

7 Promoting equity and inclusion in the digital age through early childhood education and care

This chapter explores differences in risks and opportunities relating to digital technologies among young children. It focuses on the exposure to digital risks and the development of emergent digital literacy skills in home environments before turning to differences in access to and the use of digital technologies in early childhood education and care (ECEC) centres, and particularly to the role of ECEC in mitigating digital divides among young children. Moreover, this chapter discusses ways in which digital technology may support a quality provision of ECEC as well as inclusion, thus strengthening the quality of ECEC for disadvantaged children in particular. The chapter concludes with a review of current funding structures aimed at reducing digital divides and issues policy pointers for promoting equity and inclusion in ECEC.

Key findings

Results from the *ECEC in a Digital World* policy survey (2022) indicate that reducing inequalities in access to digital technologies and in digital literacy among young children are challenges of high importance for many countries and jurisdictions. Early gaps in exposure to digital risks and digital literacy largely develop in the home environment. ECEC can help mitigate these digital divides by employing pedagogies that develop young children's digital literacy. This can be done with little or no exposure to screens and by placing a strong focus on learning how to protect against risks, which is appropriate for young children and addresses the fact that children from low socio-economic backgrounds are more likely to be heavy users of digital technologies at home. Additionally, by sparking young girls' interest in digital technologies, ECEC can contribute to greater female representation in science, technology, engineering and mathematics (STEM) fields in the future.

TALIS Starting Strong 2018 data show that before the COVID-19 pandemic, ECEC staff placed relatively little importance on the development of digital skills among young children and had relatively low confidence in their capacity to use digital technology to support children's learning. There were no systematic differences in these beliefs across ECEC centres relating to their children's populations. However, where differences did exist (e.g. Chile and Israel), ECEC staff in centres with larger shares of vulnerable children more often believed in the importance of developing ICT skills in children and in their capacity to use digital technology to support children's learning.

Careful introduction and purposeful use of digital technologies can improve quality in ECEC by supporting work processes such as continuous workforce development, communication with families and administrative tasks, providing avenues for improvement for disadvantaged ECEC settings.

TALIS Starting Strong 2018 data show large differences in perceived shortages in or inadequacy of digital technologies among ECEC centres for most participating countries, though these were largely not linked to the centres' shares of vulnerable children or location (urban or rural). In some countries, public ECEC centres had less access to adequate broadband connection and digital devices.

According to TALIS Starting Strong 2018 data, online learning for workforce development was not widespread. Where differences existed (e.g. Chile, Israel and Korea), ECEC staff in centres with larger shares of vulnerable children were more likely to engage in online learning.

Digital technologies can be used to make ECEC more inclusive, for instance by allowing young children with special education needs or with a different first language to participate more fully in ECEC.

Results from the *ECEC in a Digital World* policy survey (2022) indicate that public funding for ECEC centres is available more widely to provide access to a digital infrastructure than to use digital tools in the classroom. ECEC centres often have a choice in their digital equipment, though the extent of this varies across countries and jurisdictions.

Additional digital resources to promote equity and inclusion most often involve support for digital technologies for children with special education needs. General funds for vulnerable children may also be spent on digital technologies. In some countries and jurisdictions, ECEC centres in rural areas receive additional support for their digital infrastructure and materials. A few countries and jurisdictions also offer special programmes for children from minority communities.

Introduction

For many children, digital divides are already emergent in early childhood, driven by differences in the level of digital resources and skills in their family environments. ECEC can play a role in redressing these inequalities, provided that resources are allocated to those that need them the most and that policies ensure strong opportunities for building early digital literacy for all children. However, in the absence of digitalisation policies with an equity and inclusion focus, experiences in ECEC may also exacerbate digital divides as well as differences in quality across ECEC settings if centres with more vulnerable children develop digital literacy in children less than centres with more advantaged children or if ECEC settings with higher structural and process quality are able to exploit the opportunities of digital technologies better to further improve quality than centres with lower structural and process quality.

This chapter looks at ways to ensure equal opportunities for young children to learn and develop, irrespective of their background, in an increasingly digitalised environment. First, it introduces the concept of digital divides and takes stock of what is currently known in terms of unequal access to and use of digital technology among young children, focusing in particular on the outcomes of children from families with low socio-economic status, children with special education needs and children whose first language is different than the language of instruction in their ECEC centre. The analysis focuses on children's digital skills development and their exposure to digital risks in home environments and in ECEC settings. Information on ECEC settings is taken from the OECD survey TALIS Starting Strong 2018. The chapter further explores strategies to make digitalisation a driver of ECEC quality and of inclusion, and an equalising force for existing inequities among young children in ECEC settings. Last, the chapter examines current funding structures and the different ways in which countries and jurisdictions try to mitigate digital divides among young children in ECEC before concluding with policy pointers to promote equity and inclusion in early childhood with regard to digitalisation.

Unequal opportunities and risks of digitalisation for young children and early childhood education and care

Unequal opportunities and risks derived from digital technologies are conceptualised as digital divides. Digital divides refer to the gaps between individuals, households, businesses and geographic areas at different socio-economic levels with regard to both the opportunities to access ICT and the Internet, and to the use of these for a wide variety of activities (OECD, 2001^[1]).

The literature distinguishes between three main types of digital divides. The first digital divide refers to the inequalities in access to digital technologies. Today, this first digital divide is closing, with most children in OECD countries having access to high-quality Internet and digital devices like smartphones or tablets. On the other hand, there are important differences across ECEC centres in the access to high-quality Internet, digital devices and software, and many centres are currently developing their digital infrastructure. For example, in some centres, all teachers may have their own tablets to support their administrative tasks, teaching and professional development, whereas in others, computers may be available at a fixed location and shared among staff. Closing the first digital divide is a priority for policy makers: 64% of countries and jurisdictions participating in the *ECEC in a Digital World* policy survey (2022) consider reducing inequalities in access to digital technologies among young children as a policy challenge of “high” or “very high” importance. For Germany, Canada (Manitoba, kindergarten sector only) and Sweden, this is of “very high” importance (Figure 7.1).

Once access to digital technologies became more universal, the digital divide evolved to a different use of digital technologies, referred to as the second digital divide. There is strong variation in children's usage patterns of digital technologies across demographics such as socio-economic background. Certain groups of young children acquire greater digital literacy skills than others, setting them up to enjoy more of the

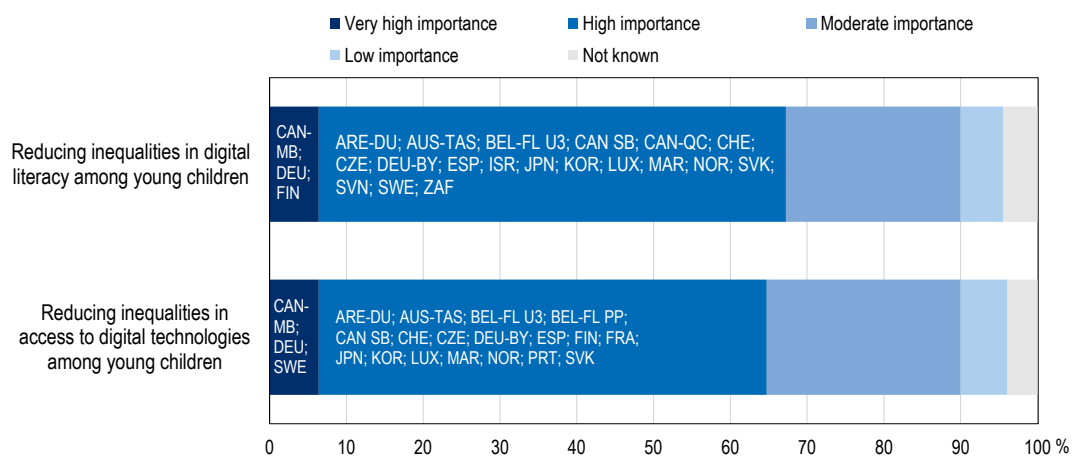
opportunities digital technologies provide throughout their lives (see Chapter 1). The second digital divide also comprises differences in exposure to digital risks across young children. Some young children develop greater digital risk awareness and portray more risk-prevention behaviours than others.

Similarly, a second digital divide exists within the ECEC sector. Centres vary in their use of digital technologies, depending on their digital resources, staff profiles and workloads, and the role of digitalisation in the ECEC centre's philosophy. This can have important implications for structural and process quality in three main areas. First, some centres leverage digital technologies to improve work processes outside the classroom, such as for administrative tasks, monitoring, taking advantage of digital workforce development, and strengthening communication with families and other services. Second, certain centres are better at mitigating differences in young children's emergent digital literacy, including by raising girls' interest in technology. Third, some ECEC centres introduce digital pedagogies as a support for other areas of learning and development, especially for children with special needs or a different first language, who tend to be marginalised in more traditional forms of learning.

Policy makers across the OECD recognise the importance of mitigating the second digital divide: 67% of countries and jurisdictions participating in the *ECEC in a Digital World* policy survey (2022) consider reducing inequalities in digital literacy among young children of “high” or “very high” importance. Canada (Manitoba, kindergarten sector only), Finland and Germany indicated this to be of “very high” importance (Figure 7.1).

Figure 7.1. Policy challenges related to digital divides

Percentage of countries and jurisdictions identifying the following policy challenges, 2022



Notes: Responses are weighted so that the overall weight of reported responses for each country equals one. See Annex A.

The response category “very high importance” was limited to three out of ten response items maximum.

Belgium (Flanders PP): pre-primary education in Belgium (Flanders). Belgium (Flanders U3): ECEC for children under age 3 in Belgium (Flanders). Canada SB: school-based sector in Canada. Canada (Manitoba): kindergarten sector only in Canada (Manitoba).

Items are sorted in descending order by the share of countries selecting response categories “very high importance” or “high importance”.

Source: OECD (2022^[2]), *ECEC in a Digital World* policy survey, Table B.1.

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The concept of a third digital divide is emerging in the literature, and relates to differences in offline returns to using digital technologies across individuals despite similar access and usage patterns (van Deursen and Helsper, 2015^[3]; Ragnedda, 2016^[4]). The idea is that digital technologies make it easier to connect and thus allow better leveraging social capital. The third digital divide is less relevant in the context of

young children directly, but could lead existing socio-economic gaps across families and ECEC centres to widen further in the future.

Digital divides in home environments

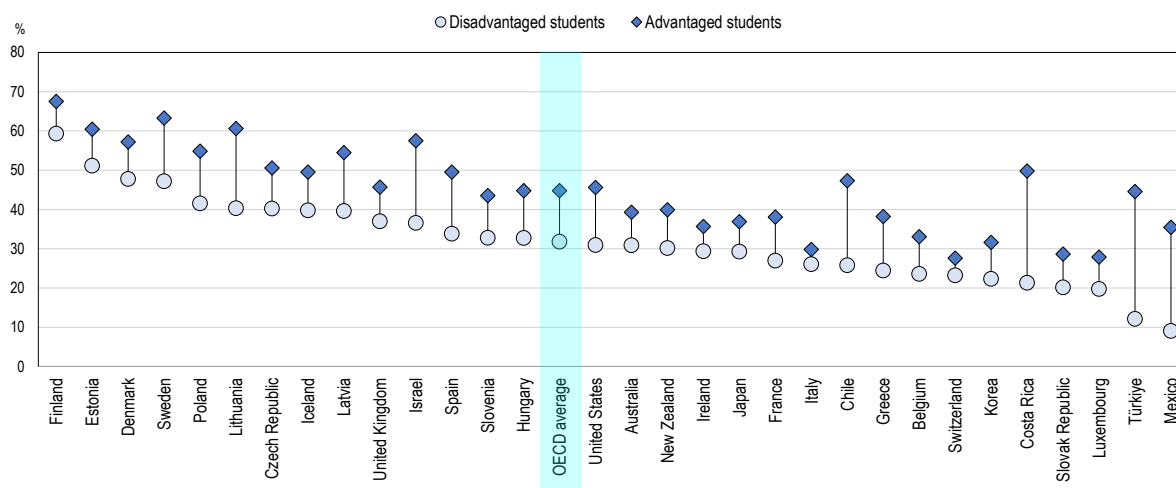
Young children acquire their digital literacy mainly at home (Chaudron, Di Gioia and Gemo, 2018^[5]) and thus depend heavily on their families' access to and use of digital technologies, parenting styles, and on their other activities; this can create important inequalities.

Access to and frequency of use of digital technologies

Access to digital technologies has developed dramatically in recent years and is now almost universal for children in many parts of the world, but important differences exist between more and less advantaged children. As up-to-date internationally comparable data for young children are rare, Figure 7.2 shows differences in first access to digital media as reported in a 2018 survey of 15-year-olds. On average across the OECD, socio-economically disadvantaged students were 13 percentage points less likely to have used a digital device before the age of 6 compared to their advantaged peers, with substantial differences across countries. Similarly, 11% of 15-year-old students with low socio-economic status across the OECD did not have Internet access at home in 2018, a share that exceeds 70% in Colombia and Mexico (Clarke and Thévenon, 2022^[6]). A comparable picture emerges with regard to access to a computer or tablet at home (OECD, 2018^[7]). Even when homes do have Internet access and digital devices, disadvantaged students are more likely to face barriers to device ownership. During ECEC centre closures owing to the COVID-19 pandemic, lack of Internet connectivity in children's homes and not enough tablets or computers in children's homes created challenges to maintaining education at the pre-primary level for 23% and 33% of responding countries, respectively (OECD, 2021^[8]).

Figure 7.2. Socio-economic gaps in access to digital technologies during early childhood

Percentage of 15-year-olds who have used a digital device before age 6, by socio-economic background, 2018



Note: A socio-economically disadvantaged (advantaged) student is a student in the bottom (top) quarter of the index of economic, social and cultural status (ESCS) in his or her own country. See Annex A.

Countries are sorted in descending order of the percentage of disadvantaged students.

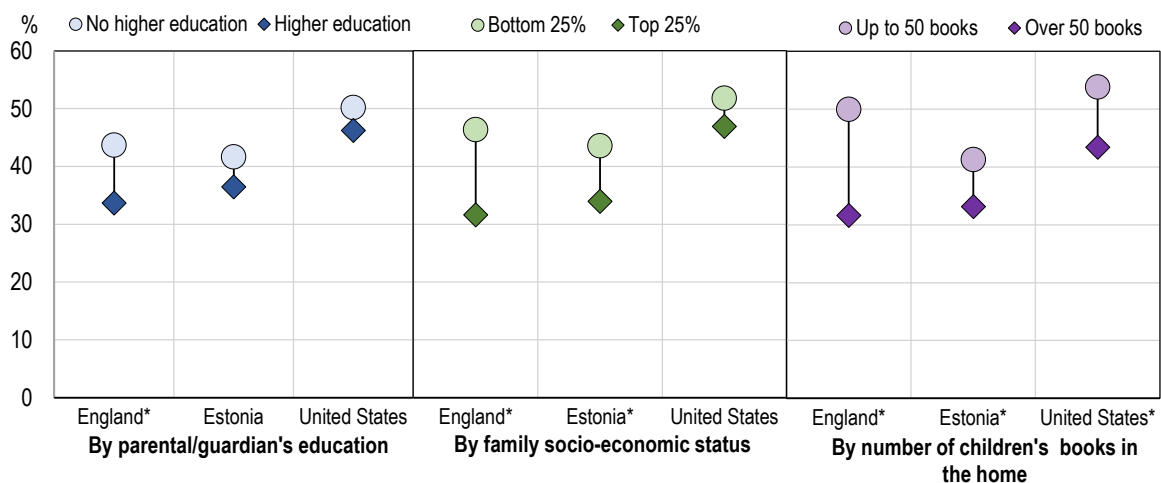
Source: OECD (2018^[9]), *PISA 2018 Database*, <https://www.oecd.org/pisa/data> (accessed on 10 December 2022).

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Moreover, there are differences in the frequency at which children in OECD countries use digital technologies. For example, children with low socio-economic status are more likely to be extreme users of digital technologies. In addition, excessive screen time is associated with reduced quality of sleep, obesity, lower life satisfaction, lower levels of socio-emotional well-being and lower academic performance, albeit causal relationships are difficult to ascertain (Burns and Gottschalk, 2020^[10]). Links between higher media use and lower parental education and lower household income extend to young children (Barr et al., 2020^[11]). The International Early Learning Study provides further evidence of this pattern. While on average in 2018, 39-49% of 5-year-old children in England, Estonia and the United States were heavy users of digital technologies (defined as daily use), this was more common among young children from disadvantaged families (OECD, 2020^[12]) (Figure 7.3). In England, children from families where at least one parent or guardian graduated from higher education (International Standard Classification of Education [ISCED] level 6 or higher) are 10 percentage points less likely to use digital devices every day than 5-year-olds whose parents have lower educational attainment. Family socio-economic status is also linked to heavy use of digital devices in England and Estonia, where children of parents from the top quartile are 15 and 10 percentage points less likely, respectively, to use digital devices every day than children from families who rank in the bottom 25%. Further, in all three countries, there is an association between everyday use of digital tools and the number of books in the home. Children with at least 50 children's books in the home are between 8 and 18 percentage points less likely to use digital devices every day compared to children with fewer books available to them. This may suggest that the use of digital tools is, to some extent, replaced by stimulating offline activities such as reading. On the other hand, factors like gender, special education needs and speaking a foreign first language are not related to differences in the daily use of digital devices (see Annex B, Table B.23).

Figure 7.3. Use of digital devices among five-year-olds

Percentage of parents/guardians reporting that their 5-year-old child uses a desktop or laptop computer, tablet device, or a smartphone every day, by family characteristics, 2018



Note: Parental/guardian's education refers to the highest educational level attained by either parent/guardian. Family socio-economic status is based on the highest occupational status of parents/guardians, highest educational level of parents/guardians, and household income. Statistically significant differences are marked with an asterisk. See Annex A.

Source: OECD (2018^[13]), *International Early Learning and Child Well-being Study*.

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Types of use and digital activities

In addition to access to and the frequency of use of digital technologies, digital activities and experiences vary by socio-economic status. This constitutes the second digital divide among young children, who experience unequal digital skills development and different exposure to digital risks. While international data for young children are scarce, gaps in digital skills between teenagers from high and low socio-economic status have been documented extensively (Hatlevik, Guðmundsdóttir and Loi, 2015^[14]). Such digital skills include the ability to use the Internet to search for and understand information, identify unreliable sources, learn new skills, and create new digital content. For example, disadvantaged children are less likely to use digital devices as a resource for information or to read the news online (Clarke and Thévenon, 2022^[6]). As with the development of other skills, differences in digital skills likely start to develop during the early years.

A large part of the second digital divide among young children can be attributed to differences across education levels and socio-economic backgrounds in parents' approaches to the use of digital technologies in the home. Key reasons for these emerging gaps seem to be a lack of awareness of beneficial and effective parenting methods and lower levels of digital literacy and lower confidence in their own ICT skills among parents in disadvantaged families. Parents with a higher socio-economic status and more education tend to apply more effective methods for developing digital literacy in their children. For example, they more often use active mediation methods, which involve showing interest and keeping up to date with the child's digital technologies usage, co-viewing and discussing programme content to help the child understand and learn from digital media, and giving advice and parental support (Livingstone et al., 2015^[15]; Mascheroni, Ponte and Jorge, 2018^[16]). In addition, the pedagogical use of technology, which helps to develop digital skills and strategies to avoid risks when using digital technologies, is encouraged more by parents with a medium or high socio-economic status, greater levels of digital literacy and confidence in their own digital skills and by parents who worry less about misuse and overuse of digital tools by their children (Gee, Takeuchi and Wartella, 2018^[17]).

In addition to the mediation and guidance of their child's use of digital technologies, parents' own use of digital tools in the presence of children can have important effects on a child's development, and awareness of these effects differs across parents from different socio-economic backgrounds. Parental use of digital technologies can affect children's development of a secure attachment relationship (Kildare and Middlemiss, 2017^[18]). For instance, parental mobile use when they spend time with their young children has been found to result in fewer parent-child interactions among low-income mothers. This provides fewer opportunities for the children to pick up social cues and may affect their non-cognitive development in the long run (OECD, 2019^[19]).

Providing information to disadvantaged families about the risks of excessive use of technology and about effective parenting methods regarding the use of digital technologies is key to addressing the second digital divide among young children. Most parents welcome guidelines and support, and tend to be more supportive of digital learning opportunities and technologies if education centres embed them in their curricula (Chaudron, Di Gioia and Gemo, 2018^[5]). As discussed in Chapter 2, results of the *ECEC in a Digital World* policy survey (2022) indicate that in 2022, 62% of participating countries and jurisdictions already offered guidance or recommendations on educational uses of technology with young children at home, although this information is not necessarily oriented towards vulnerable homes. Public guidance could be developed further, focusing on disadvantaged families in particular. In addition, ECEC settings can play an important role in communicating with families on the use of digital technologies and could target families from low socio-economic backgrounds and with less digital competence and confidence.

Digital divides in early childhood education and care centres

ECEC centres may exploit digital technologies in a range of work processes outside the classroom to support structural and process quality as well as inside the classroom to make children’s learning and development more inclusive. ECEC can further mitigate digital divides among young children that build in the home environment but may also exacerbate digital divides or differences in ECEC quality if centres with high shares of vulnerable children are less able to leverage the opportunities that digitalisation brings. This section analyses digital divides among ECEC centres by looking at their access to digital technologies and their use in the areas of continuous workforce development, communication with parents and other services, and in the classroom, paying particular attention to differences between centres with high and low shares of vulnerable children.

To explore differences among ECEC centres, this section draws predominantly on 2018 data from the OECD Starting Strong Teaching and Learning International Survey (TALIS Starting Strong). While the COVID-19 pandemic has likely altered the state of digitalisation in the ECEC sectors of most OECD countries since then, it is the only international survey of the ECEC workforce that allows exploring these issues to date and patterns of inequalities among centres are likely to persist, albeit to different extents. The data collection took place in pre-primary education settings (ISCED level 02) in Chile, Denmark, Germany, Iceland, Israel, Japan, Korea, Norway and the Republic of Türkiye. Four of the nine countries (Denmark, Germany, Israel and Norway) additionally surveyed ECEC settings for children under age 3. Centres with high shares of vulnerable children are identified as those where more than 10% of children come from families with low socio-economic status, where more than 10% of children have special education needs or where more than 10% of children have a different first language than the local one. These are referred to as diverse centres in the remainder of this chapter. Estimates for sub-groups and estimated differences between sub-groups may be small and need to be interpreted with care.

Availability and adequacy of digital technologies

Connectivity and appropriate equipment are a pre-condition for ECEC centres to benefit from the opportunities brought by digitalisation, but with large heterogeneities between ECEC settings in many countries in terms of resources, size and governance. A lack of broadband access and adequate equipment can be a challenge and contribute to a digital divide among ECEC centres. TALIS Starting Strong indicates uneven levels of digital infrastructure among ECEC settings within countries. Centre leaders were asked whether insufficient Internet access and shortages or inadequacy of digital technology for play and learning (e.g. computers, tablets, smart boards) hinder their ECEC centre’s provision of a quality environment for development, well-being and learning. The share of leaders who responded that the provision of quality ECEC was hindered “quite a bit” or “a lot” by insufficient Internet access or inadequate digital technology ranged from 10% to 40% across countries for both questions. At the pre-primary level, Chile, Germany, Israel and Türkiye report the greatest hindrances across both questions (27% or higher); for ECEC settings under age 3 it is Germany in both instances (32%) (see Annex B, Tables B.24 and B.25). These results are in line with prior literature that documents a lack of ICT equipment and/or broadband access in many ECEC settings across countries. Often cited reasons are insufficient funding to cover the substantial cost of buying and maintaining digital infrastructure, as well as physical classroom constraints for some countries, such as too few electrical sockets that require costly adaptations (Plumb and Kautz, 2015_[20]).

However, the data do not point to statistically significant differences in Internet access or shortages and inadequacy of digital equipment associated with ECEC centres’ composition of children. Centres with more than 10% of children from socio-economically disadvantaged families do not differ significantly in their answers from ECEC centres with fewer shares of children with low socio-economic status. Similarly, centres with more than 10% of children with special education needs do not experience significant differences in Internet access or digital equipment compared to centres with fewer children with special

education needs. ECEC centres where over 10% of children speak a different first language than the language of instruction face similar challenges in accessing broadband and adequate digital equipment as centres with fewer multilingual children, with the exception of Germany. At both education levels, ECEC settings in Germany, with more than 10% of young children who speak a different first language are 17-19 percentage points more likely to experience difficulties with their Internet access. For ECEC settings for children under age 3, this is also true with regard to an adequate provision of digital equipment. These results should be interpreted with care. While there may be no strong variation in digital technology to the extent that it hinders a quality provision of ECEC “quite a bit” or “a lot”, there may still be differences in the digital infrastructure across centres with more or less diverse populations.

General funding levels matter for access to digital technologies and their integration into work practices and processes. This implies that digitalisation may exacerbate existing inequalities in ECEC and centres with fewer resources may lag even further behind. TALIS Starting Strong 2018 suggests that different forms of shortages in digital technologies often coincide: Leaders of ECEC centres with shortages in Internet connectivity are 22-72 percentage points more likely to respond that an inadequate provision of digital devices hinders the delivery of quality ECEC “quite a bit” or “a lot” in Chile, Germany (both education levels), Iceland, Israel (both education levels), Korea, Norway (only ISCED level 02) and Türkiye. Moreover, centres with shortages of human or other material resources report insufficient access to digital technologies much more often. In Chile, Denmark (with low response rates), Israel, Japan, Korea, Norway and Türkiye at the pre-primary level and in Israel in centres for children under age 3, ECEC settings that face shortages in human resources are 12-26 percentage points more likely to experience insufficient Internet access. Similarly, ECEC centres that encounter shortages in human resources report challenges in access to digital devices 12-29 percentage points more often than centres without staff shortages in Chile, Iceland, Israel, Korea and Norway at ISCED level 02 and in Germany and Israel in settings for children under age 3. Centres with shortages in material resources other than digital technologies experience insufficient Internet access 11-30 percentage points more often at ISCED level 02 in Chile, Israel, Korea, Norway and Türkiye, and in ECEC centres for children under age 3 in Denmark (with low response rates) and Germany. ECEC settings that face other material shortages experience an insufficient provision of digital devices 9-42 percentage points more often than centres without material shortages at ISCED level 02 in Chile, Israel, Norway and Türkiye and in ECEC centres for children under age 3 in Germany and Norway.

The strong link with shortages of human and material resources suggests that differences in digital infrastructure across ECEC centres are not due to different choices on the side of centres (with a trade-off between digital and non-digital investments). Instead, digital equipment shortages tend to coincide with shortages of other types of resources, suggesting that more general resource allocation mechanisms are behind the unequal capacity of ECEC centres to integrate digital technology into work processes and activities. Even in systems where earmarked funds for digital infrastructure exist, ECEC centres with human resource shortages may be less able to perform the administrative work required to access these if their current staff are fully occupied focusing on short-term needs or do not have the resources to engage in training for these tasks. Thus, increasing general funding levels for centres with fewer resources could help ensure more equitable access to digital technologies among ECEC centres.

In some countries, TALIS Starting Strong 2018 data indicate publicly managed ECEC settings to be at greater risk of facing barriers in accessing digital technologies. In Chile, Denmark (with low response rates) and Germany, publicly managed centres report insufficient Internet access 16-19 percentage points more often than privately managed centres. In Israel the gap rises to 27 percentage points. When it comes to an inadequate provision of digital devices, leaders of publicly managed centres are 12 percentage points more likely to state that this hinders their delivery of quality ECEC “quite a bit” or “a lot” in Norway in settings for children under age 3. In Israel, the difference amounts to 15 percentage points in settings for children under age 3 and to 21 percentage points at ISCED level 02. In these countries, greater support for publicly

managed settings may reduce gaps in digital infrastructure if these have not already been addressed in response to the COVID-19 pandemic.

The size of ECEC centres could also matter for access to digital infrastructure. Centres with more children may be able to invest in better connectivity and more equipment because of lower average fixed costs and more possibilities to share and use expensive technological devices. However, data from TALIS Starting Strong do not point to a severe first digital divide along centre size: The extent to which Internet access and digital devices hinder a quality provision of ECEC according to leaders does not differ significantly between small centres with up to 50 children and large centres with more than 100.

The location of ECEC centres can sometimes create a first digital divide. Compared to urban areas, rural areas tend to have lower quality Internet access and rural regions often exhibit lower productivity levels and can thus be less prosperous, which in turn could affect centre funding (OECD, 2019_[19]). Results from TALIS Starting Strong do not show strong signs of a first digital divide based on a centre's location. While rural ECEC centres in Chile tend to experience more problems with their Internet than urban ones, the opposite is true in Germany (ISCED level 02) and Korea. Furthermore, shortages or inadequacy of digital devices are perceived to hinder a quality ECEC provision less often in rural centres in Korea than in urban ones, which might reflect differences in pedagogical approaches or in awareness of how to use digital technologies in the work with children.

Overall, there is a digital divide among ECEC centres, which is not related to the composition or number of children but instead strongly associated with the centres' overall funding levels. In certain countries, publicly managed ECEC settings fare worse than their private counterparts in terms of their digital infrastructure. Policies can provide additional support for these settings to ensure all centres are able to seize the opportunities that digitalisation provides for high-quality ECEC, especially since greater inequalities among centres might arise in the future if some centres use digital technologies more extensively to improve structural and process quality. Some countries are already very active in promoting widespread digitalisation of their ECEC sectors. For instance, in 2022, the Czech Republic introduced the national initiative "Innovation in education in the context of digitisation" within its Recovery and Resilience Plan, which is aligned with long-term national and European strategies and spans from pre-primary to upper secondary education (ages 3-18). Its primary aim is to ensure that all ECEC centres and schools have adequate digital equipment to mitigate digital divides and includes training resources for staff to ensure the effective use of digital technologies to this end (see Case Study CZE – Annex C).

Digital technologies to support continuous workforce development

Digital technologies can provide opportunities for distance learning for ECEC staff and centre leaders (see Chapter 4). Such continuous workforce development can benefit children through improvements in staff's practices with children as well as in staff's other areas of work. Participation in online courses or seminars may be particularly attractive for staff who are unable to travel to in-person trainings or for those in regions with lower training offers, for learning about specific or rarer needs of children for which local in-person training may be less frequently available, and for staff from smaller centres that may have fewer own training resources or a smaller peer learning infrastructure.

TALIS Starting Strong 2018 data show that online learning among the ECEC workforce is more common in some countries than in others, and that it did not constitute a large part of workforce development in most countries at the time of the survey (see Annex B, Tables B.26 and B.27). For instance, 81% of staff and leaders in Korea reported having attended courses or seminars online within the previous 12 months. For Denmark (with low response rates), Germany and Japan, the proportion is under 5% for staff and 5-10% for centre leaders. In all countries but Korea, the share of staff or leaders who attended online courses or seminars over the year before the survey was at most 46% of that of in-person courses or seminars.

Participation in online professional development is largely similar across diverse centres and non-diverse centres for both staff and leaders. However, there are a few exceptions and, in these countries, staff in diverse centres are more likely to participate in online training. In Chile, the difference is 7 percentage points in socio-economically diverse centres (over 10% of children from disadvantaged backgrounds) and 8 percentage points in centres where over 10% of children have special education needs. Leaders of socio-economically diverse centres are 17 percentage points more likely to participate in online trainings in Korea. In Israel at ISCED level 02, leaders are 19 percentage points more likely to attend online trainings in centres with more than 10% of children with special education needs and 14 percentage points more in centres where over 10% of children speak a different first language. The slightly higher participation in online training by staff working with more vulnerable children could indicate that this is a promising way to support workforce development in diverse centres. Greater flexibility to participate in workforce development can benefit vulnerable children as staff working in diverse centres tend to attend trainings on working with a variety of children more often (OECD, 2020^[21]).

Digital technologies to support communication with families and other services

Family engagement with centre activities is shown to create a better ECEC experience for children and support current and future child development (Kral et al., 2021^[22]). In addition, regular exchanges with ECEC staff and centre leaders permit parents or guardians to learn about effective pedagogies and gain confidence in their parenting. The knowledge about centre activities allows families to extend the child's learning and development into the home. However, centres with higher proportions of children with socio-economically disadvantaged backgrounds, with special educational needs or who speak a different language at home than the language of instruction report lower levels of parental engagement across OECD countries. Suggested reasons for the lower engagement are work/family circumstances that impose time constraints on the participation in centre activities, language barriers that make communication more challenging and lack of knowledge among staff about the effective engagement of families with different backgrounds than their own.

Digital communication with families has increased substantially in OECD countries during the COVID-19 pandemic as a response to initial centre closures and could provide a meaningful, additional communication channel for centres with high shares of families who face constraints with traditional communication methods (OECD, 2021^[8]). Parents may benefit from an additional, asynchronous communication channel that provides access to information about centre activities irrespective of time and location (see Chapter 6). Reduced communication barriers may serve caretakers of children with special education needs in particular, since these children may require more frequent exchanges between families and ECEC staff. For families with language barriers for communicating with ECEC staff and centre leaders, translation software can be an inexpensive way to overcome this barrier. In addition, staff can access resources online to increase their knowledge of families' backgrounds and cultures, which may help engage these families in the centre's activities.

In addition, digital communication with families could support the learning and development of children by teaching and encouraging families to engage in educational activities such as book reading at home. This is a very cost-effective intervention, with the potential to support children from low socio-economic backgrounds in particular, as their parents tend to engage less in learning activities with their children (Guryan, Hurst and Kearney, 2008^[23]; Kalil, 2014^[24]). A meta-analysis of technology-based interventions has shown positive results of text messages on the time parents spend on educational activities with their young children (Escueta et al., 2020^[25]).

ECEC centres with high shares (over 10%) of children from socio-economically disadvantaged homes, with special needs or whose first language is different from the language(s) used in the centre tend to co-operate with child, family or social services more frequently. Digitalisation can facilitate and strengthen co-operation and communication between the different services, allowing for more holistic support for these

children and their families. Since disadvantaged children benefit more often from these additional supports outside their ECEC centre, they would benefit the most from greater horizontal connectedness.

While digital technologies provide many advantages in certain areas for ECEC centres' communication with families and other services, they cannot replace face-to-face interactions and may not be useful for all children. They should serve a clear purpose and have a large enough advantage over traditional means of communication that makes up for costing additional staff time and resources. Moreover, when introducing digital communication, staff, families and other services will likely need time to adapt and it is important to not overburden staff in the transition and in the long run while ensuring that disadvantaged families benefit from and are not penalised by this form of communication.

Developing digital literacy in all young children

ECEC centres may vary in their capacity to support digital literacy development and to mitigate digital divides that develop in home environments among young children. While ECEC curriculum frameworks increasingly recognise digital literacy as an important developmental area for children starting at an early age (see Chapter 3), the beliefs and practices of ECEC staff are crucial factors for translating these goals into outcomes. Otherwise, the introduction of digital literacy in curricula may be ineffective or even reduce process quality for certain children if not implemented well. If ECEC staff have different views on the need to develop digital literacy depending on children's characteristics, or if ECEC staff who are more aware of the benefits of digital literacy or better able to teach digital literacy are allocated to advantaged ECEC centres, differences in opportunities to develop digital literacy that build up in the home environment can continue in education systems. This section looks at staff's personal beliefs about developing digital literacy in young children and at their confidence in their own abilities to use digital technologies in their practices to support digital literacy development or other levels of development.

TALIS Starting Strong 2018 gives some insights into ECEC staff's beliefs about the importance of developing digital literacy. Specifically, it asks staff to what extent they consider it important for their ECEC centre to develop ICT skills in children to prepare them for life in the future. The share of ECEC staff who responded it was of "high" importance (as opposed to "low" or "moderate" importance) varies substantially across countries, from 5% in Japan to 60% in Israel. However, within countries, ECEC staff in disadvantaged centres consider the development of digital literacy in children no less important than their colleagues in less diverse centres. On the contrary, in some instances, the opposite is true: In Chile and Israel, staff in ECEC centres with more than 10% of children from families with low socio-economic status answered more often that developing ICT skills in children was of "high" importance for their ECEC centres (a 10 and 9 percentage point difference, respectively). Similarly, in Israel and Iceland, staff in centres with more than 10% of children with special education needs gave children's digital literacy development greater importance (a 10 and 8 percentage point difference, respectively) (see Annex B, Table B.28).

High-level support can encourage staff to develop early digital literacy among children (Blackwell, Lauricella and Wartella, 2014^[26]; Becta, 2004^[27]). Centre leaders' views on the importance of digital skills development in young children are likely to affect the support they provide to their staff for this. TALIS Starting Strong shows that in five out of nine countries, ECEC staff are more likely to believe that it is important for their ECEC centre to develop children's ICT skills when the ECEC centre leader believes it is important (see Annex B, Table B.28). Overall, leaders of diverse centres did not have significantly different views than leaders from other centres (with the exception of Chile and Germany), and the results from leaders are broadly similar to those from staff (reported on above) (see Annex B, Table B.29).

It should be noted that there are many ways to develop young children's digital literacy, including some that do not require children to be directly exposed to screens (see Chapter 3). So-called "unplugged approaches" may be particularly suited for more diverse classrooms with high shares of disadvantaged young children. Limiting their screen time in ECEC settings is of greater concern for these children as they tend to spend more time on digital devices at home. Unplugged approaches may also be preferred by

teachers with strong cultural or personal beliefs and value systems who are opposed to the use of digital technologies with children (Parette, Quesenberry and Blum, 2009^[28]). Equally, ECEC centres may prefer unplugged approaches if they are a better fit for their overall philosophy and values.

However, unplugged approaches are not broadly used in ECEC (see Chapter 3), and curriculum frameworks generally mention digital technologies as the most direct way to support literacy development. Furthermore, digital technologies can be used more broadly in practices with children, for instance to support literacy or numeracy development. Employing digital teaching methods for these various goals successfully depends on the teachers attitudes towards using digital technologies and their confidence in their own abilities (Gong, Xu and Yu, 2004^[29]; Teo, 2010^[30]; Zhao and Cziko, 2001^[31]). TALIS Starting Strong 2018 asks staff about their perceived ability to use technology to support children’s learning in their work. Again, staff responses vary widely across countries: the share of ECEC staff reporting that they can use digital technology “quite a bit” or “a lot” to support children’s learning ranges from 2% in Japan to 73% in Türkiye (see Annex B, Table B.30). It is important to note that while this indicator gives interesting insights into the need for staff support, it cannot be interpreted as a direct measure of staff preparedness; for instance, the answers can vary if staff have different expectations about how much digital technology should be used or if their work environment imposes restrictions on their use of technology with children. Looking at differences within countries, staff working in diverse centres do not judge their own ability to use digital technologies to support children’s learning lower than staff from other centres. On the contrary, staff in centres with more than 10% of children from low socio-economic background are 10 percentage points more likely to be confident in their own abilities in Israel (ISCED level 02), and staff in centres with more than 10% of children with special education needs in Chile report more often (+9 percentage points) that they feel confident in their own ability to use digital technologies in the classroom.

Overall, TALIS Starting Strong 2018 data suggest that before the pandemic, there were large differences among staff, ECEC centres and countries in factors that can influence the development of digital literacy and the use of digital technologies with children in ECEC. While these factors were not less favourable in centres with high shares of vulnerable children compared to centres with low shares of vulnerable children, leaders and staff that place a high importance on developing ICT skills in ECEC tended to accumulate in centres. This suggests that some centres experienced better preconditions to mitigate digital divides than others. Since then, the COVID-19 pandemic may have increased staff’s beliefs in their own ability to use digital technologies and support children’s learning and may also have altered staff and leaders’ views on the importance of their ECEC centre to develop digital literacy in young children. Countries also invest in support for ECEC staff to adapt pedagogies that develop digital literacy in children to provide equal opportunities across the sector. Box 7.1 highlights some examples.

Box 7.1. Supporting the widespread adaptation of high-quality digital literacy development

In 2012, **Estonia** introduced the ProgeTiger programme to promote the development of digital literacy in preschool, primary and vocational education. The aim is to spark children’s interest in the fields of engineering sciences, design and technology and engineering sciences and to develop their algorithmic thinking, problem-solving skills and programming skills. At the preschool level, the programme seeks to develop basic knowledge of coding, digital media and digital safety in young children through age-appropriate activities and play. To implement these objectives, ProgeTiger finances the purchase of digital devices for teachers and supports the development of teachers’ competencies to employ digital technologies in the classroom through trainings and the creation of publicly available digital learning materials, methodological guidelines and teaching examples. In addition, it facilitates peer exchange among practitioners.

The programme was part of the Estonian Lifelong Learning Strategy 2020 and is further integrated into the Estonia Education Strategy 2021-35 under the target relating to digital pedagogy. Nearly all (99%) Estonian kindergartens have already participated in the programme (see Case Study EST – Annex C).

In **Norway**, the Directorate for Education and Training finances a scheme where developers can receive financial support to develop specifically adapted pedagogical materials for ECEC, which are connected to subject areas from the Framework Plan for Kindergartens. These materials aim to support the widespread development of digital literacy in young children.

Source: OECD (2022^[2]); see Case Study EST – Annex C.

Digital technologies as a pedagogical tool for more inclusive early childhood education

There is a wide range of opportunities to employ digital technologies to personalise learning and, therefore, employ more inclusive pedagogical practices. These pedagogies are characterised by a greater adaptation of teaching to the individual context, needs and interests of children to support their learning, development and well-being. Inclusive digital pedagogies can prevent separate classrooms for vulnerable children, which poses risks to equity and quality in ECEC (OECD, 2018^[32]). Digital technologies further allow better acknowledging children's identities, beliefs and realities, which contributes to forming stronger ties with their families and communities by making them feel welcome and understood (Rowe and Miller, 2016^[33]). Disadvantaged children can therefore benefit substantially from inclusive learning methods with digital technology (Bers, Strawhacker and Sullivan, 2022^[34]). However, disadvantaged children may also experience the greatest learning losses if digital pedagogies are not implemented well and thus become less effective than traditional methods.

There are three groups of children for which inclusive digital pedagogies may be especially promising: girls, to develop their digital literacy during early childhood and beyond, and students with special needs or with a different first language than the language(s) spoken at the ECEC centre to allow them to participate in ECEC more fully and as a support for their overall learning and development. The opportunities that technology bears for these three groups are outlined below.

Sparkling greater interest in technology among girls

Currently, digital literacy levels and representation in ICT domains are unevenly distributed in the population. In most countries, there is a strong gender imbalance. For example, women's median share of employment in the ICT sector is less than one-third across 116 countries (ILO, 2019^[35]). This pattern is also observable in higher education, where 17% of ICT students are women across the EU (Eurostat, 2019^[36]). The gender divide in the use of digital technologies and interest in ICT starts at a young age and increases as children transition into adulthood, pre-empting many girls and women from taking advantage of the opportunities technology provides. By developing digital literacy and exposing children to science and technology in a manner that nurtures their interest, ECEC has the potential to reduce the divide, with substantial benefits to children's trajectories in later years.

Inclusive pedagogies are vital to help girls identify with ICT subjects and jobs. The root cause for the lower engagement of girls and women in ICT is commonly cited as a lack of identification with the subject, stemming from gender-based stereotyped beliefs with regard to interests and careers in ICT, and (lack of) confidence in their own abilities. Research shows that experiences with technology during early childhood can reduce gender-based stereotypes, influence girls' attitudes towards digital technologies in adolescence and ensure greater success in these fields later in life (Sullivan and Bers, 2018^[37]).

Engaging pedagogies typically draw on examples and resources that reflect children's interests and identities, which already differ across gender in early childhood (Stephen and Plowman, 2014^[38]). At age 5, young children have internalised gendered roles, which reflects in their choice of play and their career aspirations (OECD, 2018^[13]). To spark girls' interest in technology, it is thus important to frame teaching in the context of their interests, explore questions that matter to them and connect to their everyday life (Lehrer and Schauble, 2015^[39]; UNICEF, 2022^[40]; Metz, 2011^[41]). Focusing on social issues or highlighting the possibilities to be creative and make a positive impact with technology also tend to strengthen girls' identification with ICT, as it draws on the gendered stereotype that depicts women more often as "helpers" (Carlone, Scott and Lowder, 2014^[42]). Further, exposure to role models sparks girls' interest in technology and technology-related jobs, leading to greater uptake of these fields. Finally, pedagogies that rely on a growth mindset, i.e. that reward the process and effort of learning, are very conducive to keeping girls interested in technology because they help overcome self-doubt or a lack of confidence in the children's own abilities (Microsoft, 2018^[43]). While this latter effect is mostly documented for teenage girls and women in the literature and research on younger girls is still scarce, equipping children with a growth mindset may at least set important foundations for girls' interest in ICT in later years.

Digital technologies for children with special education needs

Digital technologies can aid the integration of children with special education needs into ECEC settings. Applications cover a range of areas, such as improving young children's learning, behaviour, attention or communication. By enhancing the functional capabilities of children with disabilities, assistive technologies allow children to participate more fully in ECEC.

Digital technologies may provide an additional mode of teaching and expression, which can benefit children with visual, speech or hearing impairments as well as those who struggle to develop literacy skills traditionally identified in curricula. For example, augmenting traditional reading activities with short films may help some children better understand certain story elements. Equally, digital elements like photos or voice recordings provide children with new ways of self-expression that do not require traditional emergent literacy skills and make it easier to have multiple contributors to multimodal stories, including from children's home environments (Eiserman and Blatter, 2014^[44]).

Digital technologies can augment pedagogies through the personalisation of learning. Individual and immediate digital feedback, for instance through sounds or images for having recognised the correct shape or colour, could provide additional learning support to children and help engage them in learning activities. This can support, in particular, the development of children with learning or behavioural difficulties, such as children diagnosed with attention deficit disorder.

While there can be many benefits to using digital technologies with young children with special education needs in ECEC, attention needs to be paid to effective and healthy use. Risks such as overexposure to digital technologies may become more substantial for children with special needs if they increasingly rely on them to perform tasks. Moreover, mainstream technology may not be adequate for the special needs of these children and can require adaptations or special software or equipment.

Policy can facilitate and guide the adaptation of high-quality inclusive digital pedagogies in ECEC. For instance, Norway's national service for special needs education, Statped, has developed the Digital Didactics and Inclusion programme to promote inclusion through digital technologies in ECEC and schools. ECEC centres or entire municipalities can apply to participate in the programme, which offers a course for ECEC staff on inclusive digital pedagogies and digital literacy development, provides continued guidance and resources during implementation, and builds a learning community to facilitate peer exchange among staff. In addition, the website provides educational materials for and examples of inclusive digital pedagogies and informs about suitable digital software and relevant research. Resources may highlight inclusive pedagogies for specific children, or the programme can provide ideas for slight adaptations to digital pedagogies that allow children with special education needs to participate in digital classroom

activities as well. For an overview of current uses of digital assistive technology in ECEC to support children with special needs, and of beneficial conditions for their successful application, see Wyeth et al. (2023^[45]).

Supporting language development and inclusion for children with different first languages

Digital technologies in classrooms can have wide-ranging benefits for children who speak a different language at home, including greater well-being and improved literacy development [for an extensive review, see (Hsin, Li and Tsai, 2014^[46])]. They can do so by acknowledging children's cultural backgrounds, supporting the development of more positive identities and multiculturalism; and by overcoming linguistic barriers these children may face.

When young children's home cultures and experiences are represented in ECEC settings, they are more engaged in literacy activities and form more positive identities (Peleman, Vandebroek and Van Avermaet, 2020^[47]). Digital technologies facilitate the use of multicultural resources in teaching, both through the Internet and by offering easy ways for families or communities to provide images, text and oral recordings from children's environments and/or in their heritage language (Rowe and Miller, 2016^[33]) Using children's heritage languages as assets in ECEC settings affirms these children's value of multilingualism and supports their vocabulary and literacy development, as children acquire a new language more effectively when they continue to use and develop their heritage language (Cummins, 2000^[48]).

Digital technologies can support emergent multilingual children in communicating and collaborating with others. For example, asking children to take photos at home or during their other experiences and to bring them to the classroom can provide visual anchors for conversations with adults, in which children are the experts (Rowe and Miller, 2016^[33]). This way, children acquire the vocabulary in the language of instruction in addition to their heritage language, and it helps adults interpret children's communication and learn about children's lives at home and in the community (Kucirkova, Messer and Whitelock, 2010^[49]; Kucirkova, Messer and Sheehy, 2014^[50]). In addition, digital technology may serve as a translation device, thus facilitating communication between ECEC centres and children, as well as with their families.

Box 7.2. Fostering literacy and inclusion among children with a different first language through digital technologies

In 2015, the **Australian** government funded a digital, game-based learning programme for preschool children called Early Learning Languages Australia (ELLA) for an initial trial (ELLA, 2022^[51]). ELLA is aligned with the learning outcomes of the Early Years Learning Framework of the National Quality Framework for early childhood education and care (ECEC) and consists of 7 different apps with 13 selectable languages (C&K Forestview Community Kindergarten, 2019^[52]). These apps introduce children to different topics (e.g. cooking, art, role play, music) in the chosen language through words, phrases and songs. The aim is to support children in learning another language besides English and to expose them to different cultures, which enhances their problem-solving and social skills and strengthens their cultural awareness. Moreover, the programme provides children with a different first language the opportunity to share their mother tongue with peers. After a successful first trial, the programme now includes over 4 000 participating preschools.

In **Germany**, the Sprach-Kitas programme was launched in 2016 to provide supplementary financial and human resources to ECEC centres with a high share of children with need for additional language support, including migrants, refugees and children from educationally disadvantaged families (BMFSFJ, n.d.^[53]). The programme aims to employ inclusive pedagogies, embed learning into children's individual

environments and strengthen collaboration with families. In 2021, an additional focus was placed on employing digital technologies for young children’s language development.

Examples of initiatives funded through this programme include the purchase of tablets in ECEC centres to create multilingual digital picture books with children (Stadt Ingolstadt, 2022^[54]). The digital apps used for these books allow families to access the work from home using the child’s login. Creating multilingual digital picture books can strengthen children’s emerging literacy skills and is especially helpful for children with a different mother tongue, as they can “read” a book in both languages with their peers.

In **Canada**, the Government of **Ontario** published a handbook in 2007 to provide support to educators in their work with children who learn English as a second language (Government of Ontario, 2007^[55]). The handbook states that digital technologies can be useful in incorporating the child’s language into the classroom and thereby promote progress in language development. Recommendations include equipping children with a different first language with a digital device to take home and asking them to document their surroundings or to record their parents’ storytelling. The handbook suggests that digital technologies help create stories that can be shared with educators and peers, leading to greater integration of children with a different first language.

Similarly, individual ECEC centres rely on digital storytelling as inclusive digital pedagogies for groups with children who speak a different first language. For instance, in the **United States (Georgia)**, an ECEC centre worked closely with the University of Georgia to analyse the use of digital technologies for early language development in children with a different first language (NAEYC and Fred Rogers Center, 2012^[56]). Studying the case of a Chinese boy in the ECEC centre who didn’t speak any English, they found that the use of a tablet to document his surroundings including his home, family, toys and interests, helped his integration into the ECEC centre and fostered his language skills (NAEYC, n.d.^[57]). In his case, an interpreter helped the boy arrange the pictures he took and together they added names in Chinese and/or English. The boy then told the other children about his home while sharing the pictures with them. Another example is the Zaleo State Preschool in **Spain**, where 15% of children are non-Spanish (European Agency for Special Needs and Inclusive Education, 2016^[58]). One of its projects includes digital photo books, called *unos libros muy especiales*, where the children, together with their families, take photos from their experiences outside of the ECEC centre and use them to create their own storybooks, which they then show to their peers.

Sources: **Australia**: ELLA (2022^[51]); C&K (2019^[52]); **Germany**: BMFSFJ (n.d.^[53]); Stadt Ingolstadt (2022^[54]); **Canada**: Government of Ontario (2007^[55]); **United States**: NAEYC (n.d.^[57]); NAEYC and Fred Rogers Center (2012^[56]); **Spain**: European Agency for Special Needs and Inclusive Education (2016^[58]).

Public funding structures to close digital divides in and through early childhood education and care

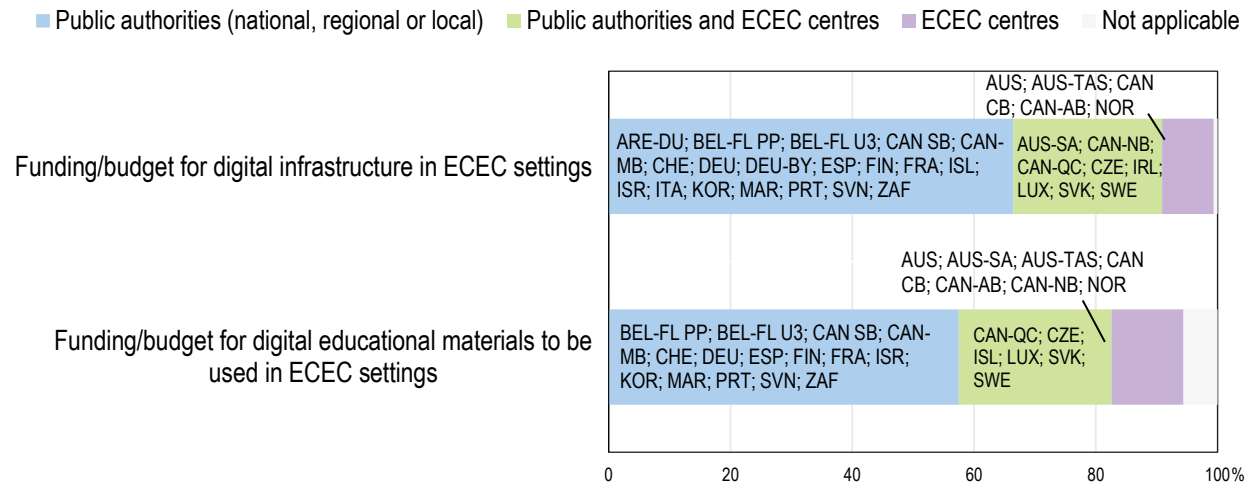
This chapter has outlined existing digital divides among children and the potential of ECEC systems in mitigating these as well as digital divides between ECEC centres and their implications on ECEC quality. This section discusses funding mechanisms that may help explain (and mitigate) some of the variation among ECEC centres in using certain digital opportunities.

By providing adequate funding for digital infrastructure and digital educational materials, countries can ensure all ECEC centres are well-equipped to make the most of digital technologies in their work with and without children, thus reducing the first and second digital divides. While the data on funding for digital resources cannot measure to what extent governments are addressing the second digital divide, the types of materials that receive public financial support can give indications that some countries may target a broader range of applications of digital technologies, with a greater potential to also mitigate the second

digital divide and improve ECEC quality in all centres. According to the *ECEC in a Digital World* policy survey (2022), public authorities assume greater public funding responsibility for ECEC centres' digital infrastructure (connectivity, devices) compared to educational materials (e.g. digital books, videos, games, robotics or programming kits) (Figure 7.4).

Figure 7.4. Provision of funding for digital technologies in early childhood education and care settings

Percentage of countries and jurisdictions specifying different sources of funding for digital technologies, 2022



Notes: Responses are weighted so that the overall weight of reported responses for each country equals one. See Annex A.

Only responses categories that were selected in survey responses are shown.

Belgium (Flanders PP): pre-primary education in Belgium (Flanders). Belgium (Flanders U3): ECEC for children under age 3 in Belgium (Flanders). Canada CB: centre-based sector in Canada. Canada SB: school-based sector in Canada. Canada (Manitoba): kindergarten sector only in Canada (Manitoba).

Source: OECD (2022^[2]), *ECEC in a Digital World* policy survey, Table B.3.

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In most countries and jurisdictions responding to the *ECEC in a Digital World* policy survey (2022), the budget for spending on basic digital infrastructure is decided by public authorities at the national, regional and/or local level. In several other countries and jurisdictions, both public authorities and ECEC centres decide on the amount of funding for digital infrastructure expenditures. Only in a few countries and jurisdictions does the responsibility lie entirely within the governance structures of ECEC centres. In comparison, responsibility for funding educational materials is, to a greater extent, in the hands of ECEC centres. This may suggest that ECEC systems where public authorities fund both digital infrastructure and digital educational materials – Belgium (Flanders), Canada (school-based sector; Manitoba, kindergarten sector only), Finland, France, Germany, Israel, Korea, Morocco, Portugal, South Africa, Slovenia, Spain and Switzerland – place a stronger emphasis on reducing both the first and second digital divides among young children and are better able to mitigate emerging differences in digital literacy. On the other hand, where no specific funding exists, the use of digital educational materials tends to be rare in ECEC settings (e.g. Ireland).

However, there may still be structural differences in ECEC funding for digital technologies and devices among centres and children. For example, many countries and jurisdictions report funding for either digital infrastructure or digital materials depending on the type of management (public or private): Denmark, Finland, France, Germany (Bavaria), Hungary, Italy, Japan, Korea, Portugal, the Slovak Republic, Sweden, Switzerland and the United Arab Emirates (Dubai). Moreover, the public provision of certain materials may be restricted to specific groups of children (e.g. children with special education needs in Slovenia).

In the majority of responding countries and jurisdictions, ECEC facilities can decide how to spend publicly provided funding for digital infrastructure and educational materials. However, their degree of autonomy in spending decisions varies significantly. In some systems, ECEC centres may decide freely whereas in other countries and jurisdictions, public authorities are partly included in the decision-making process. For instance, in Slovenia, kindergartens or municipalities may apply to national tenders to receive funding for specific digital technologies.

Besides general funding mechanisms, many countries also provide targeted funding to ECEC centres or families that may require extra support for their children. Among the equity and diversity measures around digital technologies listed in the *ECEC in a Digital World* policy survey (2022), the most common are funds targeted towards children with special education needs (Figure 7.5). Nearly 40% of countries and jurisdictions – Belgium (Flanders, pre-primary sector), Canada (school-based sector; Manitoba, kindergarten sector only), Ireland, Israel, Italy, Japan, Korea, Portugal, Slovenia, Spain and Sweden – provide specific support for digital infrastructure or materials for ECEC centres attended by these children and over 20% – Belgium (Flanders, pre-primary sector), Iceland, Israel, Korea, Spain and Sweden – also offer such provision to their families.

General funding targeting vulnerable children, which may be spent on digital infrastructure or resources, is also common among countries and jurisdictions. This is available for ECEC centres in 36% of responding countries and jurisdictions – Australia, Belgium (Flanders, pre-primary sector), Canada (school-based sector; Manitoba, kindergarten sector only), France, Hungary, Ireland, Israel, Italy, Korea, Luxembourg and Portugal – and for families in 18% of countries and jurisdictions – Belgium (Flanders, pre-primary sector), Canada (school-based sector), Italy, Korea, Luxembourg and Portugal.

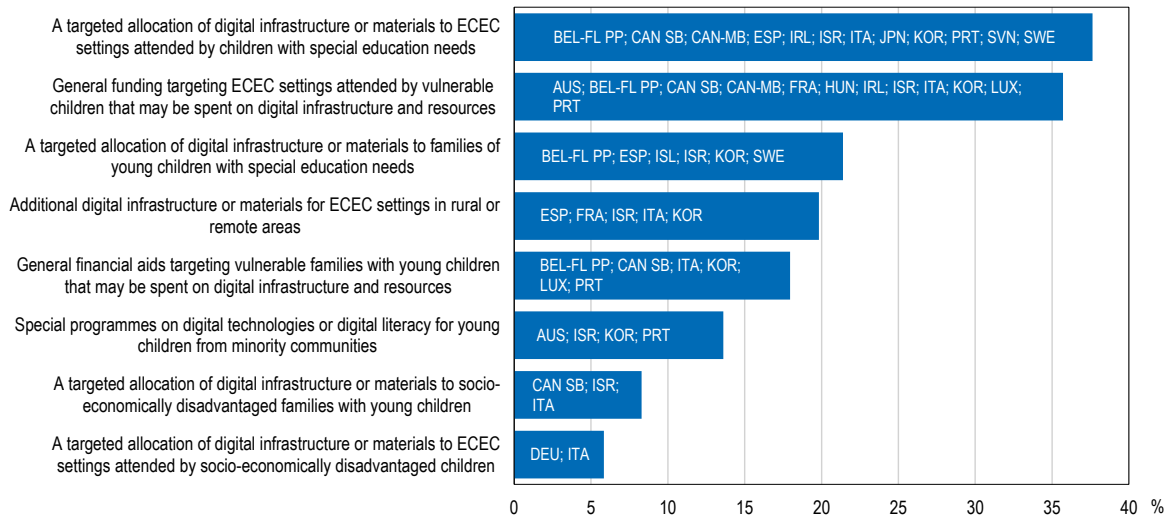
Few countries and jurisdictions earmark funds for digital infrastructure or materials for socio-economically disadvantaged children, and it is more often available for families than for ECEC centres. ECEC centres receive such support in Germany and Italy (6% of responding countries and jurisdictions), and in Canada (school-based sector), Israel and Italy, such funds are available for families.

In 20% of responding countries and jurisdictions – France, Israel, Italy, Korea and Spain – ECEC centres in rural or remote areas receive additional support for digital infrastructure or materials to reduce or prevent digital divides. Nearly one in seven countries and jurisdictions provide additional measures for young children from minority communities: In Australia, Israel, Korea and Portugal, there are special programmes on digital technologies or digital literacy for them.

It is important to note that countries and jurisdictions may have replied “no” to some of the answers due to their funding model and even though equity and inclusion measures exist. For example, in Luxembourg, primary responsibility for using funds lies with local authorities (with national mechanisms that redistribute resources across municipalities) and thus measures may vary across geographic zones. Similarly, an important number of countries and jurisdictions responded “not known” or “not applicable”. In some cases, this reflects that funding is granted occasionally but not in a structural way. In other instances, such as the Czech Republic and Denmark, additional support is only available to specific ECEC centres.

Figure 7.5. Equity and inclusion measures around digital technologies in early childhood education and care

Percentage of countries and jurisdictions specifying the following measures currently in place, 2022



Notes: Responses are weighted so that the overall weight of reported responses for each country equals one. See Annex A.

Belgium (Flanders PP): pre-primary education in Belgium (Flanders), Belgium (Flanders U3): ECEC for children under age 3 in Belgium (Flanders). Canada CB: centre-based sector in Canada. Canada SB: school-based sector in Canada. Canada (Manitoba): kindergarten sector only in Canada (Manitoba).

Items are sorted in descending order of the share of countries selecting each option.

Source: OECD (2022^[2]), *ECEC in a Digital World* policy survey, Table B.18.

StatLink  <https://stat.link/es3va8>

Policy pointers

Public policy can promote equity and inclusion in ECEC with regard to digitalisation in three main ways: First, it can support digitalisation in work processes as a force that leads to greater (as opposed to less) equalisation of structural and process quality across ECEC centres. Second, public policy can help ECEC centres level the playing field for developing children's digital literacy. Third, digital pedagogies can make ECEC and learning more inclusive, especially for certain vulnerable children.

Policy Pointer 1: Reduce differences in the quality of digital infrastructure across ECEC centres, and target centres with vulnerable children

- Pre-pandemic, ECEC centres differed in their preparedness to employ digital technologies for improving quality. By providing targeted support for ECEC centres with insufficient digital infrastructure or by making general resource allocation mechanisms more equitable, policy can ensure that all centres are able to invest in their digital infrastructure and seize the opportunities that digitalisation provides for supporting structural and process quality in ECEC.
- ECEC centres with large shares of children from vulnerable groups, who tend to have fewer opportunities to develop literacy skills at home and for whom certain digital pedagogies may be particularly valuable, can benefit from additional support.

- Effective monitoring systems and practices allow for an efficient and equitable distribution of digital resources (see Chapter 8).

Policy Pointer 2: Identify and support strategies to bridge the second digital divide among children and use digital pedagogies for inclusion purposes

- Pedagogies can mitigate divides in digital literacy that emerge in home environments. By teaching young children about digital technologies (see Chapter 3), ECEC can help them face digital risks and benefit from the opportunities of digital technologies. This may be done with or without the use of digital technologies themselves (e.g. unplugged approaches).
- Inclusive pedagogies can benefit groups of children that tend to miss out on current and future opportunities brought about by digitalisation, such as girls. In this case, for example, presenting and employing digital technologies in a context and manner that speaks to them can spark their interest in digital technologies and mitigate the gender divide among older children and adults in STEM fields.
- Furthermore, countries can support the use of digital technologies to strengthen the inclusion and learning of vulnerable children, such as children with special needs or children with a different first language than the one(s) spoken in the ECEC centre. Inclusive digital pedagogies can help them access materials in an additional and different manner.

Policy Pointer 3: Increase the ECEC workforce's preparedness to employ digital technologies, especially when working in disadvantaged settings

- To support equitable digitalisation in ECEC, public policy should ensure that all staff and leaders have opportunities to develop competences for using digital technology in their work processes, at least at a foundational level (see Chapter 4). When working in disadvantaged settings, staff and leaders would then be equipped to exploit the potential of digital technologies to improve the quality of ECEC provision in their settings.
- It is important to guide the ECEC workforce to adopt practices that make good use of digital technologies, and on how to make the transition. Particular attention can be placed on building on digital technologies to strengthen communication with families of vulnerable children. However, developing digital communication channels should not increase staff's workload excessively or replace in-person interactions with families completely. Furthermore, it is important to ensure that these families effectively engage with digital modes of communication.
- Online training could be developed further as a promising way to support workforce development where in-person training is less accessible, especially in more diverse ECEC centres where children's individual needs may be more complex.

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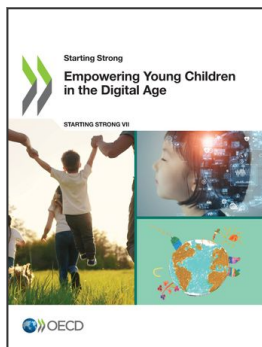
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