13]). Home Internet access was also positively associated with children's social skills. The authors of the literature review concluded that the value added of home Internet access is influenced by variables including socio-economic status, and how the technology is used (i.e. for educational or non-educational purposes) (Daoud et al., 2020[13]). This is the case in schools too, where connectivity and access are necessary but not sufficient conditions to realise the potential of digital education (OECD, 2023[14]). Inadequate access to digital tools and the Internet can hinder children from making the most of digital opportunities including participating fully in digital education, which is on the rise in OECD countries. The OECD Programme for International Student Assessment (PISA) 2022 found a negative association between student performance and a lack of or inadequate/poor-quality digital resources in schools (OECD, 2023[15]). There is thus an increasing need for Internet connections that are more reliable, faster, and with higher bandwidth and less latency (OECD, 2023[14]).

Box 5.1. When simply being connected isn't enough: Under-connectedness

In the digital inequalities discourse, there are often distinctions made between "haves" and "have-nots". Conceptualising individuals in these two camps can, however, undermine the nuances that exist regarding digital inequalities, and do not account for differences in connection quality, and factors such as device quality, quantity and suitability for individual users. For example, in a nationally representative survey of parents in the United States, many reported being under-connected in some way. Around half of surveyed parents reported having home Internet access that was too slow to do the things they

wanted to, and about one-quarter reported that their computer was shared among too many people in the household for them to have enough time on it (Katz, Gonzalez and Clark, 2017[16]). Many parents also reported cuts to Internet access due to factors such as non-payment or reaching data limits (ibid). PISA 2022 results showed that only three out of four students reported that they never or only a few times had problems with access to a digital device when they needed it, suggesting almost a quarter were under-connected in some way (OECD, 2023[15]).

Consequences of under-connectedness include: decreased likelihood in applying for jobs or services families qualify for online, constrained access to services such as medical resources. For children, under-connectedness can impede them playing educational games, searching for information in the digital environment or even doing homework and collaborating with other students (Katz, Gonzalez and Clark, 2017[16]). Under-connectedness can exacerbate social inequalities in a myriad of ways, thereby affecting child well-being and education outcomes.

COVID-19 shone a spotlight on inequalities in digital access

The COVID-19 pandemic posed additional challenges for countries regarding digital inequalities, despite a narrowing gap in access in recent years. Responses from the Questionnaire (2022) highlighted that, as schools shifted to distance learning, more households than expected did not have sufficient access to digital tools nor to a fast enough Internet connection. For example, a 2021 report looking at digital trends in the Flemish Community of Belgium highlighted disparities in ability to afford high-speed Internet between low and high-income households. Furthermore, almost one in five (19%) households reported a need for an additional computer in the home, while the figure for low-income households rises to 26% (Sevenhant et al., 2021[17]). In Spain, the Questionnaire (2022) response identified that the COVID-19 pandemic emphasised inequalities, underscoring the inequality of opportunities among students.

The Children's School Lives study, a national longitudinal study of primary school students in Ireland, reported that principals and teachers were concerned about the access to remote learning of their students (Symonds et al., 2020[18]). Variation across schools was observed, and while many teachers and principals reported high levels of access among students, approximately one-third of teachers and principals reported that one-quarter of students in their classrooms and schools were unable to access remote learning. The most commonly perceived barriers were a lack of digital devices in the home, as well as factors such as parental work responsibilities, and lack of parents' interest and/or knowledge. Interestingly, from the parental perspective, the main reported barrier to assisting their children's distance learning was a lack of time due responsibilities such as child-care and work demands (Symonds et al., 2020[18]). PISA 2022 results suggest that on average across OECD countries, high-performing students reported fewer problems with remote learning such as less difficulty accessing the Internet (OECD, 2023[15]).

While the trend data on access in general is quite promising and shows an overall reduction in inequalities in access, the COVID-19 pandemic was an urgent reminder of the fact that there is still much progress to be made in many OECD countries. Minimising inequalities in the rate of digital uptake and access, especially within more disadvantaged populations, should be embedded in policy goals.

Which factors affect connectivity?

Barriers to device and Internet access have largely remained unchanged in recent years. For example, geography is still a barrier to suitable Internet connectivity. Children living in rural or remote communities tend to have more limited access to the Internet and digital tools than those living in urban or suburban communities (Gottschalk and Weise, 2023[7]). This is the case especially in countries with large geographical areas and low-density populations in more remote settings, such as Australia and Canada,

as highlighted in the Questionnaire (2022). PISA 2022 data supports this, with disparities in digital resources observed between urban and rural schools (OECD, 2023[15]).

Socio-economic status and material deprivation represent important barriers to Internet and device ownership and access. Rates of children living in material deprivation and severe material deprivation vary across European countries, from 3% and 0.5% respectively in Iceland to 33% and 18.1% in Greece. When factoring in the inability to afford access to the Internet and/or a computer, the figures worsen (Ayllón, Holmarsdottir and Lado, 2023[10]). A 2020 study of 15-year-olds in Australia reported that 18% of students from low socio-economic backgrounds did not have a computer for schoolwork, compared to only 3.5% of students from mid socio-economic backgrounds and 0.4% of students from high socio-economic backgrounds (Lamb et al., 2020[19]). Affordable and high-quality connection to the Internet is also unequally distributed in many OECD member countries. For example, fibre connections tend to be key for high-quality and speed Internet. In some countries, such as Germany, less than 10% of broadband connections were fibre-based as of June 2023, compared to an OECD average of 41% (OECD, 2023[20]). At the school level, those with a more advantaged student body tend to suffer less from shortages of digital resources than socio-economically disadvantaged schools (OECD, 2023[15]).

According to the Questionnaire (2022), economic inequalities in Mexico result in difficulties in accessing the Internet, with some schools and households lacking infrastructure and equipment. Literature suggests that access to digital tools in Mexico is mediated by socio-economic status, with higher access in more affluent households (Martínez-Domínguez and Fierros-González, 2022[21]). In this context, like in Australia and Canada, geography also plays a role as infrastructure development is lagging in more rural parts of the country (Martínez-Domínguez and Fierros-González, 2022[21]). Parental education level is also associated with connectivity in OECD countries. For example, an analysis conducted in Italy suggests digital inequalities are widening for those with lower educational attainment (Di Pietro, 2021[22]). More educated households tended to have higher access to digital technologies than their less educated counterparts. Among households with poor educational attainment, growth in computer and Internet access lagged behind households where at least one person had attained a lower secondary level of education.

Regarding barriers to digital access, there are compounding factors. Research from Australia suggests that access issues associated with rurality are often exacerbated by other factors such as educational levels and employment status (Park, 2017[23]). Therefore, individuals who live in remote areas with low educational attainment and without regular employment are less likely to have home Internet access, which reinforces both digital and social exclusion. A German study suggests that small, rural schools may have particular challenges regarding digitalisation due in part to geography, but also that smaller schools may lack the financial resources that larger, urban institutions have (Rundel and Salemink, 2021[24]). The interplay between supply-side factors (such as infrastructure, or lack thereof in more remote areas) and demand factors (such as educational levels, socio-economic status) should be considered in conceptualising and implementing digital policy (Park, 2017[23]).

Policies and practices to mitigate digital access disparities

Many OECD countries have strategies to improve quality access to digital technologies and the Internet, thereby reducing the first-level digital divide. Mitigating access disparities requires a number of factors, including financial, personnel and material resources (OECD, 2021[25]).

As seen in Table 5.1, systems employ various approaches to mitigate inequalities in access to the Internet and digital tools. In many systems, schools and students benefit from digital strategies that aim to equip the population in general with broadband. According to the Questionnaire (2022), this is the case in Mexico with the implementation of the National Digital Strategy across the country. Some broadband initiatives are more focused on equipping schools and education institutions with adequate connectivity, as is the case

in Ireland and in Italy. The National Plan for Digital Schools in Italy will focus on ensuring connectivity for all secondary schools in the country, as well as in some primary and kindergarten institutions.

Table 5.1. Increasing students' access to digital technologies and the Internet

Strategy	System examples
Ensure/improve Internet access in schools	**Ireland:** The Digital Strategy for Schools – to 2027 aims to provide appropriate broadband connectivity to all schools. **Italy:** The National Plan for Digital Schools will increase connectivity in schools and educational institutions, providing Internet speeds of 1 Gigabit per second (Gbps). The goal of the plan is to connect 35 000 school buildings in total. **Mexico:** Although not specific to education, the National Digital Strategy aims to increase connectivity throughout the country.
Equipping students, teachers and schools with digital tools and devices	**Australia:** The University of Adelaide has a National Lending Library that lends digital equipment to schools, particularly those in rural and remote parts of the country. The equipment is free of charge to borrow and is accompanied by lesson plans that are mapped onto the Digital Technologies section of the Australian Curriculum. **Flemish community (Belgium)**: The Digisprong Action Plan aims to provide schools with digital devices for each student. It was approved by the government in 2020, with implementation in 2021 and 2022. **Ireland:** Some objectives of the Digital Strategy for Schools – to 2027 are to establish sustainable funding mechanisms for purchase and maintenance of digital infrastructure in schools, and to make technical support solutions appropriate and accessible for schools. **Mexico**: An annual plan of new equipment rentals for students has been implemented. **Spain:** Programme to provide laptops to students has been implemented and there has been installation, updating and maintenance completed on interactive digital systems in schools and classrooms.

Source: Questionnaire (2022)

In Ireland, the Digital Strategy for Schools – to 2027 has objectives to provide high speed broadband and device access, and appropriate support, to schools. Pillar 2 of the Strategy deals with access, and the main objectives concern establishing sustainable funding mechanisms for digital infrastructure, providing broadband and advice on how to embed digital tools in the teaching and learning process, making technical support solutions available and accessible for all schools, and working with relevant stakeholders for the procurement and purchase of appropriate digital equipment and services. An important step in the development of the strategy is the involvement of students (see Box 5.2).

Box 5.2. Working with learners: Irish Digital Strategy for Schools consultation process

Launched in 2022, the Irish Digital Strategy for Schools aims to increase digital access in schools. Funds will be distributed to school leaders, and under the guidance of their Digital Learning teams, they choose how to spend them based on the unique context and needs of their school. Additional funding will be invested in the Schools Broadband Programme.

A consultation process underscored that more needed to be done in reducing digital inequalities, and addressing the needs of students who were subsequently at risk of educational disadvantage. It included a questionnaire for teachers, principals and students, and focus groups that included students. The questionnaire asked students about their confidence in using digital technologies to learn, whether they had access at school and at home, and how digital devices were incorporated into teaching and learning. While most students responded that digital devices were used in many subject areas, that they felt confident in and liked using them for learning, very few reported that they or their fellow students had been involved in developing policies on the use of digital technologies in their schools. Schools can capitalise on students' enthusiasm and self-reported comfort in using digital technologies by including them in decision making on these topics. This can give them a sense of ownership over their digital learning, and helps realise students' right to have a say in matters that affect them.

Source: Questionnaire (2022)

The Flemish Community of Belgium and Spain also have action plans to improve connectivity within schools. In the Flemish Community of Belgium, the Digisprong Action Plan had an implementation goal in 2022 targeting all primary and secondary schools. The main pillars of this plan include providing one-to-one access to digital devices in schools and equipping teachers with the tools and skills to incorporate digital tools into the teaching and learning process. There is an emphasis on continuous professional learning to improve and maintain skills, and on supporting schools to digitise the curriculum. Within the National Plan for Digital Capabilities in Spain, the proposal for the Digitisation of the Educational Ecosystem (#EcoDigEdu) was approved in 2021 for implementation between 2021 and March of 2025. This strategy aims to reduce gaps in digital use and access while promoting equal opportunities in education. One objective is to improve access to mobile devices for disadvantaged students, while another is to ensure access to sufficient digital tools in classrooms along with support and training for teachers. A budget of almost EUR 150 million was allocated towards the provision of portable devices, and EUR 821 million to installing, updating and providing maintenance to interactive digital systems in classrooms.

In ensuring all children have suitable access to digital tools and the Internet, systems can help level the playing field when it comes to digital education and digital outcomes more generally. While this is only one part of the digital inequalities puzzle, it is an important hurdle to be overcome in mitigating other inequalities that can become further entrenched when children have inadequate access. Evaluating policy effectiveness is an important step also in ensuring their success and continuation, which can include measuring the number of devices distributed and the schools equipped. For example, these metrics will be monitored as part of the #EcoDigEdu initiative in Spain. This is an important step, yet simple metrics such as these can miss important details that are crucial to ensure equity and inclusion, such as quality of devices and Internet speed (Gottschalk and Weise, 2023[7]).

In Ireland, oversight and consultation structures will be established to assist the implementation of the Digital Strategy for Schools – to 2027 and to establish effectiveness measures. A Steering Group will provide guidance and oversee the implementation of the strategy, while a Consultative Group with a large stakeholder group will also be established. Strategic partnerships like this can be important for effective design, implementation and continuing improvement and monitoring. Industry actors in particular can be key players in supporting the digital transformation in schools and in building equitable, high-quality digital capacity for all children.

To the Internet and beyond

Reducing inequalities in access to digital tools and the Internet is a key step in moving towards a digital future that is equitable for all children. However, the rapid pace of technological development and emergence of tools from robotics to artificial intelligence has implications for these inequalities. There is a risk that children face exclusion due to uneven distribution of access to emerging technologies such as artificial intelligence (UNICEF, 2021[26]).

Funding challenges are already rampant with regards to the purchase, maintenance and upgrading of devices in schools. As technology evolves, and with the obsolescence of different tools, education systems have difficult decisions to make regarding the allocation of scarce resources. There are also implications for teachers, who require support in effectively implementing digital tools into the teaching and learning process. Teachers have reported teaching with digital technologies as a high-need area of their professional development across cycles of The OECD Teaching and Learning International Survey (TALIS) (OECD, 2019[27]). Furthermore, their self-efficacy and willingness to incorporate digital tools in the classroom varies widely (Gottschalk and Weise, 2023[7]). While inequalities in access to devices such as computers, tablets and the Internet might be narrowing, there are important considerations with regards to accessing advanced technologies both inside and out of education.

Empowering all children to make the most of digital opportunities

Despite a narrowing gap in many systems in terms of access to digital tools and the Internet, a prominent policy concern across OECD countries is inequality in digital skills. With the continued permeation of digital tools into children's daily lives, those who can safely and effectively navigate the digital environment will be able to maximise the opportunities this affords, while those who are unable to do so risk being left behind. Some scholars argue that children should be supported to adopt a proactive and, importantly, a critical stance towards digital technologies, considering how they can be used to better their lives and the world around them (Iivari, 2020[28]). Digital skills are crucial to do this effectively, alongside knowledge, attitudes and values.

The ITU defines digital skills as "the ability to use information and communication technologies in ways that help individuals to achieve beneficial, high-quality outcomes in everyday life for themselves and others' and that 'reduce potential harm associated with more negative aspects of digital engagement" (ITU, 2018, p. 23[29]). A classification by Helsper and colleagues (2020[30]) suggests four broad digital skills categories:

- Technical and operational skills: abilities to manage and operate digital tools, ranging from the knowledge of using buttons to adjusting and managing settings to programming.
- Information navigation and processing: abilities to find, select and critically evaluate sources of information in the digital environment.
- Communication and interaction: abilities to use digital tools to interact with others, build social networks, and evaluate the impact of digital communication/interactions on others.
- Content creation and production: abilities to create digital content, understanding how it is produced/published and how it impacts others.

A systematic review of the literature linked digital skills to opportunities in the digital environment as well as information benefits, however the relationship with other beneficial outcomes including academic grades and civic participation were more mixed and the authors were unable to draw reliable conclusions based on the limited available evidence (Livingstone, Mascheroni and Stoilova, 2023[31]). Supporting children to develop digital skills is important, as is gaining the necessary skills to cope with the problems children may encounter in the digital environment (Livingstone, Stoilova and Rahali, 2023[32]).

The literature in this domain is clear: digital skills are a key pillar of children's participation in modern life, including digital education, and can support their social inclusion and realising their rights. Many factors are associated with disparities in digital skills. Higher levels of skills in children tend to be associated with things such as parental mediation, age, gender, amount of time spent in the digital environment, self-efficacy, and attitudes towards the Internet and digital technologies (Haddon et al., 2020[33]; Mascheroni et al., 2022[34]). Factors such as perceived discrimination[2] may also affect the relationship between some of these aforementioned factors and digital skills, whereby perceived discrimination may weaken the positive effects of factors like age and self-efficacy on acquiring digital skills (Mascheroni et al., 2022[34]).

There is some association between family socio-economic background and how children interact with the digital world. Findings from a meta-analysis suggest that higher socio-economic status is related to stronger information and communication technology (ICT) literacy, but that this association was weak and that the relationship varied across included samples (Scherer and Siddiq, 2019[35]). Socio-economic status is also associated with the types of digital activities children participate in, with advantaged children tending to use digital tools more than their disadvantaged peers for educational and school-related purposes for example (Micheli, 2015[36]; Weber and Becker, 2019[37]).

A focus on digital skills in OECD education systems

Education systems across the OECD recognise the importance of developing digital skills in compulsory education for many reasons, including promoting inclusion, supporting children in seizing digital

opportunities and in realising their rights. OECD education systems implement different strategies targeted at improving digital skills in student populations, examples of which are outlined in Table 5.2.

Table 5.2. Strategies to promote children's digital skills

Initiative	Country examples
National strategies, action plans and frameworks	**Denmark:** In December 2021, the government made an agreement across a range of political actors focusing on improving digital formation of children. Initiatives within this agreement include establishing a digital traffic club to improve children's critical awareness and competence of digital tools, and developing materials for teachers and educational institutions on digital formation that can be used in teachers' practice. **Flemish community (Belgium)**: The Digisprong Action Plan supports schools in various ways regarding digitalisation of education. Measures within this framework target access, provision of digital resources to students and teachers, a range of training courses for teachers and more emphasis on digital competence in teacher training, and improving access to high-quality digital teaching material. **Ireland:** The Digital Strategy for Schools – to 2027 is a multi-pronged strategy that aims to empower students to be confident and competent digital learners, who are critically engaged and can participate as global citizens in an increasingly digital world. **Italy:** The National Strategy for Digital Skills aims to double the population with advanced digital skills by 2025. This strategy is multi-pronged, aiming to support digital skill development for populations including working adults, retired individuals, immigrants and students in compulsory education. It does so through different means such as formal and informal trainings, use of e-learning platforms and public communications. **Norway**: A national strategy on digital skills was implemented in 2017, followed up by an action plan in 2023. Some of the measures in the 2017-2021 strategy included implementing coding into the curriculum and spreading knowledge of digital tools and teaching aids available for students with special education needs. **Québec (Canada):** The Ministry of Education in Québec developed a Digital Competency Framework that aims to foster digital skills in students. Education stakeholders are helped in undertaking pedagogical planning or educational projects to develop digital competencies. The website, competencenumerique.ca was developed in relation to the Digital Reference Framework as a resource to help individuals develop digital competences.
Curriculum	**Australia:** The current Australian Curriculum includes Digital Technologies learning areas, guiding schools on which digital skills and knowledge should be taught. Digital literacy is recognised as a general capability, and as an essential skill required for students both at school and beyond. **Finland**: A new literacies development programme aims to strengthen media literacy, programming skills and overall digital skills for children from early childhood through comprehensive education. **Luxembourg:** The "Media Compass" (*Medienkompass*) curricular framework was introduced in 2022. Competence areas include information and data, communication and co-operation, content creation, and data protection and security. Coding and computational thinking have also been introduced as transversal skills in primary education. In lower secondary education, digital science has been introduced as a new curricular area. **Saskatchewan (Canada):** The Ministry of Education created a support document for schools and for curriculum writers to help identify a continuum of knowledge and skills for students.
Teachers and teacher education	**Australia:** The Digital Technologies Hub was established to provide materials to support teachers in planning, teaching and assessment of the Australian Curriculum: Digital Technologies. There are also materials suitable to integrate into other learning areas such as English, science and mathematics. **Ireland:** The Digital Strategy for Schools embeds appropriate and effective use of digital tools for teaching, learning and assessment during initial teacher preparation, induction and continuing professional learning. **Israel:** Online professional development courses are available for teaching staff, as is the "Online Academy" programme that hosts interactive broadcasts for teachers, parents and students with guidance from leading experts and academics. **Italy:** The National Strategy for Digital Skills has a specific goal to improve the digital skills of teachers. By 2020, 70 000 teachers had received specialised training. **Luxembourg:** Teachers specialised in digital competence have been introduced in primary schools. **Norway**: Teacher education was an important focus of the national Digital Strategy from 2017-2021. Proposed measures included providing digital education for teachers on the pedagogical use of digital tools, strengthening digital competence in initial teacher education and improving research and communication around topics on digitalisation and learning. **Spain:** Developing digital competence of teachers, both individually and collectively, is a focus of the strategy to boost the use of digital technologies for learning and the development of digital skills in students. Teachers will be helped to achieve at least an intermediate level of digital competence, with more advanced levels for certain teachers responsible for digital planning. An objective of the programme is to certify the degree of teachers' digital competence.
Extra-curricular activities	**Denmark:** Coding Pirates is an initiative where children meet weekly to participate in workshops on coding, inventing and design that is present in around 100 departments in the country in locations like schools and libraries. It is led by adult volunteers such as programmers and teachers, and aims to foster creativity and design thinking, while spending time with others and playing. **Israel:** Initiatives such as digital camps are available for students from primary to high school, and digital workshops are

	offered for students aged between 6 and 15 years in both Hebrew and Arabic. The Skillz Championship is another initiative, where students learn about robotics, computer science and mathematics in a fun way. The goal of the Championship is to expose students to different digital content in an experiential and challenging way, to increase their motivation and desire to learn about mathematics and technological subjects. **Luxembourg:** Activities like robotics challenges and contests are organised, offering teams of children the chance to compete in challenges involving real-world problem solving and to develop science, technology, engineering and mathematics (STEM) competences. For example, in April 2022 a regional final of the 'First LEGO League Challenge[3]" was hosted at Lycée Aline Mayrisch for teams of students aged 9-16 from different schools in the region.

Source: Questionnaire (2022)

Many of these strategies are general, and do not target specific groups of students. One barrier to developing policies focusing specifically on digital inclusion of disadvantaged young people is the lack of research in this specific domain, with few studies outside of the small collection of single-country and qualitative studies (Helsper, 2017[38]). Developing and implementing targeted programmes, for example aiming digital skills education at students from disadvantaged backgrounds or at younger girls can, however, help mitigate digital inequalities related to social and demographic factors (Helsper, 2021[39]).

Box 5.3. Digital Education Action Plan 21-27 in the European Union (EU)

The Action Plan[4] focuses on improving digital literacy, skills and capacity, at all levels of education and training and for all levels of digital skills. It sets out measures for high-quality and inclusive digital education and training. The action plan aims to deploy different digital technologies to improve, support and extend education and training. In doing so, it seeks to equip all learners with the competences to live, work, learn and thrive in an increasingly digital world.

Guiding principles of the Action Plan are set out to ensure improvements in equity and quality of education, adjusting to the ongoing digital transformation. The principles encompass adequate investment in digital infrastructure to reduce inequalities in access, fostering digital literacy and skills from basic to advanced levels, increasing equality and inclusiveness, and the important roles of teachers, school leaders and society in general in transforming education.

Source: (European Commission, 2020[40]), Digital Education Action Plan 2021-2027: Resetting education and training for the digital age, https://education.ec.europa.eu/sites/default/files/document-library-docs/deap-communication-sept2020_en.pdf

In the Questionnaire (2022) some countries identified how they evaluate or intend to evaluate digital skills programmes. For example, in Spain, the number of teachers with a certification of their level of digital competence is used as a metric to understand policy reach and success. In Italy, a dashboard of over 60 indicators monitors milestones, results and impacts of the actions under each strand of the National Strategy for Digital Skills. In Ireland schools will be required to perform self-evaluations, while other mechanisms include establishing a Steering Group to oversee guidance and implementation of the Digital Strategy for Schools – to 2027, and a Consultative Group comprising key stakeholders (parent/guardians, learner representatives, education partners) as well as an Industry Group to be consulted on implementation and programme evaluation. In Australia, an evaluation of the Digital Technologies Hub was conducted in 2018, and a further evaluation was planned for 2022. Outcomes of the 2018 evaluation suggest that the available resources were high quality and engaging.

Evaluating outcomes of digital skills programmes can be challenging, as there are many different conceptions of - and methods used to measure - digital skills. An evidence review suggests that in some cases different dimensions of digital skills in tandem are emphasised whereas others are more focused on a particular area, for example programming or information literacy (Haddon et al., 2020[33]). This adds some complexity in assessing the outcomes of digital skills strategies. Harmonising definitions and

methodologies in measuring certain digital skills or digital skill dimensions is important to ensure more consistency in research and policy making.

Adults are key actors in empowering children in the digital environment

Supporting teachers to support their students

Schools and teachers are important players in mitigating the digital skills gap. As highlighted by Canada in the Questionnaire (2022), usage and expertise of digital technologies can vary widely among teaching staff even within institutions. TALIS 2018 data suggests that the distribution of teachers who are trained in and feel capable of using ICT and who regularly let their students use ICT for projects or class work are not randomly distributed across schools. In fact, there is a higher share of teachers who feel they can support student learning using digital technologies in private than in public schools in about a quarter of TALIS-participating countries and economies, and this share is also larger in socio-economically advantaged than disadvantaged schools in seven education systems (OECD, 2022[41]). However, in some education systems teachers who were trained in the use of ICT are more concentrated in socio-economically disadvantaged schools. This is the case in countries like Australia, England (United Kingdom), France and Sweden (OECD, 2022[41]). In others such as Alberta (Canada), the Flemish Community of Belgium, Latvia and Türkiye, the percentage of teachers who have been trained in ICT during their initial education is higher in schools with a higher share of students whose first language is different from the language of instruction.

Data from TALIS Starting Strong 2018 suggests similar patterns in ECEC settings, whereby a large percentage of ECEC staff in all participating countries report having low self-efficacy in their capacity to use digital tools to support children's learning (OECD, 2020[42]). This could be related to factors such as the paucity of digital infrastructure in ECEC settings or their relatively low expectations on the extent to which they should incorporate digital tools into their practice.

According to the Questionnaire (2022) teachers in countries such as Finland and Spain need additional support in strengthening digital competences, as this is sometimes not a major focus in initial teacher preparation. This is consistently a highly reported area of need for teacher professional development, and is especially relevant for older teachers who often express problems with or barriers to their use of digital tools in the teaching and learning process (Scherer, Siddiq and Teo, 2015[43]). Additionally, teachers in many systems do not receive training regarding digital risk mitigation (Burns and Gottschalk, 2019[6]), and according to a report on countries in the European Union, few countries offer training on how to use digital tools for supporting inclusion (European Commission Directorate-General for Education et al., 2021[44]). Even when teachers receive training on using digital technologies in the teaching and learning process, sometimes this can be of poor quality (Gudmundsdottir and Hatlevik, 2017[45]), and when teachers have limited knowledge, interest and willingness to incorporate digital tools into their practice they are less likely to do so (Rundel and Salemink, 2021[24]). Despite this, since the onset of the COVID-19 pandemic many education systems have emphasised training for teachers in this area.

The power of parents

Alongside teachers, parents are important actors in supporting children's digital skill development. Enabling mediation, whereby parents actively mediate and moderate their child's use of digital tools and online safety also potentially using parental controls, tend to be associated with higher chances of encountering both digital opportunities and risks, as well as developing digital skills. The more digitally skilled a parent is, the more likely they are to employ enabling mediation with their children, and this type of medication can support children in exercising agency in the digital environment and is also positively associated with requests from children to their parents for support (Livingstone et al., 2017[46]). In contrast, more restrictive approaches tend to hinder children's access to opportunities, while also potentially

sheltering them from risk (Livingstone et al., 2017[46]). This more restrictive mediation is negatively associated with child-initiated requests for support (Livingstone et al., 2017[46]). Parents from disadvantaged backgrounds are likely to have lower levels of digital skills, which runs the risk of perpetuating cycles of digital disadvantage.

Early development of digital skills has been associated with beneficial outcomes later in childhood such as academic outcomes, however simply spending time online at young ages without developing skills was a marginally negative predictor of later academic achievement (Hurwitz and Schmitt, 2020[47]). This suggests that parents supporting their children in developing digital skills from a young age may help to mediate the potential impacts of early Internet use on later outcomes, while also providing benefits.

Digital decision-makers promoting child participation

Decision-makers can support digital empowerment of children by providing learning opportunities for digital skills and involving children as key stakeholders in developing, designing, and implementing digital skills strategies (OECD, 2022[48]). Research shows that children are keen to be consulted about the digital skills and digital literacies they want to develop, and to determine the ways these should be delivered (Livingstone, Stoilova and Rahali, 2023[32]). Something to keep in mind is that participatory processes tend to favour children who are advantaged, and risk excluding children from disadvantaged backgrounds (Gottschalk and Borhan, 2023[49]). When involving children in making decisions on policy issues in general but also in particular in relation to inequalities, special attention should be paid to ensure there are adequate opportunities for children from socially disadvantaged or underrepresented backgrounds to participate. The ways in which the different needs or abilities of these children can affect their participation must be taken into account. Considerations include time or geographical constraints, access to adequate digital devices for online consultations, availability of assistive technologies for those who need them, and language accommodations for non-native speakers.

The future of digital skills inequalities

In OECD countries there is currently a policy emphasis on improving digital skills for all children. Considering the persistence of inequalities in digital skills between advantaged and disadvantaged groups, targeting interventions at those who are disadvantaged may help mitigate this gap. However, assessing whether targeted or general measures have the intended impact still proves difficult with varying definitions and methodologies used to quantify digital skills within a given population.

An important measure that clearly needs to be adopted in digital skills strategies is building the capacity of adults who can provide support and guidance to children. Supporting teachers to gain a critical understanding of how digital tools can be incorporated into the teaching and learning process is key, as is providing learning opportunities for both teachers and parents to improve their digital skills. This will allow the trusted adults in children's lives to assist them appropriately and effectively in navigating the digital environment. As with inequalities in access, special attention should be paid to how children use (or do not use) advanced digital technologies, ensuring that those who may have limited access to these tools still have opportunities to learn about how they can be useful for their education and their futures. Doing so may reduce the risk of perpetuating disadvantage.

Finally, including children in developing and implementing programmes to support their digital skills development is important. As children tend to be among the most avid users of digital technologies (International Telecommunication Union, 2021[50]), they have keen and important insights into their own digital habits and the skills they may need to engage in the activities that interest and motivate them. Harnessing this enthusiasm for digital technologies, and their apparent willingness to participate in developing digital skills strategies, could promote developing more comprehensive, effective and inclusive policy measures.

Recognising digital risks and overcoming inequalities for empowerment

Children can encounter risks when navigating the digital environment that can be categorised under four broad categories within a "4C" typology: contact, content, conduct and consumer risks (OECD, 2021[51]). Cross-cutting risks that span across these categories include privacy, advanced technology, and health and well-being risks. Examples of risk manifestations within this typology include: encountering content that is harmful, hateful, illegal or disinformation (content risk); encounters with others that are harmful, hateful or illegal (contact risk); commercial profiling and financial risks (consumer risk); behaving in a way that is harmful, hateful or illegal (conduct risk); or risks that can be classed in different categories depending on the child's role, such as cyberbullying (contact risk for the cyberbullying victim, conduct risk for the perpetrator, content risk for bystanders) (OECD, 2021[51]). Risk and harm are related yet distinct with risk exposure not necessarily always resulting in harm and various protective and vulnerability factors that mediate the relationship between the two (Livingstone and Stoilova, 2021[52]).

The first iteration of the Questionnaire (2018) identified cyberbullying, access to harmful content, security and privacy concerns, and sexting as pressing policy challenges in education systems (Burns and Gottschalk, 2019[6]). The 2022 iteration saw a similar pattern with cyberbullying as the most pressing policy challenge among respondents. Other pressing concerns include exposure to dis and misinformation, exposure to harmful content, security and privacy concerns, sexting and datafication. Risks such as these can hinder child empowerment due to implications for well-being and children's right to privacy.

Cyberbullying remains a pressing challenge for OECD education systems

Cyberbullying was identified as a pressing policy challenge in both the 2018 and 2022 iterations of the Questionnaire. A commonly cited definition is "wilful and repeated harm inflicted through computers, cell phones, and other electronic devices" (Hinduja and Patchin, 2015, p. 11[53]). Policy makers around the world have expressed concern over cyberbullying for many reasons including well-being implications for victims (Gottschalk, 2022[54]). There are also important ramifications to consider regarding the perpetrators. For example, Questionnaire (2022) responses suggest that in France there is concern that cyberbullying perpetrators and bystanders have low levels of empathy, that they might belong to friendship circles that are aggressive and that there can be a lack of awareness of how their actions affect the victims.

Many governments have made combatting cyberbullying a policy priority. This is the case for example in the French community of Belgium, which has included bullying and cyberbullying as priorities in the Policy Statement of the Wallonia-Brussels Federation 2019-2024[5], within the context of education and childhood matters. The Ontario (Canada) Ministry of Education in 2021 also implemented a policy/programme memorandum on bullying prevention and intervention (see Box 5.4). In 2022 the Minister for Education in Ireland launched a steering committee to review the 2013 Action Plan on Bullying[6], with plans to specifically consider cyberbullying, gender identity bullying and sexual harassment. Despite cyberbullying being a priority for many policy makers, Questionnaire (2022) results suggest that some countries struggle with finding solutions that can be scaled at a national level.

According to the Questionnaire (2022), some systems such as the Flemish Community of Belgium, and provinces in Canada including Newfoundland and Labrador, Ontario and Saskatchewan, report concerns regarding the prevalence of cyberbullying rates among children. The prevalence and severity of cyberbullying in some countries has prompted help-seeking behaviour from children, parents, teachers, social workers and other actors. For example, a network of Safer Internet Centres exists across the EU, Iceland and Norway. This network offers an Insafe helpline, which is accessible through means including phone, SMS, online form etc and 14% of contacts made in 2022 were concerning cyberbullying (Stoilova, Rahali and Livingstone, 2023[55]). This was the most frequently reported problem, although there is a heterogeneity of concerns that individuals may contact a helpline about including sex and relationships, harmful content, e-crime, media literacy, data privacy and more. This heterogeneity in the risk landscape

can prove challenging for policy makers when considering courses of action to take. Furthermore, children and the adults close to them do not report or seek help for all the risks they encounter, which makes estimating overall prevalence or severity a challenge. Countries take a range of approaches to tackle cyberbullying, as outlined in Table 5.3.

Table 5.3. Select examples of policies and programmes targeting cyberbullying

Approach	System examples
National strategies, approaches and campaigns	**France:** The CyberNAH programme was developed with the mission of combatting cyberbullying. Measures include digital monitoring to anticipate viral cases of cyberbullying and strengthening capacities of schools to manage cyberbullying cases among others. In 2022, a law was passed to combat bullying in schools (*Loi Balanant*), reinforcing measures the country has taken in the fight against bullying. **French community (Belgium):** A school climate observatory was developed that is responsible for ensuring monitoring and supplying schools with references and educational tools to improve school climate with the goal of reducing (cyber)bullying. A reference programme was also designed for schools to implement aimed at preventing and accounting for cases of (cyber)bullying. **Latvia:** The Ministries of Health, Education and Science, and Welfare have proposed a national approach to bullying and cyberbullying, with common guidelines and recommendations to be used in settings such as educational institutions to tackle bullying. **Luxembourg:** The Bee secure programme co-ordinates a number of measures to combat cyberbullying including campaigns, classroom interventions, a helpline and a stopline.
Support in schools	**Estonia**: School psychologists are available for consultation regarding cyberbullying cases. **Flemish community (Belgium):** Training has been provided for school care agents on how to handle cyberbullying cases. **Ireland:** There are professional learning opportunities and curricular supports available to schools to assist them in the development of policies and practices on the safe use of the Internet including on the prevention of cyberbullying. Schools are also advised to have acceptable use policies governing students' use of digital tools.
Online resources	**Ireland:** Webwise promotes the autonomous, effective and safer use of the Internet by young people through a sustained information and awareness strategy targeting school leaders, teachers, parents/guardians and learners themselves with consistent and relevant messages. **Saskatchewan (Canada)**: The Be Kind Online website provides resources to support educators, students and families to address bullying and cyberbullying, and the affiliated youth grant programme encourages youth to make positive change in their schools and communities.
Data collection and monitoring	**Estonia:** Well-being questionnaires and surveys, including at the school level, provide insights on cyberbullying and measuring effectiveness of interventions. **Latvia:** PISA results are used to benchmark bullying rates and set targets for improvement. The goal in the Education Development Guidelines 2021-2017 is to reduce reported rates of bullying from 35% of students in 2018 to 23% by 2025. PISA 2022 results show the rate has decreased to 29%. **Ontario (Canada):** School boards must monitor, review and evaluate effectiveness of policies and guidelines using indicators established in collaboration with teachers, school staff, students, parents and school councils. School boards need to develop/enhance strategies to track and monitor instances of (cyber)bullying and every two years they must conduct anonymous school climate surveys of students, staff and parents.

Source: Questionnaire (2022)

Box 5.4. Providing (cyber)bullying support in Canada to diverse groups

In 2021, the Ontario Ministry of Education implemented a new Policy/Program Memorandum on Bullying Prevention and Intervention. In doing so, a framework was provided for school boards to adopt regarding issues such as violence at school, including bullying and cyberbullying. The province allocated funding to various initiatives that provide targeted support for certain student groups who may be more at risk for victimisation.

One such initiative was for the Ontario Native Education Counselling Association (ONECA[7]) to provide opportunities for Indigenous students to inform the Ministry and school boards in identifying needs regarding bullying prevention. Funding was also allocated to Egale[8], an organisation dedicated to

improving the lives of 2SLGBTQI[9] people in Canada, to develop a digital platform to support 2SLGBTQI students that includes access to counselling services, and support resources on topics such as mental health and anti-bullying. The Canadian Centre for Gender and Sexual Diversity[10] was allocated funds to develop training workshops and a virtual youth summit that was aimed at supporting the mental health of 2SLGBTQI+ students.

Other initiatives that were supported under this programme include providing funding to the White Ribbon[11] organisation to develop a programme targeted at boys in secondary school to counteract issues such as sexual exploitation and violence against women.

Source: Questionnaire (2022)

Mitigating mis/disinformation and datafication are also pressing concerns

False and misleading information (mis and disinformation)

The 2022 iteration of the Questionnaire included an item on exposure to mis and disinformation, asking respondents if this was a challenge or pressing policy challenge in the education policy context. This was the second most highly reported challenge in responding education systems. Misinformation refers to false or misleading information, not intended to deliberately deceive, manipulate or inflict harm and the spreader does not create the initial content (Lesher, Pawelec and Desai, 2022[56]), while disinformation means the content is intentionally false or misleading and spread with the intention of deceiving or causing harm (European Commission, 2020[57]) (for an overview, refer to (Hill, 2022[58])).

While this is an issue of growing concern among policy makers around the world, there is still a lack of large-scale data that shows the extent to which children engage with false and misleading information in the digital environment. Some research identifies that children report being exposed to this type of content on a weekly or sometimes daily basis, and that sometimes they engage with it by sharing or liking content posted by others (Hill, 2022[58]). The potential for false and misleading information to spread rapidly and widely is a concern, as is the fact that this content can have a certain shock value or novelty factor for the reader thereby increasing the likelihood that it is consumed and spread further.

Respondents to the Questionnaire (2022) identified the ways in which children's exposure to mis and disinformation has manifested as a pressing policy concern. In Estonia, there are concerns about radicalisation and polarisation, and a recognised need for critical thinking skills and abilities to recognise fake information. In Iceland, the Icelandic Media Commission has been at the forefront of raising awareness of mis and disinformation and how individuals can reach to phenomena such as fake news and information chaos. The Commission administered a survey in which respondents aged 15-17 were identified as the least likely to be critical of information they encountered on the Internet. In response, the Commission initiated a media literacy programme in co-operation with education stakeholders. Similarly in Sweden, a main finding of the National Agency for Education is that students need more support in developing a critical perspective to online messaging and information. In the Flemish Community of Belgium, a recent curriculum reform placed media literacy as one of the core three elements of the Digital Education Key Competence framework. There are various programmes in place to support schools, teachers and pupils regarding information processing and how to evaluate news sources (see Chapter 4 for related programmes and information on media education).

Datafication of children

While less reported among respondent systems, datafication of children is also a rising concern in policy and research spheres. Trends in children's digital activities suggest they are spending more time engaging

in digital activities and from younger ages (Burns and Gottschalk, 2019[6]; Burns and Gottschalk, 2020[59]). When children spend time in the digital environment, commercial providers of digital technologies can generate, collect and process large amounts of personal data which can result in children being increasingly 'datafied' (Lupton and Williamson, 2017[60]). Based on children's digital practices, and those of their parents, they may be exposed to data practices from early ages, even from before the time they are born (Barassi, 2020[61]; Siibak, 2019[62]; OECD, 2022[48]).

Data can be used to support children's well-being and education outcomes, for example by providing information that can assist in personalising learning experiences or offering interventions that can enhance educational opportunities for children (Siemens and Gašević, 2012[63]; Shute and Rahimi, 2017[64]). Big data can also be used to improve the provision of services such as healthcare, through identifying the services certain children may need or by tracking communicable disease spread and provision of vaccination coverage (OECD, 2019[65]; Okomo, 2022[66]). Despite the potential uses of data for good, there are risks, in particular with the collection of sensitive or private data. These concerns about privacy are related to how this can affect their rights and potentially perpetuate existing inequalities (Livingstone, Stoilova and Nandagiri, 2018[67]; Barassi, 2020[61]), and there are issues around transparency regarding how, where and by who children's data might be used (Milkaite and Lievens, 2020[68]). Children's data can be collected and processed through various tools and means, and can be used by advertisers, content developers or other third parties for purposes such as commercial profiling and/or automated decision making that is beyond the child's capacity to control (Selwyn and Pangrazio, 2018[69]). Safeguarding children's digital privacy and protecting their personal data is crucial for the well-being and autonomy of children, and for meeting their needs in digital spaces (OECD, 2021[70]).

According to the Questionnaire (2022), some countries are increasingly concerned with datafication of children. For example: in Israel, there are concerns that children may inadvertently share information about themselves or others that could endanger them. In Estonia, one concern is the lack of awareness of parents and children about the consequences of datafication and how this can affect things such as a child's future relationships or working life. To combat these concerns, the Israeli Ministry of Education has issued a website[12] with guidance for teachers on how to safeguard students' sensitive information and digital privacy. Information is provided about securing accounts through two-step authentication processes, using caution when downloading applications on students' personal devices, and guidance for how to identify and react when facing a potential security or privacy breach. Teachers are advised to handle and report privacy and security incidents as quickly as possible. In Estonia, there is an emphasis on raising awareness of data security and datafication issues, and there is a government initiative to develop a personal data protection framework that empowers digital users to be in control of their data.

Who might be more susceptible to risk of harm in the digital environment?

Different factors affect children's digital risk exposure and can also mediate potential harm. Offline vulnerability correlates with vulnerability in digital environments. Vulnerable or disadvantaged children are more likely to face digital risks, to experience harm and tend to be less able or likely to find support (Stoilova, Livingstone and Khazbak, 2021[71]). Older teenagers, those who identify as LGBTQI+[13], and children from lower socio-economic backgrounds are more likely to engage in risky behaviours such as sexting, which has been associated with outcomes such as sexual extortion[14]. Girls are more susceptible to experiencing risks such as cyber-dating violence and online sexual solicitation (Stoilova, Livingstone and Khazbak, 2021[71]). Children with special education needs are more likely to experience contact risks (El Asam and Katz, 2018[72]), and they report higher levels of cyber-victimisation (Didden et al., 2009[73]).

Behaviours in the digital environment and offline can influence risk of harm. For example, traditional bullying victimisation is highly correlated with cyberbullying victimisation, and the same pattern is found for perpetration (Gottschalk, 2022[54]). In the digital environment, children who have seen one type of harmful content are more likely to have also seen others (Stoilova, Rahali and Livingstone, 2023[55]). This can

include content such as hate messages, gory or violent images and content suggesting ways in which to be thin or lose weight, among others (Smahel et al., 2020[74]) Understanding the factors that can compound risks in both digital and physical environments are important when establishing efforts for harm mitigation.

PISA 2018 results suggest that socio-economically advantaged students in all participating countries and economies were more adept at assessing credibility of sources than their disadvantaged peers (Suarez-Alvarez, 2021[75]). Systems with a higher proportion of students who were taught whether information was subjective or biased were more likely to be able to detect fact from opinion in the PISA reading assessment, even when accounting for factors such as country GDP per capita and reading performance, underscoring the power of learning opportunities in this domain (Suarez-Alvarez, 2021[75]). Children from disadvantaged backgrounds may also be more exposed to privacy risks and surveillance (Gangadharan, 2017[76]), and less able to leverage the benefits of newly emerging technologies such as artificial intelligence systems (Lutz, 2019[77]). Data driven systems and advanced technologies may also perpetuate structural biases, favouring individuals from more advantaged backgrounds (Selwyn and Jandrić, 2020[78]). If the data used to train digital systems does not reflect the diverse backgrounds and characteristics of children, built-in biases can further disadvantage already disadvantaged children. Additionally, an uneven knowledge of algorithms can exclude those with low algorithmic awareness from the various opportunities, thereby deepening existing social inequalities (Shin, Rasul and Fotiadis, 2021[79]).

The research on digital risk is much more developed than the research on protective factors, however there is some evidence outlining what can protect children from harm. For example, those who lack social support systems are more likely to face digital risks and are less likely to have people they can turn to for help (Stoilova, Livingstone and Khazbak, 2021[71]). Children who are aware of digital risks are also more likely to employ safety strategies.

Moving towards a harm-averse (not necessarily risk-averse) future

Moving forward, it is essential for policy makers and the research community to coordinate efforts on appropriately defining and measuring digital risks. Inconsistent definitions create challenges in identifying which risks should be targeted by policies and practices, and in measuring their prevalence. Further research is also necessary about which groups of children are more likely to encounter which digital risks, and who is more vulnerable to harm. Targeting policy measures to at-risk groups, or to students who may lack support in the digital environment (e.g. children lacking in digital skills, parents or teachers with low levels of digital literacy, children who face overly restrictive mediation techniques and cannot speak openly with adults about risks they encounter etc.) could benefit the most disadvantaged.

While the focus in this report is child empowerment, providing children with digital learning opportunities and improving their digital skills is only one part of the policy puzzle in ensuring a safe and equitable digital future for all children. Embedding digital safety into the curriculum can be empowering, as is embedding learning about digital safety in professional development opportunities for teachers. However, placing the safety burden on children in a digital world that has been built by adults, often with limited interests in mind, needs to be avoided. Government regulation is key in promoting a safe digital future by ensuring that strong data protection laws are appropriately implemented and adhered to, that mechanisms for reporting and acting upon serious risk exposure such as cyberbullying are accessible for all children (and their teachers and parents), and that digital platforms are accountable for the propagation of false and misleading content. These are just a few examples of ways in which regulation and oversight can support a safer digital space for children to explore.

Finally, eliminating digital risk is likely impossible and impractical. Exposure to risk can help children build resilience (Burns and Gottschalk, 2019[6]), and they can develop necessary skills such as critical thinking and discerning fact from opinion. Limiting children's exposure to the digital environment can limit their exposure to risks, but it also limits their abilities to profit from the various opportunities and to exercise some of their human rights such as their rights to information and to play.

Digital inequalities – Reflection tool

Despite a narrowing gap in terms of access to digital tools and the Internet, inequalities remain pervasive across OECD systems.

While the trend data on access is quite promising, showing an overall reduction in inequalities, the COVID-19 pandemic was an urgent reminder of the fact that there is still much progress to be made and a significant proportion of children still lack adequate access.

Barriers to adequate connectivity have largely remained unchanged in recent years. Individuals who live in remote areas and from lower socio-economic backgrounds are less likely to have adequate digital access, which reinforces both digital and social exclusion.

Disparities in digital skills are stark and some students risk being left behind.

The literature in this domain is clear: digital skills are a key pillar of children's participation in modern life, including digital education, and can support their social inclusion and realising their rights.

Socio-economic status is associated with the types of digital activities children participate in, with advantaged children tending to use digital tools for educational and school-related purposes more than their disadvantaged peers.

If the data used to train digital systems does not reflect the diverse backgrounds and characteristics of children in increasingly diverse societies, built-in biases can further disadvantage already disadvantaged children.

A multistakeholder approach must be used to promote digital inclusion and equality for all, especially the most disadvantaged.

Industry actors in particular can be key players in supporting the digital transformation in schools and in building equitable, high-quality digital capacity for all children.

When involving children in making decisions on policy issues, special attention should be paid to ensuring there are adequate opportunities for children from socially disadvantaged or underrepresented backgrounds to participate, while also accounting for how different needs or abilities can affect their participation.

Capacity-building for adults who are expected to provide support and guidance to children is required.

Parents supporting their children in developing digital skills from a young age may help to mediate the potential impacts of early Internet use on later outcomes, while also providing benefits. It is important to consider that parents from disadvantaged backgrounds are likely to have lower levels of digital skills, which runs the risk of perpetuating cycles of digital disadvantage.

Supporting teachers to gain a critical understanding of how digital tools can be effectively incorporated into the teaching and learning process is key. Providing learning opportunities for both teachers and parents to improve their digital skills will allow the trusted adults in children's lives to better assist them appropriately, safely and effectively in navigating the digital environment.

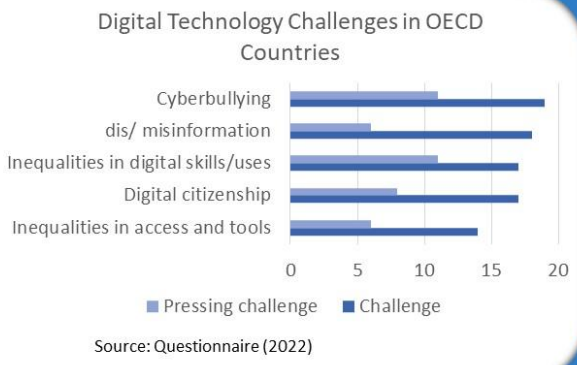
Embedding digital safety into the curriculum can be empowering.

Placing too much responsibility on children for their safety in a digital world that has been built by adults needs to be avoided. Limiting children's exposure to the digital environment can limit their exposure to risks on the one hand, but on the other it limits their abilities to profit from the various opportunities and to exercise some of their human rights such as their rights to information and to play. Supporting children in navigating risks and building resilience is key.

Reflecting on Digital Inequalities

DATA & TRENDS

Inequalities in digital skills and uses and inequalities in access are often listed as pressing policy challenges by OECD countries, alongside various digital risks.



Source: Questionnaire (2022)

EMPOWERMENT

Opportunities

Mitigating digital inequalities means that children can benefit from digital learning opportunities including informal learning.

Children show willingness and enthusiasm in participating in making decisions about their digital learning and digital engagement more broadly.

Challenges

Funding challenges with regards to the purchase, maintenance and upgrading of devices in schools.

Teachers require support in effectively implementing digital tools into the teaching and learning process, including adequate professional learning opportunities.

What can governments do?

- ❑ Minimising inequalities in the rate of digital uptake and access, especially within more disadvantaged populations within societies, should be embedded horizontally in policy goals with dedicated and targeted resources.
- ❑ Ensuring all children have suitable access to digital tools and the Internet can help level the playing field when it comes to digital education and digital outcomes more generally.
- ❑ Harmonising definitions and methodologies in measuring certain digital skills or digital skill dimensions can make evaluating outcomes of digital skills programmes more practical and support evidence-based policy making.
- ❑ Decision-makers can support digital empowerment of children by providing learning opportunities to bolster their digital skills. Children should also be involved as key stakeholders in developing, designing and implementing digital strategies and curricular approaches to support their digital learning.
- ❑ Building the capacity of adults who can provide support and guidance to children is an important measure that needs to be adopted in digital skills strategies.
- ❑ Embedding digital safety into the curriculum can be empowering, as is embedding learning about digital safety in teacher education and professional learning opportunities.

Why not have an arts-informed evidence discussion with stakeholders?

Marvin is a 17-year-old student president for the national students' union of a medium-sized OECD country. He sits on an official advisory committee to the Ministry of Education. Mounting concern over digital inequalities has led the Ministry to announce the creation of a new Digital Competency Framework that aims to foster digital skills in all students.

Concerned about the lack of diversity on the committee, Marvin has been researching innovative methods to engage communities about policy issues in an evidence-informed way and capture varied perspectives to advance digital equity in schools. Arts-informed approaches have been shown to be particularly promising for discussing equity issues (Cooper et al., 2023[80]) and reaching underserved communities (Siregar et al., n.d.[81]). Marvin suggests to the committee that such an approach should form part of the framework development process. The Ministry agrees, and the committee provides resources to organise such a consultation. Dr. Tanaka, a respected university researcher in educational equity, offers to help shape the agenda and provide a plain language 2-page evidence synthesis, which is circulated to participants two weeks before.

When the day arrives, 60 people from community organisations, students (of different grades and backgrounds), teachers and policy makers are in attendance. The agenda is highly engaging:

Introduction and setting the stage (15 minutes)

Marvin opens the meeting and welcomes participants. Dr. Tanaka then guides the audience through a presentation on key findings from recent studies and presents what they might mean for education policy and practice. Crucially, each piece of evidence is broken down into a one sentence simple language summary, called an evidence statement.

Interactive Artistic Activity (30 minutes)

With colored pencils and blank canvases in hand, participants immerse themselves in a creative expression exercise, led by local artists. Marvin watches with pride as students, teachers and community members channel their thoughts and emotions into vibrant artworks that capture the essence of educational equity.

Sharing and Dialogue (1 hour)

Marvin, Dr. Tanaka and the local artists then facilitate a lively discussion, inviting participants to share their artistic creations and reflect on the connections with the one-sentence evidence statements. Stories unfold, perspectives collide, and bonds strengthen as everyone contributes their unique insights to the dialogue. The facilitators bring together the different themes within the artistic works and how lived experiences of community members connect with the evidence statements on equity.

Collective story-building (1 hour)

After lunch, participants split into groups of 5-10 people. Each group works with a local artist and, using their artistic creations as a basis of discussion, constructs a 3-5-minute-long narrative on the topic of digital equity. This narrative could be a spoken story, a poem, a song, a play or any format that can be recorded with words and shared with an audience. Importantly, the characters in the narrative must benefit from making evidence-informed decisions linked to the evidence statements.

Storytelling, Action Planning and Next Steps (30 minutes)

After a short break, participants, led by the local artists, perform their stories. Afterwards, Marvin and committee members lead a collaborative brainstorming session to try and identify priority areas for action. For example, further refining and performing the stories in underserved community settings.

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Notes

[1] Material access "includes the means required to maintain the use of the Internet over time, such as computer devices (e.g. desktops, tablets, Smart TVs), software (subscriptions), and peripheral equipment (e.g. printers, additional hard drives)" (van Deursen and van Dijk, 2018[8]).

[2] This refers to children who are perceived to be discriminated against at an individual or social level. At an individual level this could entail being treated badly because of factors such as appearance, sexual orientation, opinions etc. At a social level this could be due to factors such as SES, ethnicity, religious beliefs etc. (Mascheroni et al., 2022[34]).

[3] See: https://www.firstlegoleague.org/ (accessed on 06 May 2024).

[4] See: https://education.ec.europa.eu/focus-topics/digital-education/action-plan#:~:text=The%20Digital%20Education%20Action%20Plan%20(2021%2D2027)%20is%20a,States%20to%20the%20digital%20age.(accessed on May 2024).

[5]See: https://gouvernement.cfwb.be/files/Documents/Déclaration%20de%20Politique%20Communautaire%202019-2024.pdf (accessed on 06 May 2024).

[6] See: https://assets.gov.ie/24758/0966ef74d92c4af3b50d64d286ce67d0.pdf (accessed on May 2024).

[7] See: https://oneca.com/ (accessed on 06 May 2024).

[8] See: https://egale.ca/ (accessed on 06 May 2024).

[9] 2SLGBTQI in Canada 2S (referring to Two Spirit) is often included in the LGBTQI+ acronym, and individuals sometimes use this acronym instead of or in addition to identifying as LGBTQI+. According to Egale, 2S "encompasses the many Indigenous traditional identities forcefully suppressed by colonization. The term honours the fluid and diverse nature of gender and attraction and its connection to community and spirituality. An individual may choose to use this term instead of, or in addition to, identifying as LGBTQI" (Egale, n.d.[82]).

[10] See: https://ccgsd-ccdgs.org/ (accessed on 06 May 2024).

[11] See: https://www.whiteribbon.ca/ (accessed on 06 May 2024).

[12] See: https://pop.education.gov.il/sherutey-tiksuv-bachinuch/data-security-e-learning/ (accessed on 06 May 2024).

[13] LGBTQI+ stands for Lesbian, Gay, Bisexual, Transgender, Queer, Intersex and the '+' signifies other sexual identities that are not encompassed by this acronym.

[14] According to the Luxembourg Guidelines, Sexual extortion refers to blackmailing someone (a child or an adult), often with the help of self-generated images of that person, in order to extort them for sexual favours, money or other benefits. It can also involve coercing individuals to continue producing sexual material under the threat of exposure to others of the material that depicts them (Interagency Working Group, 2016[83]).