5

Inequalities in Digital Proficiency: Bridging the Divide

Digital inequality refers to differences in the material, cultural and cognitive resources required to make good use of information and communication technology (ICT). This chapter examines differences in access to and use of ICT that are related to students' socio-economic status, gender, geographic location, and the school a child attends. It also investigates whether performance on computer-based tests is related to students' socio-economic status and their familiarity with computers.

Disparities in access to and proficiency in information and communication technology (ICT), particularly between socio-economically advantaged and disadvantaged children, and between rural and urban residents, have long been a focus of public policy. The expression "digital divide" was coined to underline the fact that such disparities may threaten social and national cohesion, as they impede full participation in work and reduce political efficacy for population groups that are left behind on the analogue side of the divide (OECD, 2001). Indeed, given the many opportunities that technology makes available for civic participation, networking or improving one's productivity at work, the unequal distribution of material, cultural and cognitive resources to tap into these opportunities may perpetuate and even exacerbate existing status differences.

What the data tell us

- In most countries, differences in computer access between advantaged and disadvantaged students shrank between 2009 and 2012; in no country did the gap increase.
- In countries/economies where the socio-economic gap in access to the Internet is small, the amount of time that students spend on line does not differ widely across socio-economic groups; but what students do with computers, from using e-mail to reading news on the Internet, is related to students' socio-economic background.
- In mathematics, the relationship between socio-economic status and performance on the computer-based assessment reflects differences observed in performance on the paper-based assessment, not differences in the ability to use computers; in digital reading, this relationship also reflects differences in navigation and evaluation skills across socio-economic groups.

ONE DIVIDE OR MANY DIVIDES? DIGITAL ACCESS, DIGITAL USE AND DIGITAL PRODUCTION

Digital inequality refers to differences in the material, cultural and cognitive resources required to make good use of ICT. Traditionally, research on digital inequality has focused on differences in physical access to and possession of ICT tools, while emphasising that access is only one of the many factors required to make good use of technology. The greater attention given to material resources is certainly related to the relative abundance of data measuring these factors, as compared to data on differences in cultural and cognitive resources, such as the norms of use of ICT in the community or individuals' digital knowledge and skills (Hargittai and Hsieh, 2013).

A first, core "digital divide" thus concerns issues of physical access: are computers accessible, available and up-to-date? Is there an Internet connection that allows access to the most recently developed content? Comparisons of PISA data from different years confirm an observation already made about the United States in the early 2000s (Compaine, 2001): with time, information and communication technologies that were once exclusively available to the most wealthy fraction of the population, tend to become universally available. As a consequence, many gaps in access close. Yet while older technologies become available to more and more people, new digital technologies, tools and services are almost invariably marketed only to the most wealthy, thus reinforcing, at least initially, the privilege of more advantaged populations (Hargittai and Hsieh, 2013).

Equal access, however, does not imply equal opportunities (equity). Indeed, even when opportunities to learn about the world, practice new skills, participate in online communities or develop a career plan are only a few clicks away, students from socio-economically disadvantaged backgrounds may not be aware of how technology can help to raise one's social status. They may not have the knowledge and skills required to engage with massively open online courses (MOOCs), e-government websites, open educational resources, etc.

To refer to the non-material resources that condition students' ability to take full advantage of ICT tools, the terms "second" or "second-order" digital divide have been used (Attewell, 2001; Dimaggio et al., 2004). More recently, "proficiency" and "opportunity" gaps have been distinguished, referring to differences in what people can do, and what they actually do, when using computers and other digital tools (Stern et al., 2009). PISA data are a unique source of evidence to determine the width of such divides, and to analyse how effective education systems and schools are in narrowing them.

ACCESS AND EXPERIENCE GAPS RELATED TO SOCIO-ECONOMIC STATUS

By 2012, in most countries and economies that participate in PISA, socio-economic differences were no longer associated with large divides in access to computers (the so-called "first digital divide"). However, gaps previously observed in the quantity, variety and quality of ICT tools available, as well as in the mastery of them, persisted.

Socio-economic differences in access to computers and the Internet

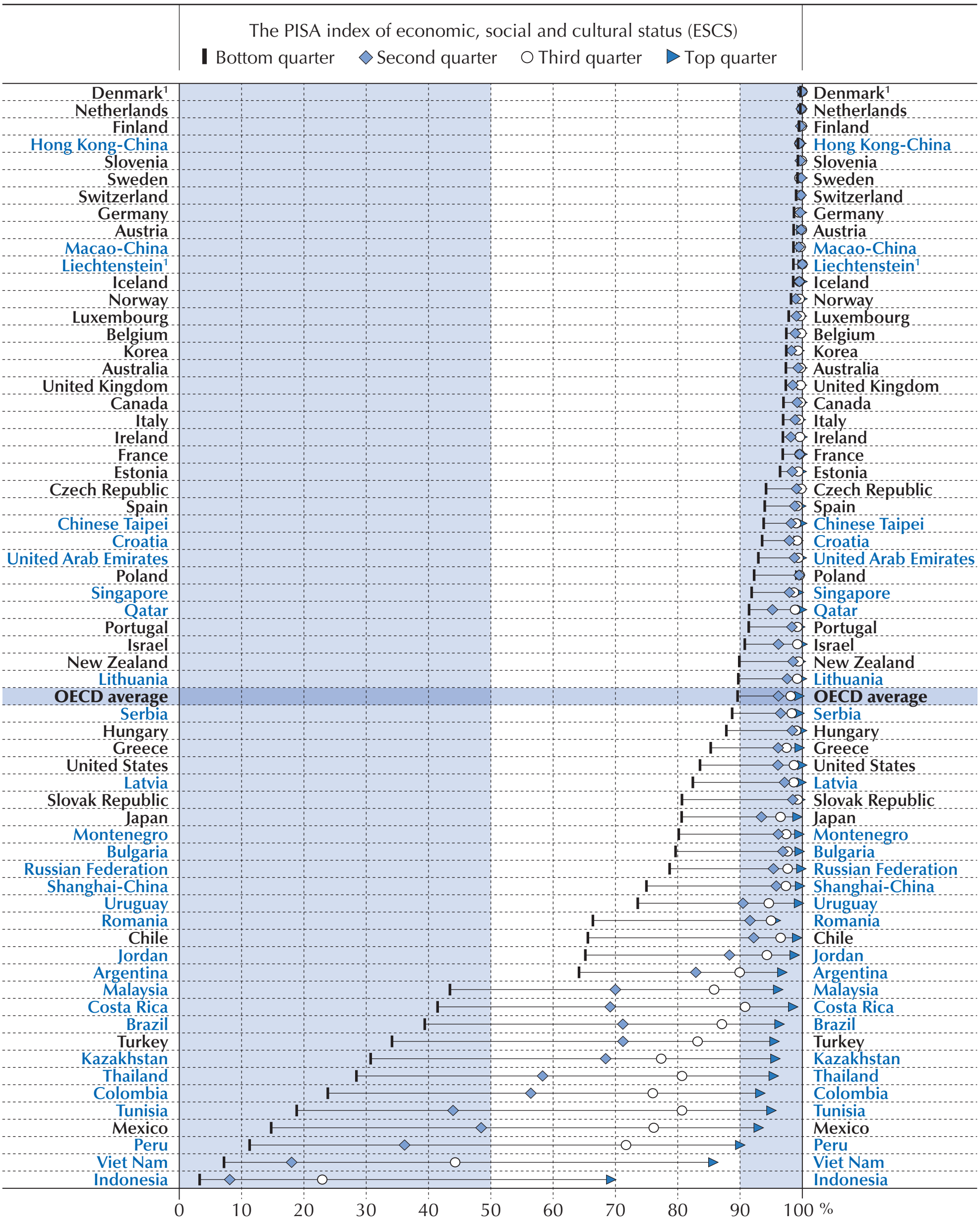
In a majority of countries and economies participating in PISA, over 90% of students – even among the most disadvantaged students – have at least one computer at home. Some middle- and low-income countries and economies, nevertheless, still show large differences in basic measures of access between disadvantaged and advantaged students. In fact, the digital divide between advantaged and disadvantaged students within countries is sometimes larger than the divide observed between PISA-participating countries and economies (Figure 5.1).

Figure 5.1 shows the relationship between students' socio-economic background and the availability of a computer at home. Students in the top quarter of the *PISA index of economic, social and cultural status* (ESCS) in their country were categorised as being relatively advantaged, and those in the bottom quarter were categorised as being relatively disadvantaged.

Figure 5.1 shows that in all but three countries and economies (Indonesia, Peru and Viet Nam), at least 90% of advantaged students have access to computers. But while in some countries and economies – namely Denmark, Finland, Hong Kong-China, the Netherlands, Slovenia and Sweden – more than 99% of disadvantaged students have access to a computer at home, in 12 other countries fewer than half of the disadvantaged students do. In other words, across countries and economies, access to ICT is more similar among students from well-off families than among students from poorer families. Meanwhile, in almost all countries and economies, fewer disadvantaged students than advantaged students have access to a computer at home. A gap of at least 75 percentage points between the two groups is observed in Mexico, Peru, Tunisia and Viet Nam.

■ Figure 5.1 ■

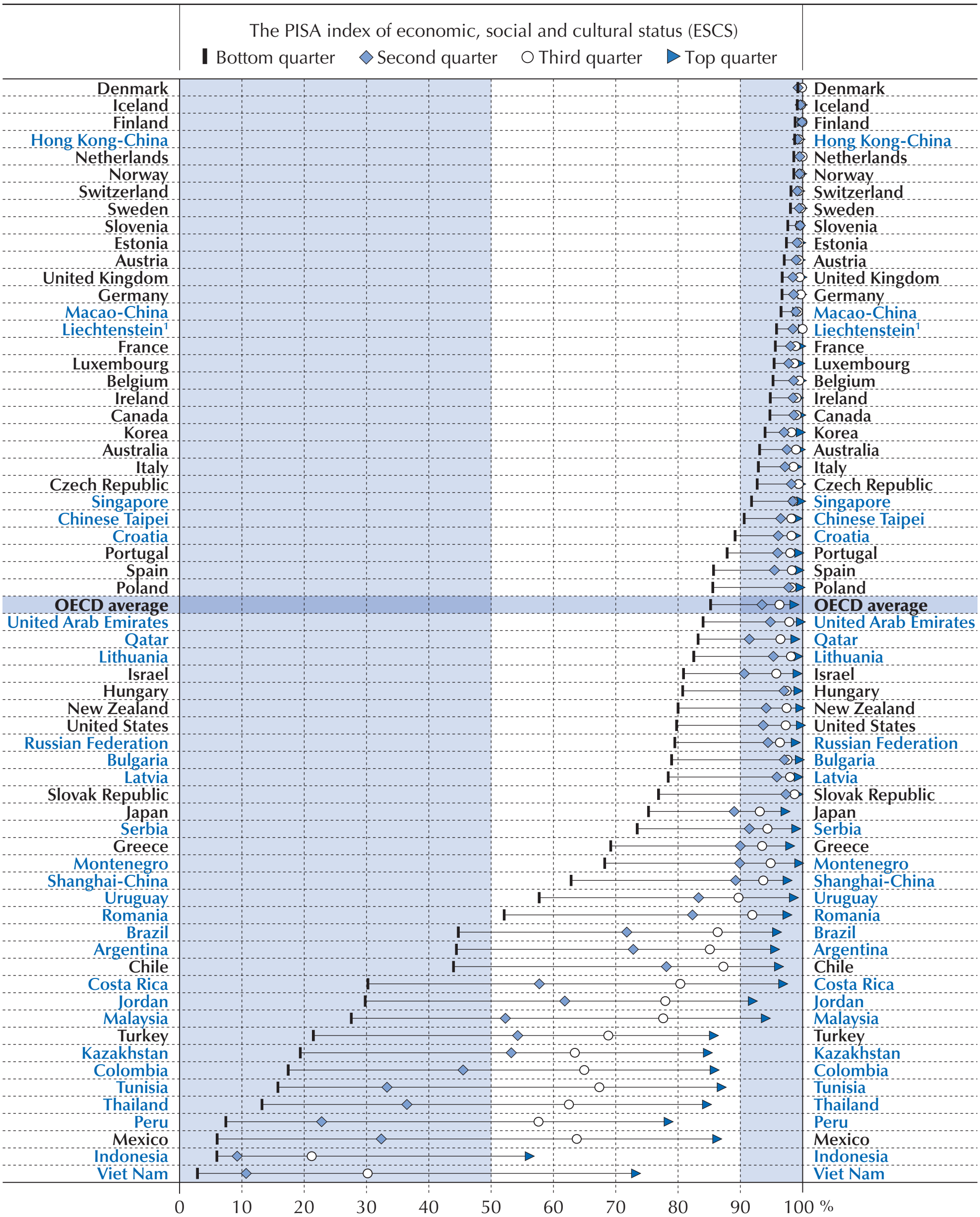
Access to computers at home and students' socio-economic status



1. The difference between the top and the bottom quarter of ESCS is not statistically significant.
Countries and economies are ranked in descending order of the percentage of students in the bottom quarter of ESCS who have a computer at home.
Source: OECD, PISA 2012 Database, Table 5.1a.
StatLink http://dx.doi.org/10.1787/888933253134

■ Figure 5.2 ■

Access to the Internet at home and students' socio-economic status



1. The difference between the top and the bottom quarter of ESCS is not statistically significant.

Countries and economies are ranked in descending order of the percentage of students in the bottom quarter of ESCS who have a connection to the Internet at home.

Source: OECD, PISA 2012 Database, Table 5.1a.

StatLink http://dx.doi.org/10.1787/888933253149

In most countries, differences in computer access between advantaged and disadvantaged students shrank between 2009 and 2012 (Figure 5.3 and Table 5.1c); in no country did the gap increase. By 2012, in all countries there were at least as many students in the bottom quarter of socio-economic status as in the top quarter who gained access to computers at home. The narrowing of this core digital divide within most countries means that equity in access to ICT has improved over this three-year period.

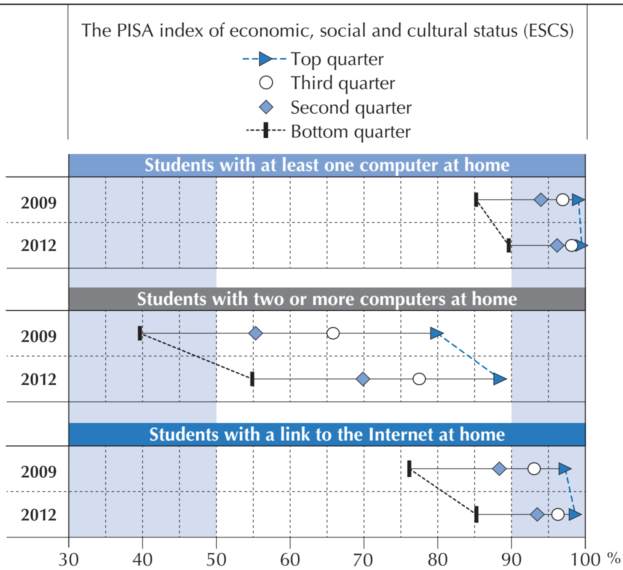
Despite the narrowing of this gap, the number of computers available at home differs depending on the household's socio-economic status. In Hungary and Poland, for instance, five out of six advantaged students (84%) have two or more computers at home, compared to only one out of four disadvantaged students. On average across OECD countries, 88% of advantaged students have two or more computers at home, compared to 55% of disadvantaged students (Figure 5.3 and Table 5.1a).

The number of locations where people can go on line, and the possibility of accessing online services "on the go" by using handheld devices, continue to be shaped by socio-economic status. In addition, differences in the quantity of ICT resources available are probably compounded by differences in their quality, which is not measured in PISA. It is likely that households with two or more computers possess at least one newer model, whereas households with a single computer may have an older or less powerful model.

■ Figure 5.3 ■

Change between 2009 and 2012 in access to computers and the Internet at home, by socio-economic status

OECD average



Source: OECD, PISA 2012 Database, Tables 5.1a and 5.1b.

StatLink http://dx.doi.org/10.1787/888933253153

That differences in the quantity of computers go hand-in-hand with differences in the ICT services available to students is confirmed by an analysis of unequal access to the Internet. As shown in Figure 5.2, in almost all countries and economies, disadvantaged students reported less Internet access than advantaged students. In countries with relatively little Internet access overall, only the more advantaged students tended to have a connection to the Internet at home. In 40 countries and economies, at least 99% of students in the top quarter of socio-economic status have access to the Internet at home. By contrast, in 15 countries and economies, fewer than one in two students in the bottom quarter of socio-economic status has access to the Internet at home.

Still, on average the gap in Internet access between advantaged and disadvantaged students shrank between 2009 and 2012 (Figure 5.3). It widened only in Indonesia, Kazakhstan, Mexico, Peru and Tunisia, where advantaged students were the main beneficiaries of greater access to the Internet between 2009 and 2012. In all of these countries, fewer than 80% of advantaged students had access to the Internet in 2009 (Tables 5.1a, b and c). These exceptions may thus be the result of different stages in the typical pattern of diffusion of innovation (Rogers, 2010).

Socio-economic and gender differences in early exposure to computers

In 2012, very few students, even among the most disadvantaged, had no experience using computers. But since in many countries/economies the gap in access had closed only recently, disadvantaged students may have less experience using computers than their more advantaged peers do.

On average across OECD countries, only 23% of disadvantaged students had started using computers at the age of 6 or before, as compared to 43% of advantaged students. A similar (and sometimes larger) difference between the two socio-economic groups can be found in all countries that participated in the optional ICT questionnaire. Only in Denmark did more than one in two students from the lowest quarter of socio-economic status start using computers at pre-school age (Figure 5.4).

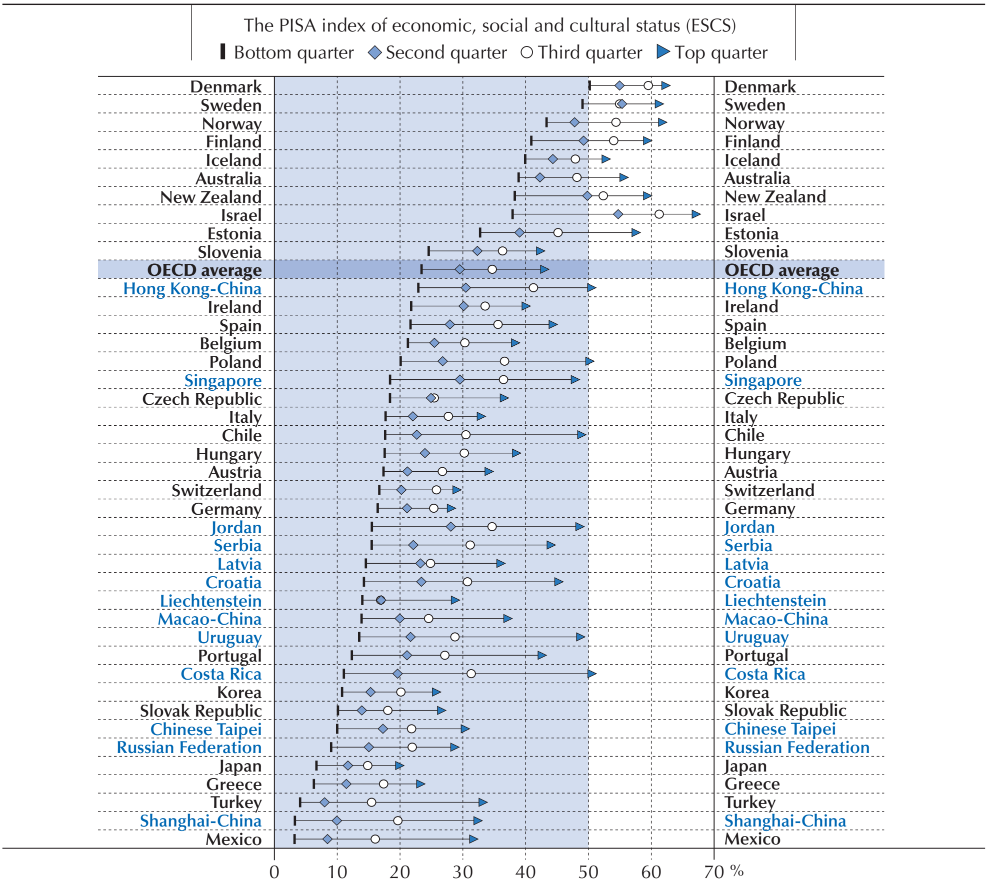
Similarly, some experience with the Internet is common even among the most disadvantaged students. On average across OECD countries, in 2012 only 1.3% of disadvantaged students had no experience at all using the Internet (Table 5.2).

Nonetheless, some countries have large socio-economic divides in basic use of and experience with computers. In Mexico, the OECD country with the largest inequalities in access to computers, 15% of disadvantaged students had no experience accessing the Internet; of these, a majority (9% of all disadvantaged students) had no experience at all using computers. Only 3% of disadvantaged students in Mexico reported that they first used a computer at age 6 or below (and thus potentially had more than 10 years of experience using computers), compared with 32% of advantaged students (Table 5.2). And socio-economic gaps may be even larger, given that many of the most disadvantaged 15-year-olds in Mexico are not in school anymore.

■ Figure 5.4 ■

Early exposure to computers, by students' socio-economic status

Percentage of students who first used a computer when they were 6 years or younger



Note: Differences between the top and the bottom quarter of ESCS are statistically significant in all countries and economies.
Countries and economies are ranked in descending order of the percentage of students in the bottom quarter of ESCS who first used a computer when they were 6 years or younger.
Source: OECD, PISA 2012 Database, Table 5.2.
StatLink http://dx.doi.org/10.1787/888933253168

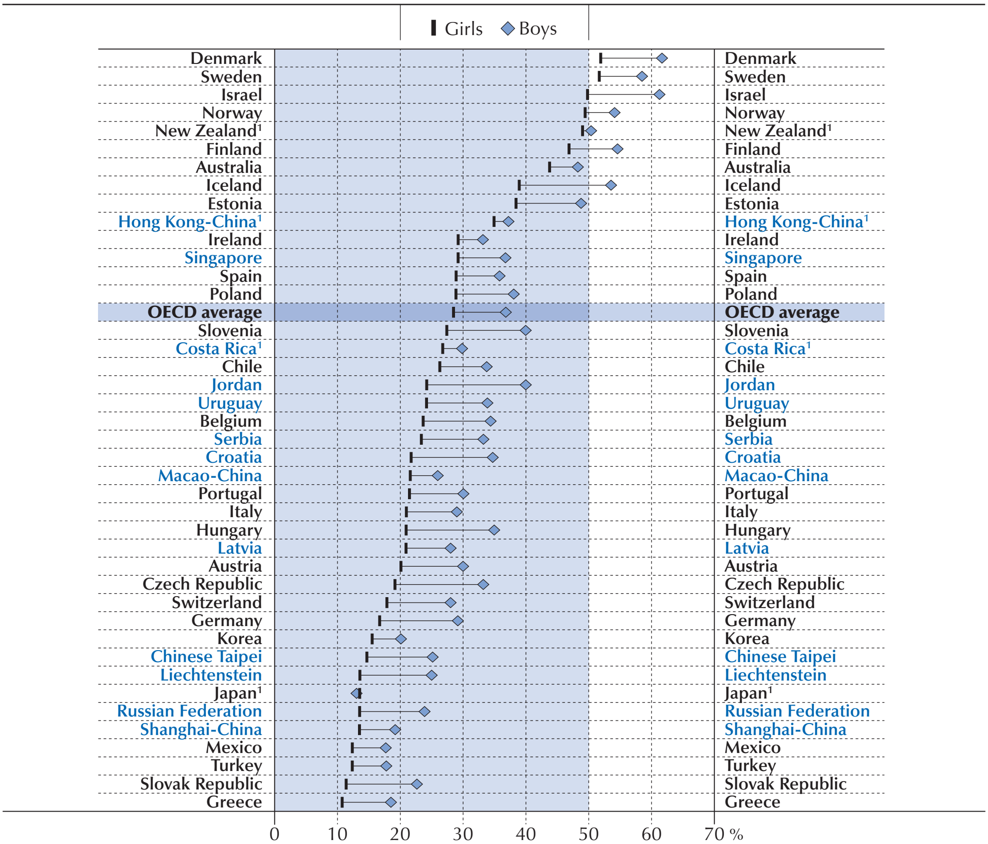
Early exposure to computers and the Internet also differs markedly between boys and girls (Figure 5.5). Boys are significantly more likely than girls to have started using computers early in all but four countries/economies; and in those countries/economies, namely Costa Rica, Hong Kong-China, Japan and New Zealand, the difference is not significant.

The existence of gender gaps in computer experience highlights the importance of non-material barriers in shaping opportunities for digital learning. It is not enough to remove material constraints to ensure that online experiences and skills are equally distributed. Intangible factors, such as cultural norms, count too.

■ Figure 5.5 ■

Early exposure to computers, by gender

Percentage of students who first used a computer when they were 6 years or younger



1. The difference between boys and girls is not statistically significant.

Countries and economies are ranked in descending order of the percentage of girls who first used a computer when they were 6 years or younger.

Source: OECD, PISA 2012 Database, Table 5.2.

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Indeed, given that boys and girls come from all kinds of backgrounds and attend all kinds of schools (at least in countries where participation in schooling at age 15 is universal), differences in their self-reported experience with computers do not reflect material constraints, but rather students' interests and families' and educators' notions about what is suitable for them (see also OECD, 2015). Parents, for instance, may place more restrictions on girls' use of the Internet out of safety concerns.

Gender differences also illustrate the potentially long-lasting consequences of such intangible factors. In restricting girls' access to the Internet more than they do for boys, for instance, parents may undermine girls' feelings of competence. Data from the International Computer and

Information Literacy Study (ICILS) show that in almost all participating countries, girls in the eighth grade feel less confident than boys in their ability to do advanced ICT tasks, such as building a webpage (Fraillon et al., 2014, Table 5.17). Such feelings of incompetence (low self-efficacy) may, in turn, help to explain why, later in life, there are about five times more men than women among those who study computing at the tertiary level (OECD, 2014), or even among those who actively contribute to Wikipedia (Hargittai and Shaw, 2015; Hill and Shaw, 2013).

Rural/urban gaps in Internet access

Because PISA contains information about the location of the school attended by students, rather than the location of the students' home, it can provide only an imprecise picture of rural/urban gaps in access to and use of ICT. Still, PISA data show that in several lower- and middle-income countries, students who attend rural schools have significantly less access to ICT resources at home, particularly when it comes to Internet connections (Tables 5.7a and 5.8). This may be partly the result of poorer fixed and mobile, narrow and broadband infrastructure. The gap in infrastructure is not directly related to students' socio-economic status, but may contribute to socio-economic divides, particularly in countries where poverty is more concentrated in rural, isolated areas.

Data collected from school principals confirm that in several countries, there is a rural/urban divide in connectivity (the possibility of using services offered on line). In Colombia, Indonesia, Mexico and Peru, in particular, rural schools often have as many computers as urban schools, in proportion to the size of their student population. Yet more than one in four students who attend rural schools or schools located in small towns do not have any computer connected to the Internet in their school. By contrast, fewer than one in ten students who attend urban schools do not have access to a computer connected to the Internet at school. In rural schools in these countries, when there are school computers, fewer than half of them are connected to the Internet, on average (Table 5.9a).

A comparison with PISA 2009 identifies countries that made progress in closing rural/urban gaps. In Albania, Indonesia and Uruguay, a large share of schools located in rural areas gained access to an Internet connection for their school computers between 2009 and 2012, possibly as a result of policies to support the economic development of rural areas. As a result, the share of students in rural schools where no computer is connected to the Internet declined rapidly (Table 5.9c).

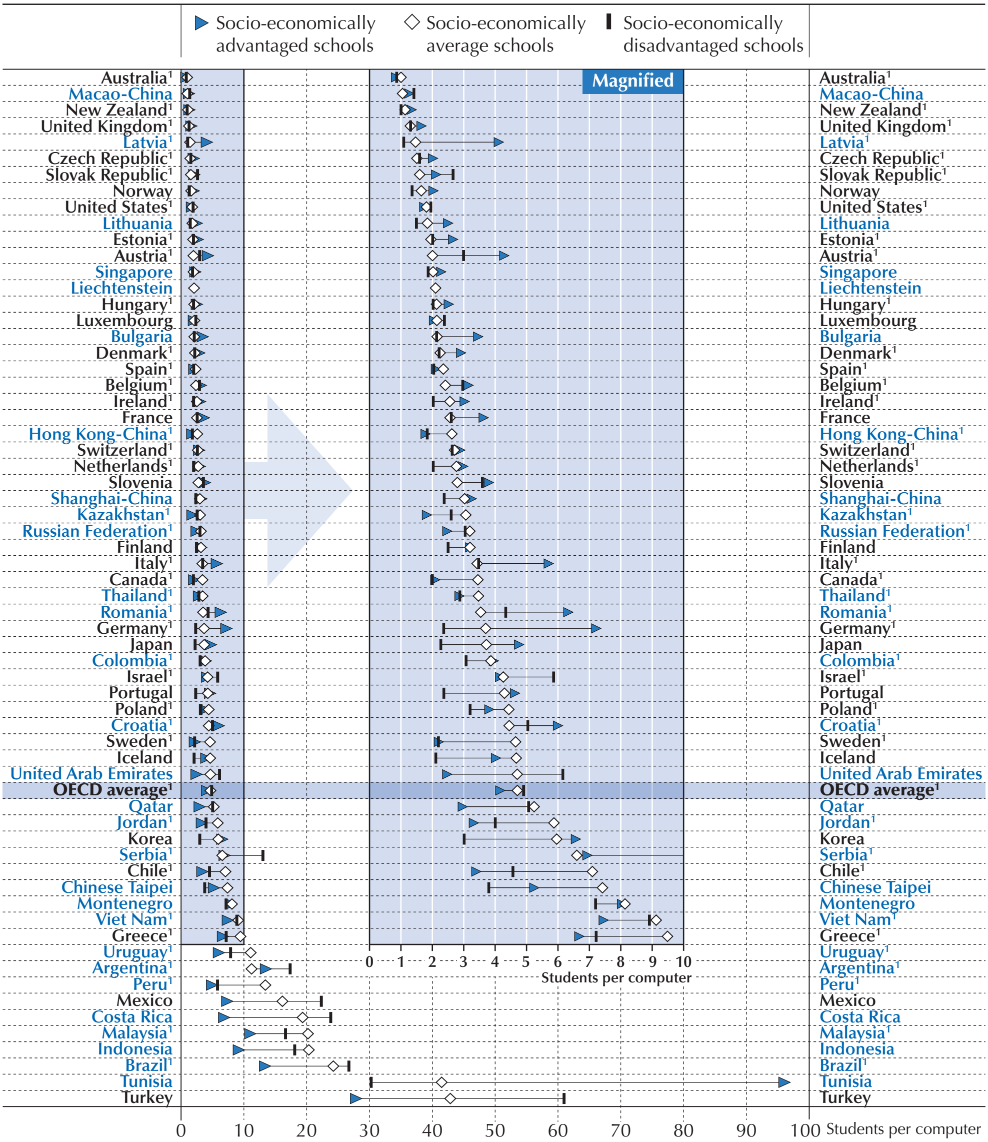
The role of schools as providers of access to computers and the Internet

In countries where home access to computers and the Internet is strongly related to socio-economic status, schools often play an important role in ensuring that all students have access to ICT resources. In fact, particularly in countries with high levels of income inequality, giving access to ICT resources to all is among the main objectives of ICT policies in education.

In most countries, ICT resources tend to be as good in those schools that serve predominantly disadvantaged students as in more advantaged schools.[1] However, in Costa Rica, Indonesia and Mexico, schools with a disadvantaged student population on average have fewer ICT resources than advantaged schools. A significant share of these disadvantaged schools have no ICT resources at all, higher student/computer ratios, and lower shares of school computers connected to the Internet. In the remaining countries, when there is a difference in the level of ICT resources at school, it is often in favour of disadvantaged schools. In Japan, Korea, Portugal and Tunisia, for instance, there are about half or less than half as many students per computer in disadvantaged schools, compared to advantaged schools (Figure 5.6 and Table 5.5a).

■ Figure 5.6 ■

Student-computer ratio at school, by socio-economic profile of the school



1. The difference between socio-economically advantaged and disadvantaged schools is not statistically significant.

Notes: See Note 1 at the end of this chapter for the definition of socio-economically disadvantaged and advantaged schools. Only schools with at least 10 students in the national modal grade for 15-year-olds are included. The number of students per computer is based on principals' reports about the number of students in the national modal grade for 15-year-olds and on the number of computers available for these students. In schools where no computer is available, the number of students per computer is set at the number of students reported by the principal plus 1.

Countries and economies are ranked in ascending order of the student-computer ratio in schools with an average socio-economic profile.

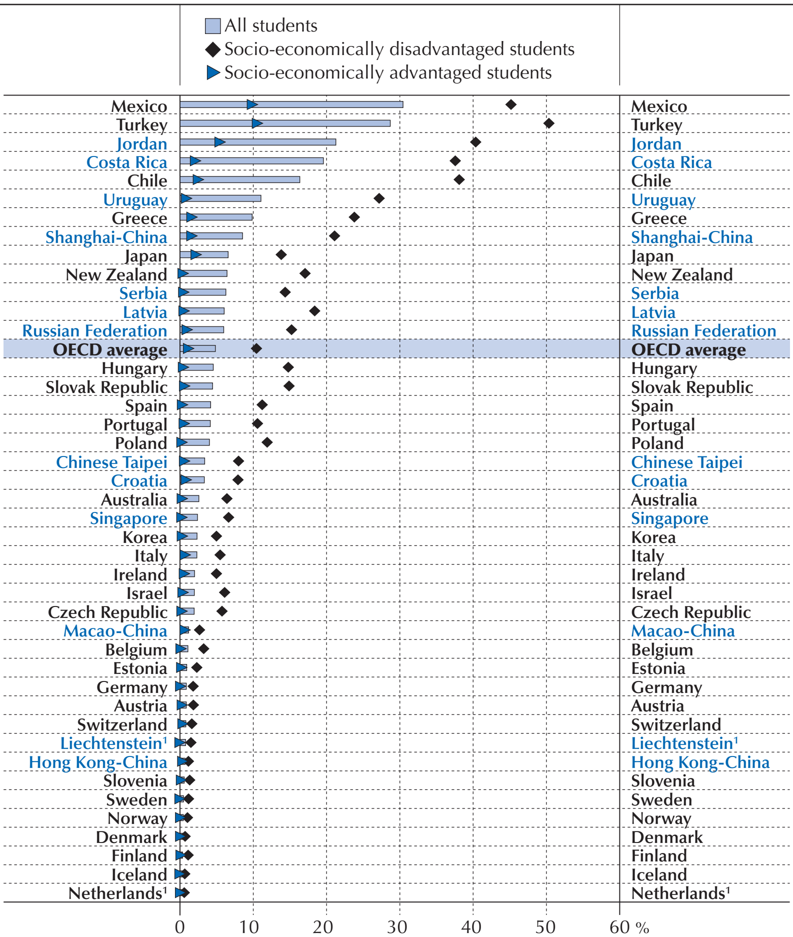
Source: OECD, PISA 2012 Database, Table 5.5a.

StatLink http://dx.doi.org/10.1787/888933253186

Many disadvantaged students can access computers and the Internet only at school. In Costa Rica, Mexico and Turkey, in particular, more than a third of the most disadvantaged students (those in the bottom quartile of socio-economic status) have access to computers at school, but not at home. Similarly, among the most disadvantaged students, 50% of students in Turkey, 45% in Mexico, 40% in Jordan and 38% in Chile and Costa Rica only have access to the Internet thanks to their school (Figure 5.7 and Table 5.4a).

■ Figure 5.7 ■

Percentage of students with access to the Internet at school, but not at home



1.The difference between socio-economically advantaged and disadvantaged students is not statistically significant.

Note: Socio-economically disadvantaged/advantaged students refers to students in the bottom/top quarter of the *PISA index of economic, social and cultural status.*

Countries and economies are ranked in descending order of the percentage of all students who reported having access to an Internet connection at school, but not at home.

Source: OECD, PISA 2012 Database, Table 5.4a.

StatLink http://dx.doi.org/10.1787/888933253199

Still, with the rapid expansion of home ICT resources observed in many countries, the role of schools in creating equitable access is no longer as important as in 2009. In that year, more than half of the most disadvantaged students in Chile, Jordan, the Russian Federation, Turkey and Uruguay had access to the Internet at school, but not at home (Table 5.4b).

DIFFERENCES IN COMPUTER USE RELATED TO SOCIO-ECONOMIC STATUS

This section explores differences in students' use of computers across socio-economic groups. As the divides in access to digital media and resources are closing rapidly – at least in high-income countries – research has started focusing on other aspects of digital inequality (see e.g. Attewell, 2001; Natriello, 2001; Dimaggio et al., 2004; Van Dijk 2005). As Gui (2007) notes, what people do with media is more important than the technologies and connectivity available to them – and also more resistant to change. Indeed, when all barriers that prevent access to new media have been removed, how people use new media still depends on individuals' level of skill, including basic literacy skills, and social support, which vary across socio-economic groups.

Computer use at home

Computer use by students can be first characterised by the amount of time that students spend on line. PISA data show that, on average across OECD countries, the amount of time that students spend on line during weekends does not differ across socio-economic groups. Interestingly, a reverse gap – whereby students from poorer families spend more time on line than students from wealthier families – is observed in 16 out of 29 OECD countries. Disadvantaged students spend at least 15 more minutes per day on line during weekends, compared to advantaged students, in Belgium, Germany, Korea, Shanghai-China, Switzerland and Chinese Taipei (Table 5.12).

Similarly, when the frequency and variety of computer use for leisure, outside of school, are summarised in an index, differences are mostly limited to countries with large gaps in access. In Costa Rica, Jordan and Mexico, the most advantaged students (those from the top quarter of socio-economic status) use computers for leisure more than the OECD average, while students from the bottom quarter are more than one standard deviation below this benchmark. At the same time, in Belgium, Finland, Germany, Sweden, Switzerland and Chinese Taipei, there are no significant differences across socio-economic groups in the average value of the *index of ICT use outside of school for leisure* (Table 5.10).

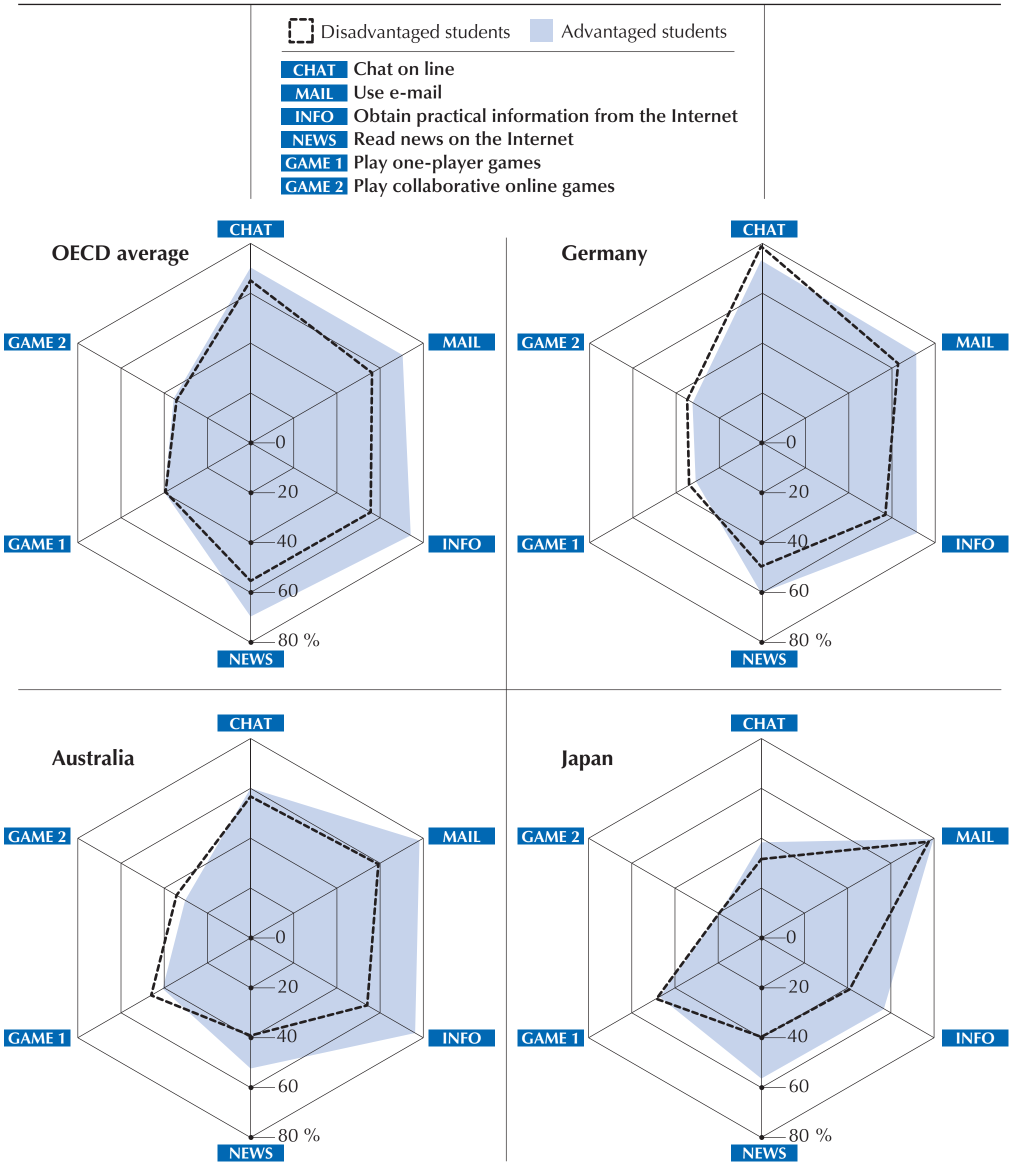
Yet the specific activities for which students use computers in their free time differ across socio-economic groups. In general, disadvantaged students tend to prefer chat over e-mail, and to play video games rather than read the news or obtain practical information from the Internet (Figure 5.8).

While across OECD countries, a similar proportion of advantaged students (70%) uses e-mail or chats on line at least once a week, on average, the share of disadvantaged students who chat on line (65%) is significantly larger than share of those who use e-mail (56%). And while in most countries/economies there are no differences related to socio-economic status in the use of video games, the influence of socio-economic status is strong when it comes to reading news or obtaining practical information from the Internet (Figure 5.8).

■ Figure 5.8 ■

Common computer leisure activities outside of school, by students' socio-economic status

OECD average values and values for selected countries



Notes: The figure shows the percentage of students who engage in each of the selected activities at least once a week.
Socio-economically disadvantaged/advantaged students refers to students in the bottom/top quarter of the *PISA index of economic, social and cultural status.*
Source: OECD, PISA 2012 Database, Table 5.11.
StatLink http://dx.doi.org/10.1787/888933253203

Differences in ICT use according to socio-economic groups among 15-year-olds are related to similar differences found in the adult population. An early survey of Swiss adults, for instance, found that more educated people use the Internet more for finding information, whereas less educated adults seem to be particularly interested in the entertainment aspects of the Internet (Bonfadelli, 2002). More recently, a survey in the Netherlands found that low-educated Internet users spent more time on line in their spare time, but those with higher social status used the Internet in more beneficial ways. While more educated people looked for information and personal development opportunities, less educated people spent more time gaming or chatting (Van Deursen and Van Dijk, 2014). The similarity of findings across age groups suggests that socio-economic differences in the use of the Internet and the ability to benefit from its many resources – the so-called second-order digital divide – are closely linked with wider social inequalities.

Computer use at school

When it comes to using ICT at school, differences related to students' socio-economic status are often smaller than those observed when considering ICT use outside of school. In 11 countries and economies, socio-economically disadvantaged students use computers at school more than the most advantaged students. The opposite is true in 10 countries/economies, while in 21 countries and economies, and on average across OECD countries, the difference in computer use between the two groups is not significant (Table 5.10).

During mathematics instruction, disadvantaged students often get more exposure to computers than advantaged students. The use of computers for mathematics teaching and learning (and for other core subjects) may first be introduced in the most challenging classrooms, either because educational disadvantage justifies the extra cost of introducing such tools, or because in these situations teachers and parents are keener to experiment these tools. In five countries and economies, however, advantaged students use ICT in mathematics classes more frequently than disadvantaged students. Denmark and Norway, where the use of computers in mathematics lessons is relatively common, are among these countries (Table 5.10).

HOW PERFORMANCE ON COMPUTER-BASED TESTS IS RELATED TO SOCIO-ECONOMIC STATUS AND FAMILIARITY WITH COMPUTERS

Across all domains assessed in PISA, socio-economic status bears a strong influence on the performance of students; and, as shown above, in some countries disadvantaged students have limited access to ICT devices or less experience in using them. How does the strength of the relationship between the *PISA index of economic, social and cultural status* (ESCS) and performance vary across computer- and paper-based assessments? What does this imply for the relationship between digital skills and familiarity with computers and their uses?

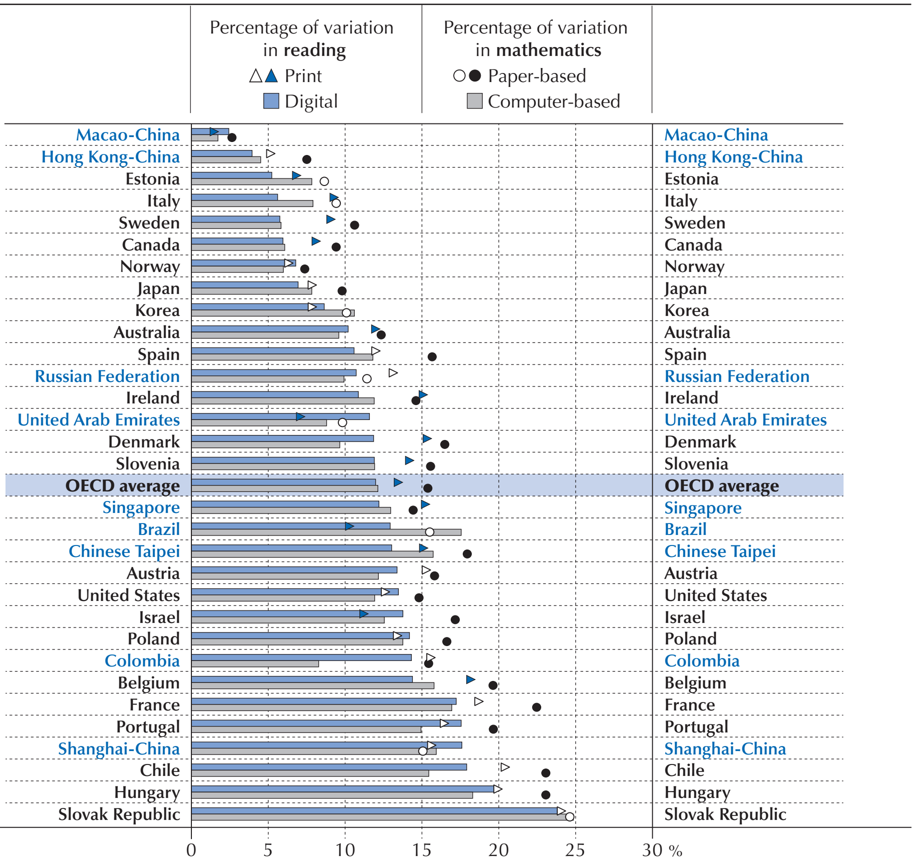
Disparities in performance related to socio-economic status

In the assessment of digital reading and the computer-based assessment of mathematics alike, differences in the *PISA index of economic, social and cultural status* (ESCS) account for 12% of the variation in performance, on average across OECD countries. This is slightly less than in print reading (13%) and significantly less than in mathematics (15%). The impact of socio-economic status on performance is thus weaker in computer-based assessments than in paper-based assessments (Figure 5.9).

■ Figure 5.9 ■

Strength of the relationship between socio-economic status and performance in digital reading and computer-based mathematics

Variation in performance explained by socio-economic status



Note: Hollow markers identify countries/economies where the strength of the relationship between the *PISA index of economic, social and cultural status* and performance is not significantly different between computer-based assessments and paper-based assessments of the respective domains.
Countries and economies are ranked in ascending order of the strength of the relationship between performance in digital reading and the PISA index of economic, social and cultural status.
Source: OECD, PISA 2012 Database, Table 5.14.
StatLink http://dx.doi.org/10.1787/888933253212

Furthermore, Figure 5.10 shows that the relationship between socio-economic status and performance on computer-based assessments mostly reflects differences observed in performance on paper-based assessments. On average, students who attain a certain score in PISA mathematics perform equally well in the paper-based and computer-based assessments, regardless of their socio-economic status. In digital reading, small differences in performance remain among students who attain the same score in the paper-based assessment of reading, but come from different socio-economic backgrounds.

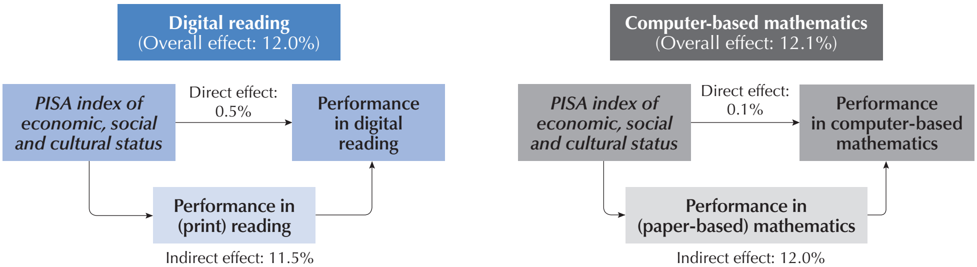
In the computer-based assessment of mathematics, in particular, there is little evidence of a specific association between socio-economic status and performance. The observed relationship is accounted for by differences in students' performance in the paper-based mathematics assessment related to socio-economic status. After accounting for such differences, a significant relationship with the *PISA index of economic, social and cultural status* remains in only 4 out of 32 countries/economies (Table 5.15). This implies that differences in performance, related to socio-economic status, in the computer-based assessment of mathematics do not stem from differences in the ability to use computers, but in differences in mathematics proficiency.

By contrast, in digital reading, differences in reading proficiency across socio-economic groups only partially account for differences in performance in digital reading. A small, direct association between socio-economic status and digital reading performance is observed. This direct association most likely stems from differences in navigation and evaluation skills – i.e. those components of reading that are emphasised to a greater extent when reading on line than when reading print. Even in digital reading, however, this direct association accounts for only 0.5% of the variation in performance, while the indirect association (through the effect of socio-economic status on print reading skills) accounts for 11.5% of the variation.

■ Figure 5.10 ■

Relationship among analogue skills, socio-economic status, and performance in computer-based assessments

Variation in performance on computer-based assessments explained by socio-economic status; direct and indirect effects (OECD average)



Note: The figure shows that socio-economic status explains 12.0% of the variation in digital reading performance. This is largely the result of the association between socio-economic status and performance in print reading. Only 0.5% of the variation in performance in digital reading is uniquely associated with socio-economic status.
Source: OECD, PISA 2012 Database, Table 5.15.

Previous sections showed that, in their free time, students from the top quarter of socio-economic status read on line and use the Internet to obtain practical information more than disadvantaged students do, even in countries where advantaged and disadvantaged students spend similar amounts of time on line. PISA data cannot show whether reading more on line results in better online reading skills, or the reverse. What they do show, however, is that the differences in use are highly related to differences in students' skills.

Trends in the relationship between digital reading performance and socio-economic status

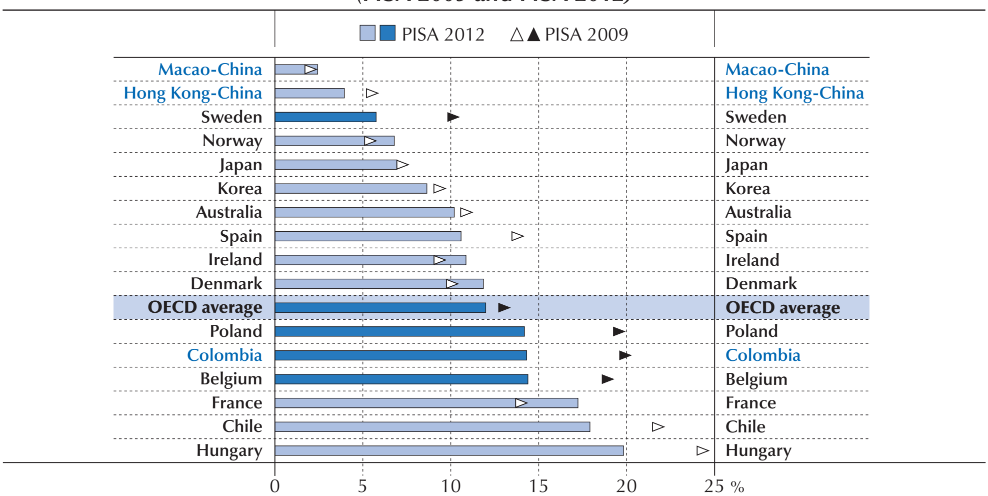
By analysing how the relationship between digital reading performance and socio-economic status has evolved over time, it is possible to assess whether the bridging of the so-called first digital divide – the fact that access to ICT is now almost universal – also translated into a reduction of the second digital divide – the fact that socio-economic status still has an impact on how well students can use new tools.

Figure 5.11 reports trends in equity for digital reading. In Belgium, Colombia and Poland, where socio-economic status had a strong impact on performance in digital reading in 2009, and in Sweden, the relationship weakened considerably by 2012. In none of these countries was a similar trend observed for print reading (Table 5.16). Meanwhile, in all four countries where equity in digital reading performance improved between 2009 and 2012, equity in access to ICT at home also improved (Figure 5.12).

■ Figure 5.11 ■

Trends in the relationship between digital reading performance and socio-economic status

Variation in digital reading performance explained by socio-economic status (PISA 2009 and PISA 2012)

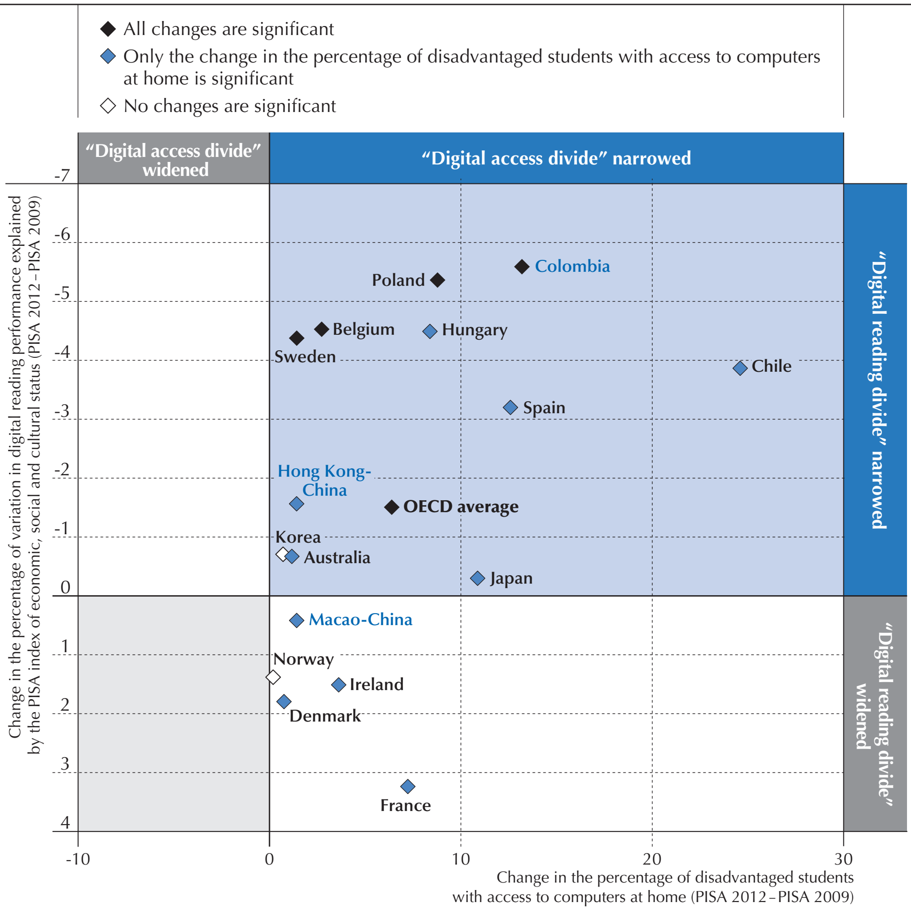


Notes: Countries/economies where the difference between PISA 2009 and PISA 2012 in the percentage of variation in digital reading performance explained by the *PISA index of economic, social and cultural status* is significant is marked in a darker tone.
The OECD average refers only to OECD countries represented in this chart.
Countries and economies are ranked in ascending order of the strength of the relationship between performance in digital reading and the PISA index of economic, social and cultural status.
Source: OECD, PISA 2012 Database, Table 5.16.
StatLink http://dx.doi.org/10.1787/888933253226

This suggests that greater equity in digital reading was mostly achieved by reducing the specific impact of socio-economic status on digital skills, rather than the general impact of socio-economic status on reading performance.

■ Figure 5.12 ■

Change between 2009 and 2012 in the "digital access divide" and "digital reading divide"



Notes: "Disadvantaged students" refers to students in the bottom quarter of the *PISA index of economic, social and cultural status*.
The OECD average refers only to OECD countries represented in this chart.
Source: OECD, PISA 2012 Database, Table 5.16.
StatLink http://dx.doi.org/10.1787/888933253235

Note

1. Socio-economically disadvantaged and advantaged schools are identified within individual school systems by comparing the average socio-economic status of the students in the system and the average socio-economic status of the students in each school, using the *PISA index of economic, social and cultural status* (ESCS). Socio-economically disadvantaged schools are those where the school mean ESCS is significantly lower than the country average ESCS (see OECD, 2013, Box IV.3.1).

Chapter 5 tables are available on line at http://dx.doi.org/10.1787/edu-data-en.

Note regarding Israel

The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

References

Attewell, P. (2001), "The first and second digital divides", *Sociology of Education*, Vol. 74/3, pp. 252-259.

Bonfadelli, H. (2002), "The Internet and knowledge gaps a theoretical and empirical investigation", *European Journal of Communication,* Vol. 17/1, pp. 65-84.

Compaine, B.M. (2001), *The Digital Divide: Facing a Crisis Or Creating a Myth?*, MIT Press.

Dimaggio, P., E. Hargittai, C. Celeste and **S. Shafer** (2004), "From unequal access to differentiated use: A literature review and agenda for research on digital inequality", in Neckerman, K. (ed.), *Social Inequality*, Russell Sage Foundation, pp. 355-400.

Fraillon, J., J. Ainley, W. Schulz, T. Friedman, and **E. Gebhardt** (2014), "Students' use of and engagement with ICT at home and school", In *Preparing for Life in a Digital Age*, Springer International Publishing, pp. 125-166.

Gui, M. (2007), "Formal and substantial internet information skills: The role of socio-demographic differences on the possession of different components of digital literacy", *First Monday, Vol.* 12/9.

Hargittai, E. and **Y.P. Hsieh** (2013), "Digital inequality", in W.H. Dutton (ed.), *Oxford Handbook of Internet Studies*, Oxford University Press, pp. 129-150.

Hargittai, E. and **A. Shaw** (2015), "Mind the skills gap: The role of internet know-how and gender in differentiated contributions to Wikipedia", *Information, Communication & Society,* Vol. 18/4, pp. 424-442.

Hill, B.M. and **A. Shaw** (2013), "The Wikipedia gender gap revisited: Characterizing survey response bias with propensity score estimation", *PLoS one*, Vol. 8/6.

Natriello, G. (2001), "Bridging the second digital divide: What can sociologists of education contribute?", *Sociology of Education,* Vol. 74/4, pp. 260-265.

OECD (2015), *The ABC of Gender Equality in Education: Aptitude, Behaviour, Confidence*, PISA, OECD Publishing, Paris, http://dx.doi.org/10.1787/9789264229945-en.

OECD (2014), "Indicator C3 How many students are expected to enter tertiary education?", in OECD, *Education at a Glance 2014: OECD Indicators*, OECD Publishing, Paris, http://dx.doi.org/10.1787/eag-2014-24-en.

OECD (2013), *PISA 2012 Results: What Makes Schools Successful (Volume IV): Resources, Policies and Practices*, PISA, OECD Publishing, Paris, http://dx.doi.org/10.1787/9789264201156-en.

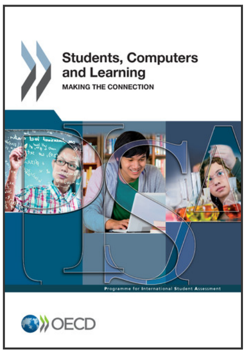
OECD (2001), "Understanding the Digital Divide", *OECD Digital Economy Papers*, No. 49, OECD Publishing, Paris, http://dx.doi.org/10.1787/236405667766.

Rogers, E.M. (2010), *Diffusion of Innovations,* 4th edition, Simon ans Schuster, New York.

Stern, M.J., A.E. Adams, and **S. Elsasser** (2009), "Digital inequality and place: The effects of technological diffusion on internet proficiency and usage across rural, suburban, and urban counties", *Sociological Inquiry,* Vol. 79/4, pp. 391-417.

Van Deursen, A.J.A.M. and **J.A.G.M., Van Dijk** (2014), "The digital divide shifts to differences in usage", *New Media & Society*, Vol. 16/3, pp. 507-526.

Van Dijk, J.A.G.M. (2005), *The Deepening Divide: Inequality in the Information Society*, SAGE Publications.



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