The questions education policy makers should ask

This chapter provides a synthesis of the PISA results concerning school policies and practices, and how they are related to both student performance and equity across a school system. It also summarises the characteristics common to high-performing and equitable school systems.

At the time this report was published, the COVID-19 pandemic was raging around the globe. Medical systems were straining to combat, or at least contain, the virus, as they struggled with severe shortages of supplies to tend to the seriously ill. National economies suffered vertiginous falls in their capital markets as "lockdown" measures, imposed to slow human-to-human transmission of the virus, shuttered businesses large and small. The course of the virus was unpredictable, as was the number of people who would ultimately succumb to it. The only certainties on the horizon were tens of thousands of deaths and a global recession, which would only exacerbate the already profound income inequality observed in most OECD countries.

What the COVID-19 pandemic meant for students and teachers in many parts of the world was an abrupt suspension of classes and closing of schools. Those who could, continued teaching and learning on line; those who weren't equipped with a computer or an Internet connection had more difficulty guiding and using their learning time. If they weren't already, parents became even more involved in their child's education – and often had to juggle the demands of their own work and household maintenance with the need to create and maintain a productive and captivating learning environment.

PISA 2018 was conducted well before COVID-19 had claimed its first victim, or had even become a household name. The findings discussed in this report do not reflect the impact of the pandemic. However, it may be useful to consider the implications of the results in light of the uncertainties and economic contractions that governments around the globe will be facing in the immediate aftermath of the pandemic - and probably well beyond.

In times of growing budget deficits, spending on education needs to be wise and appropriate. As PISA consistently finds, after a certain threshold is reached, it's not how much money a country invests in its education system that makes the greatest difference, but rather how that money is allocated. And that's where results from PISA can help. When governments have to make tough choices about how to spend their money most effectively, they can see, through PISA, which subgroup of students (or schools) may be most affected by a crisis, and which policies and practices have the strongest associations with performance, equity in education and student well-being. They can then make the necessary trade-offs and spending decisions, to meet the specific needs of their students, based on hard data.

Indeed, the results from PISA 2018 show that, across all countries and economies, about 23% of the variation in reading performance was associated with differences in student performance between the participating school systems. When considering performance differences within countries, about 33% of the variation lay between schools and 67% lay within schools. This means that both policy makers and school leaders need to assess what's working and what isn't in their systems and classrooms so that all students are given equal opportunities to succeed.

For example, with this unanticipated and sudden shift to online learning, policy makers and school leaders must now ask themselves:

ARE SCHOOLS EQUIPPED TO TEACH – AND ARE STUDENTS READY TO LEARN – REMOTELY?

Availability of technology at school

On average across OECD countries in 2018, there was almost one computer available at school for educational purposes for every 15-year-old student (the computer-student ratio is equal to 0.8). In Austria, Iceland, Luxembourg, Macao (China), New Zealand, the United Kingdom and the United States, the computer-student ratio was 1.25 or more, while in Albania, Brazil, Greece, Kosovo, Montenegro, Morocco, Turkey and Viet Nam, there was only one computer (or fewer) available for every 4 students (ratio = 0.25).

In most countries, the distribution of computers tended to be more equitable in schools than in homes. In fact, in 16 countries and economies, the computer-student ratio was greater in disadvantaged schools than in advantaged schools. In 17 countries and economies, the number of computers available per student was greater in advantaged schools than in disadvantaged schools. There were also more computers per student in private than in public schools, and in rural than in urban schools.

There has been notable progress in equipping schools with computers, with a widespread increase in the computer-student ratio between 2009 and 2018. The largest increases in the average number of computers per student were observed in Estonia, Iceland, Lithuania, Luxembourg, Sweden, the United Kingdom and the United States. On average across OECD countries, there was one additional computer available per every four students in 2018 than was available in 2009 (0.26 of an additional computer per student).

It is noteworthy that students attending schools with more computers per student scored lower in the PISA assessment than their peers in schools with fewer computers per student. On average across OECD countries, one additional computer per student in a school was associated with a 12-point decline in reading scores before accounting for other factors, and with a 6-point decline after accounting for students' and schools' socio-economic profile. (In 47 out of 77 participating countries/economies, the proportion of portable computers, such as laptops, in school was unrelated to students' reading scores.) While there may

be many reasons why there was a negative association between computers-per-student and students' scores, the finding does suggest that it takes more than providing technology to see better learning outcomes.

Adequacy of the technology available at school

Making digital devices available at school will not be useful unless those devices are adequate to the teaching and learning tasks at hand. PISA 2018 found that little more than two in three 15-year-old students were enrolled in a school whose principal reported that the digital devices at school are sufficiently powerful, in terms of computing capacity. In Japan, less than half of students were enrolled in such a school, and in Kosovo just one in five students were.

Differences between advantaged and disadvantaged schools were significant. For example, in Brazil 68% of students in advantaged schools attended a school whose principal reported that the school had sufficiently powerful digital devices, but just 10% of students in disadvantaged schools attended such a school. Large disparities were observed amongst OECD countries too. In Spain, there was a 40 percentage-point difference (70% vs. 30%) in the availability of sufficiently powerful digital devices between advantaged and disadvantaged schools.

Equally important, while in the four Chinese provinces/municipalities that participated in PISA 2018 (Beijing, Jiangsu, Shanghai and Zhejiang), Denmark, Lithuania, Singapore and Slovenia, 9 out of 10 students were in schools whose principal reported that their school's Internet bandwidth or speed is sufficient, on average across OECD countries, only 6 in 10 students attended such schools.

Some 40% of all computers available to 15-year-olds in school are portable. In a few high-income countries, most computers available at school are portable: in Denmark, Norway, Singapore and Sweden, 9 out of 10 computers are portable, and in the United States, 8 out of 10 computers are portable. By contrast, in 50 countries and economies, only 30%, at most, of all computers available at school are portable. In Georgia, Jordan, Malta, Morocco, the Philippines and Thailand, only 1 in 10 computers, at most, are portable.

Portable computers are more frequently available in private than in public schools, and in socio-economically advantaged than in disadvantaged schools, on average across OECD countries. Indeed, the growth in the availability of portable computers at school between 2015 and 2018 was due to gains amongst schools in the second, third and top quarters of the distribution of schools' socio-economic profile, while amongst disadvantaged schools, the share of portable computers did not change during the period. As a result, the disparity in access to portable computers related to socio-economic status increased between 2015 and 2018.

In addition, the infrastructure needed to use digital technologies effectively is not universally available. On average across OECD countries in 2018, more than 65% of students attended a school whose principal reported that the school's capacity to enhance learning and teaching using digital devices is sufficient in terms of the adequacy of software available, the computing capacity of digital devices, the Internet bandwidth or speed, and the number of digital devices connected to the Internet. Around 55% of students attended a school where an effective online learning platform is available to them, on average across OECD countries.

But differences between advantaged and disadvantaged schools in this regard are notable. For example, 71% of students attended schools where appropriate software is provided. However, significantly more students in advantaged schools (77% of students in advantaged schools) than in disadvantaged schools (65% of students in disadvantaged schools) were able to benefit from adequate software at school.

Teachers' capacity to use technology

PISA 2018 asked school principals about different aspects of their school's capacity to enhance teaching and learning using digital devices. On average across OECD countries in 2018, 65% of 15-year-olds were enrolled in schools whose principal reported that teachers have the necessary technical and pedagogical skills to integrate digital devices in instruction. The proportion varied considerably between socio-economically advantaged and disadvantaged schools. In Sweden, for example, 89% of students in advantaged schools attended such a school, but only 54% of students in disadvantaged schools did.

On average across OECD countries, about 60% of 15-year-old students were enrolled in schools whose principal reported that teachers have sufficient time to prepare lessons integrating digital devices, ranging from close to 90% of students in the four Chinese provinces/municipalities that participated in PISA 2018 to little more than 10% of students in Japan.

The picture was similar when it comes to the availability of professional resources for teachers to learn how to use the digital devices. About 55% of students were in schools where teachers are provided with incentives to integrate digital devices into their teaching or have sufficiently qualified technical assistant staff.

School practices for using digital devices effectively

The effectiveness of using digital devices and ICT to enhance teaching and learning may also depend on schools' policies and practices. PISA 2018 asked school principals whether they had formal guidelines (e.g. written statements, programmes or policies) or specific practices (e.g. regularly scheduled meetings) that focus on how to use digital devices effectively in the classroom.

On average across OECD countries, the most common school practices intended to improve learning through the use of digital devices were: having regular discussions between principals and teachers about the use of digital devices for pedagogical purposes (63% of students attended schools that practice this); having written school statements about the use of digital devices (62% of students); and having a specific programme to prepare students for responsible Internet behaviour (60% of students).

### Box V.9.1. **Inequities in the home learning environment**

For some students, even the basics for learning are not available at home. On average across OECD countries, 9% of 15-year-old students do not have a quiet place to study in their home; in Indonesia, the Philippines and Thailand, more than 30% of students do not have such a place to study. These tend to be students from the most socio-economically disadvantaged backgrounds. Even in PISA top-performer Korea one in five students from the 25% most disadvantaged schools reported that they do not have a place to study at home, while one in 10 students in advantaged schools reported so.

Online learning does not just require a place to study, but also a computer at home that students can use to do their work. PISA 2018 results revealed considerable disparities across and within countries in the availability of home computers for schoolwork. While in Austria, Denmark, Iceland, Lithuania, the Netherlands, Norway, Poland, Slovenia and Switzerland over 95% of students reported that they have a computer at home to use for their schoolwork, only 34% of students in Indonesia reported so. Here, too, there tend to be large differences between socio-economic groups. For example, virtually every 15-year-old in socio-economically advantaged schools in the United States has a computer at home for schoolwork, but only three in four students in disadvantaged schools have one. In Peru, 88% of students in advantaged schools but just 17% of students in disadvantaged schools have a computer at home for their schoolwork.

When it comes to Internet connectivity, the picture is similar. In some countries, access to the Internet at home is nearly universal, while in others only 50% of 15-year-old students have Internet access at home. In Mexico, 94% of advantaged students have an Internet connection at home, but just 29% of disadvantaged students do.

Figure V.9.1 **Students' online learning environment at home**

Based on principals' reports; OECD average
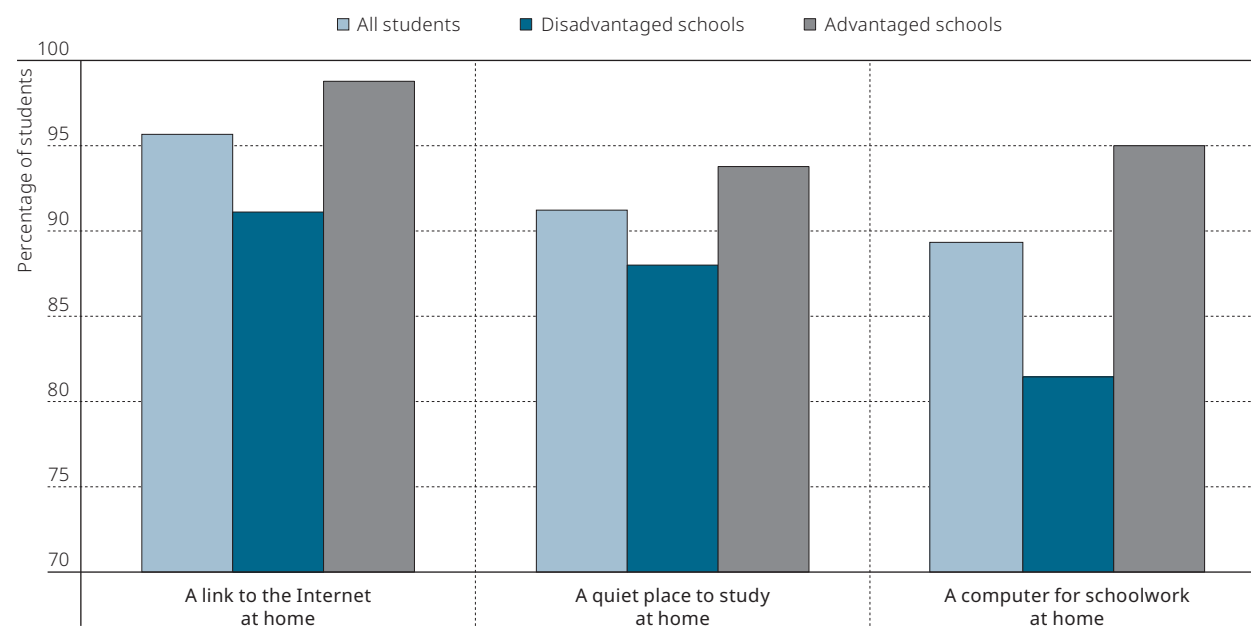
Note: All differences between advantaged and disadvantaged schools are statistically significant, on average across OECD countries.
Source: OECD, PISA 2018 Database, Table V.B1.9.1, Table V.B1.9.2 and Table V.B1.9.3.
StatLink 🔗 https://doi.org/10.1787/888934132165

School guidelines and practices to enhance teaching and learning using digital devices were more often observed in socio-economically advantaged schools than disadvantaged schools. Across OECD countries, some 23% of the differences in equity in reading performance could be accounted for by the percentage of students in schools whose principal reported that their school has its own written statement about the use of digital devices.

The results show that it is important to distinguish between the quantity and quality of digital devices. While the number of computers available to students in advantaged and disadvantaged schools were nearly the same, portable computers, including laptops and tablets, were more prevalent in advantaged schools. The ability to provide remote education for all students depends crucially on the availability of digital devices at home. Data show that the distribution of computers at home is less equitable, so it would be particularly important to provide portable digital devices to students in disadvantaged schools.

The results also show significant disparities in the availability of computers with sufficient power and Internet bandwidth or speed. Disadvantaged schools should be provided with sufficient bandwidth since PISA finds that that particular resource is associated with greater equity at the system level.

In order to use the hardware efficiently, adequate software and digitally qualified teachers must also be available. Having adequate software and an effective online learning platform was also unevenly distributed between advantaged and disadvantaged schools. It would be useful to develop software and online platforms that are accessible to all schools. There were more teachers with the necessary skills to integrate digital devices into instruction, and more qualified technical assistant staff, in advantaged schools than in disadvantaged schools. More than one in three teachers lack fundamental technical and pedagogical skills, so providing teachers with the necessary training would certainly improve online teaching. It would also be helpful to offer schools guidelines for the use digital devices since having such guidelines is associated with greater equity in the system.

Even while addressing the suddenly urgent issue of connectivity, and even – perhaps especially – as the global economy contracts as a result of the pandemic, education policy makers still need to consider other basic questions if they want to be able to provide all students with the best education possible. For example:

IS HAVING MORE COMPUTERS AT SCHOOL RELATED TO BETTER PERFORMANCE?

While results show that the proportion of portable computers in school is largely unrelated to students' reading scores, having high-speed Internet access at school is associated with better performance, even after accounting for socio-economic status.

Access to the Internet was virtually universal in most education systems that participated in PISA 2018. In 55 out of 79 countries and economies, 9 out of 10 computers available to 15-year-olds for educational purposes at school were connected to the Internet. On average across OECD countries, having more computers at school that are connected to the Internet was positively associated with reading performance. Students in schools whose principal reported that the school's Internet bandwidth or speed is sufficient scored 10 score points higher in reading, on average across OECD countries, than students in schools whose principals did not report adequate Internet speed. However, after accounting for students' and schools' socio-economic profile, these positive associations disappeared, as students in advantaged schools, where computers are more often connected to the Internet and the connection is faster, tended to score higher.

Internet connectivity was strongly associated with mean reading performance at the system level. High-performing countries and economies tended to have more school computers (those available to 15-year-olds for educational purposes) that are connected to the Internet. This positive relationship was observed, even after accounting for per capita GDP, across all participating countries and economies. Differences in Internet connectivity accounted for as much as 57% of the differences in mean reading performance across all participating countries and economies in PISA 2018. In addition, schools' Internet bandwidth or speed was positively correlated to mean reading performance, and to equity in reading performance, across all participating countries and economies, before and after accounting for per capita GDP.

But access to adequate hardware is just one component of digital learning; teachers need to know how to use technology to enhance their instruction. PISA 2018 found that a school's capacity to enhance teaching and learning using digital devices is greater in socio-economically advantaged schools than disadvantaged schools. On average across OECD countries, students in advantaged schools were more likely to attend a school whose principal agreed that the school's capacity for using digital devices is sufficient.

Students attending schools with a greater capacity to enhance teaching and learning using digital devices scored higher in reading, on average across OECD countries. For example, students in schools where teachers have the necessary technical and

pedagogical skills to integrate digital devices in instruction scored five points higher than students in schools where teachers did not have these skills, although this difference was not statistically significant after accounting for socio-economic status.

Having the right software for learning was also related to reading performance. Some 34% of the variation in mean reading performance across all countries/economies could be accounted for by differences in the availability of adequate software.

It is important, too, for schools to clarify how computers are to be used in their classrooms. Doing so can provide a blueprint for teachers as they design lessons that may include web-based material. Across all participating countries and economies, school systems with a higher percentage of students in schools whose principal reported that their school has its own written statement about the use of digital devices generally showed higher mean performance in reading, mathematics and science.

At the system level, both the absolute level of and disparities in digital resources are associated with countries'/economies' performance and degree of equity in education, as shown in Box V.9.2. Providing all schools, including disadvantaged schools, with greater access to digital devices and guidelines for using them appropriately would be crucial for both performance and equity.

ARE TODAY'S SCHOOLS WELL-EQUIPPED WITH THE RELEVANT HUMAN AND MATERIAL RESOURCES TO MEET THEIR STUDENTS' NEEDS? ARE THESE RESOURCES DISTRIBUTED EQUALLY AMONGST SCHOOLS IN AN EDUCATION SYSTEM?

The most valuable educational resource at school is the teaching staff. Students cannot be expected to learn effectively if they do not have access to well-prepared and qualified teachers – and if there are not enough teachers at the school to give their students the support they need. On average across OECD countries in 2018, 27% of students were enrolled in schools whose principal reported that learning is hindered by a perceived lack of teaching staff, and 33% were enrolled in schools whose principal reported that learning is hindered by a perceived lack of assisting staff. Shortages of teachers and support staff tended to be reported more often by principals of disadvantaged schools (in 42 countries and economies) and by principals of public schools (in another 42 countries and economies). In 44 countries and economies, students attending schools whose principal reported greater shortages of teaching and support staff scored lower in reading.

The percentage of teachers fully certified by an appropriate authority was positively correlated with mean performance in reading, even after accounting for per capita GDP, across OECD countries. Differences in teacher certification accounted for about 16% of the differences in mean reading performance across all countries and economies. Moreover, the percentage of full-time teachers was associated with greater equity in reading performance across all countries and economies, even after accounting for per capita GDP.

As with shortages of teaching and support staff, socio-economically disadvantaged schools were more likely than advantaged schools to suffer shortages of material resources (i.e. school infrastructure and educational materials), on average across OECD countries and in 47 education systems. Disparities in material resources related to schools' socio-economic profile were comparatively large in six Latin American countries (Argentina, Brazil, Colombia, Mexico, Panama and Peru) and three Southeast Asian countries (Indonesia, the Philippines and Thailand).

Disparities in shortages of material resources were also observed between rural and urban schools (in 25 education systems, rural schools suffered from more shortages) and between public and private schools (in 39 education systems, public schools suffered from more shortages).

On average across OECD countries, shortages of educational materials were more strongly associated with lower reading performance than shortages of physical infrastructure. After accounting for students' and schools' socio-economic profile, the association between students' reading scores and schools' physical infrastructure became statistically insignificant; but the association between reading scores and shortages of educational materials remained negative and statistically significant.

At the system level, PISA 2018 found that instruction hindered by a lack of educational materials was associated with lower reading scores in all participating countries and economies. School systems that showed more equity in the allocation of material resources tended to score higher in reading.

An effective, online learning platform – especially when remote learning becomes education's lifeline – has become a must-have if countries are to make good use of whatever computer hardware they make available to their students. On average across OECD countries in 2018, just about half of 15-year-olds were enrolled in schools whose principal reported that an effective online learning support platform is available. Again, there were large variations within and across countries, especially related to schools' socio-economic profile. Across all countries and economies, on average, 58.8% of students in advantaged schools attended a school whose principal reported that the school has an effective online learning platform, while only 48.8% of students

in disadvantaged schools attended such a school. In the four Chinese provinces/municipalities that participated in PISA 2018, Denmark, Macao (China) and Singapore, 9 out of 10 students were enrolled in schools that have an effective online learning support platform; in Argentina, Belarus, Costa Rica, Japan, Kosovo, Luxembourg, Morocco, the Republic of North Macedonia, Panama and Peru, less than 30% of students were enrolled in such a school.

Across OECD countries, about 15% of the difference in equity in reading performance could be accounted for by the percentage of students in schools whose principal agreed or strongly agreed that "an effective online learning support platform is available". The correlation was weaker, but statistically significant, across all countries/economies. Across all participating countries and economies, having an effective online platform was also associated with better performance at the system level.

One of the intersections of material and human resources at school is class size. Do schools have the physical infrastructure to accommodate smaller classes? Are there enough teachers at school to provide more personalised support to students when there are fewer of them in class? And how is class size associated with student performance?

On average across OECD countries in 2018, large language-of-instruction classes were more frequently observed in socio-economically advantaged schools than in disadvantaged schools, in urban than in rural schools, in public than in private schools, and in upper secondary than in lower secondary schools. Students attending larger language-of-instruction classes (i.e. one more student per class) scored three score points higher in reading, on average across OECD countries. Even after accounting for students' and schools' socio-economic profile, in 39 countries/economies and on average across OECD countries, students attending larger language-of-instruction classes scored higher in reading (an increase of one student per class corresponded to an increase of one score point). In 3 countries/economies the relationship was negative and in 33 countries/economies it was not statistically significant.

But at the system level, the results were different. Education systems with smaller language-of-instruction classes generally showed higher mean reading performance than systems with larger classes. There was a negative correlation between larger classes and mean performance in reading, even after accounting for GDP, across all participating countries and economies. Differences in class size accounted for about 12% of the difference in mean reading performance across all countries and economies.

While high-performing systems tended to invest in smaller classes, PISA 2018 data show that large classes have not prevented schools in East Asia from providing good instruction, and that, across OECD countries, students in large classes tended to score higher. Given the high costs associated with smaller classes, governments should seriously consider the opportunity costs of reducing class size, and other approaches should be also considered to compensate for large classes. For example, the role of teaching strategies, disciplinary climate, and student motivation and dispositions in large classes could be further studied in order to provide guidance for schools and teachers who teach large classes.

Can schools compensate for disadvantage at home?

In many countries, disadvantaged students often do not have a quiet place to study at home. This makes it even more important that schools provide such a space for their students. It is an investment that pays off in student outcomes – at both the school and system levels. PISA 2018 found that in 20 countries and economies, attending a school that provides space where students can do their homework is associated with higher scores in reading, after accounting for the socio-economic profile of students and schools. Students who have access to a room at school for doing homework scored 14 points higher in reading than students without access to such a room at school, on average across OECD countries; after accounting for socio-economic status, they scored 4 points higher.

Across all countries and economies, and after accounting for per capital GDP, there was a strong correlation between the share of students who have access to a room at school for doing homework and mean performance in reading, mathematics and science. Across OECD countries, the correlations were weaker, but they were also statistically significant in the three core subjects, after accounting for per capita GDP.

But the share of students in disadvantaged schools whose school provides a room for homework was about 7 percentage points smaller than the share of students in advantaged schools whose school provides such a space, on average. This indicates that the students who could benefit the most from this precious resource – a space dedicated to quiet study – are less likely to have access to it.

Providing all schools with better physical infrastructure and extra capacity is important as it lends additional space for students. In the aftermath of the coronavirus pandemic, schools may need to become more flexible and accommodate students with more space to adhere to the new conventions.

The PISA 2018 results also showed considerable disparities between advantaged and disadvantaged schools related to shortages of education staff and material resources, including digital resources. However, in high-performing countries/economies, differences in the availability and quality of material resources between disadvantaged and advantaged schools were smaller or, in some cases, disadvantaged schools had more material resources than advantaged schools. The picture was similar when considering digital resources, including Internet speed, digital devices' computing capacity, and the availability of software and an effective online learning support platform. Here too, in high-performing countries/economies, socio-economic disparities were smaller or, in some cases, disadvantaged schools tended to have more of these resources than advantaged schools, while the level of digital resources in these systems was generally high to begin with. Furthermore, in high-performing countries and economies, more schools had a specific programme to prepare students for responsible Internet behaviour. Socio-economic disparities were also smaller and, in some cases, disadvantaged schools were more likely than advantaged schools to have such a programme.

Ensuring that all schools, both disadvantaged and advantaged, have adequate and high-quality material resources, including digital resources, and the appropriate support is important for the learning needs of students from all backgrounds.

IS MORE LEARNING TIME ASSOCIATED WITH BETTER STUDENT PERFORMANCE?

There is still no consensus on how much time students should spend in regular classes each week. PISA 2018 found that learning time in regular language-of-instruction lessons was positively associated with reading achievement, but only amongst students who spent up to three hours per week in such lessons; amongst students who spent four, five or more hours per week, the association between learning time and student achievement became null then negative, on average across OECD countries.

System-level analyses also showed a similar curvilinear relationship between time spent in regular lessons and performance. Across all countries and economies, in those countries/economies where more students spent less than 20 hours per week in regular lessons (including all subjects) or more than 39 hours per week, students scored worse (the upper threshold in OECD countries was 32 hours per week). Moving from one hour or less of learning time in the language of instruction to three hours was associated with larger improvements in reading scores amongst disadvantaged than advantaged students. This may reveal that, initially, returns to learning were greater amongst disadvantaged students. However, beyond three hours of instruction there were diminishing returns to learning for disadvantaged students, while diminishing returns were observed after four hours of instruction for advantaged students This suggests that the relationship between learning time and performance is heterogeneous, depending on student, and perhaps school, characteristics.

Most parents would like to see their children in schools where they can acquire solid academic knowledge and skills but also have enough time to participate in non-academic activities, such as sports, theatre or music, that develop their social and emotional skills, and contribute to their well-being. Therefore, it is important to ensure that learning time is productive so that students can develop their academic, social and emotional skills in a balanced way.

DO ALL STUDENTS HAVE EQUAL OPPORTUNITIES TO LEARN AT SCHOOL?

PISA 2018 shows that foreign-language lessons take up a substantial proportion of 15-year-old students' learning time in school. On average across OECD countries, students spent more time in foreign-language lessons (3.6 hours per week) than in science lessons (3.4 hours), while they spent slightly more time in language-of-instruction lessons (3.7 hours) and mathematics lessons (3.7 hours) than in foreign-language lessons.

Socio-economic disparities in learning time in regular school lessons are most prominent in foreign-language lessons, followed by science lessons, on average across OECD countries. Disadvantaged students reported spending 3.3 hours per week in foreign-language lessons, while advantaged students reported spending 4 hours per week. This means that advantaged students spent 42 minutes more than disadvantaged students in foreign-language lessons. Similarly, advantaged students spent 3.8 hours per week and disadvantaged students spent 3.2 hours per week in science lessons, a difference of 34 minutes. Smaller differences were observed for mathematics lessons: advantaged students spent 3.8 hours per week and disadvantaged students spent 3.6 hours per week in regular mathematics lessons. Both advantaged and disadvantaged students spent 3.7 hours per week in language-of-instruction classes.

Why are socio-economic disparities in learning time observed in foreign-language and science lessons, but less so in mathematics lessons and not at all in language-of-instruction lessons? One possible explanation would be that the two former subjects are more likely to be non-compulsory. Either certain schools do not offer these lessons or students do not enrol in these classes as they are elective subjects, even if offered by schools.

It is worth noting that advantaged students reported spending more time in foreign-language lessons than in the other three subjects. On average across OECD countries, advantaged students reported spending 4 hours per week in foreign-language

lessons, while they reported spending 3.7 hours per week in language-of-instruction and 3.8 hours per week in mathematics and science lessons. This suggests that advantaged students emphasise learning foreign languages.

Being able to communicate in multiple languages is increasingly important in an interconnected world. Beyond its use as a practical tool, a mastery of other languages may be related to more positive attitudes towards other cultures. Volume VI of PISA 2018 Results analyses in detail the relationship between students' mastery of languages other than their own and their ability to communicate across cultures.

PISA 2018 results may suggest the emergence of a new type of social divide and a potential threat to achieving a harmonious interconnected world: advantaged students have more opportunities to learn foreign languages than disadvantage students do. This may lead to unequal job opportunities later on in their lives. It may leave certain groups of students unprepared for living with others from different backgrounds if exposure to other languages is related to students' ability to engage in open, appropriate and effective communication across cultures.

Further research is needed to fully understand what drives the socio-economic disparities in time spent in foreign-language lessons. Both whether and how different types of schools provide foreign-language lessons, and the choices students make, could result in such socio-economic disparities. On average across OECD countries, students in private schools, in schools in urban areas, or in upper secondary education spend more time in foreign-language lessons than those in public schools, in schools in rural areas, or in lower secondary education. One may also need to examine the potential risk of providing more choice of subject matter to students without providing relevant and proper guidance. Would more elective courses result in some students selecting their courses based on their immediate interest rather than their long-term benefit? Would a stringent core curriculum ensure that all students have equal opportunities to learn skills that are key to their future well-being? These questions need to be considered in any discussion about the trade-offs between teaching to a curriculum common to all students vs. teaching to cater to individual students' needs and interests.

WHAT CAN PRE-PRIMARY EDUCATION MEAN FOR PERFORMANCE AND EQUITY IN EDUCATION?

Many studies, including previous PISA assessments, have consistently shown that attendance at pre-primary school is associated with higher performance amongst adolescents. In recent years, many countries have expanded access to this level of education. Still, on average across OECD countries, around 20% of the students who sat the PISA 2018 test reported that they had not attended pre-primary education. In 14 countries and economies, more than half of students had not attended. Baku (Azerbaijan), Bosnia and Herzegovina, Colombia, Kosovo, Saudi Arabia, Serbia and Turkey showed the largest proportions of students (between 65% and 75%) who had not attended pre-primary education.

In 68 out of 78 countries and economies for which there were comparable data, students who had not attended pre-primary education were more likely to be socio-economically disadvantaged and enrolled in more disadvantaged schools at the age of 15.

In addition, in many countries, more students had spent more years in pre-primary education than was observed in earlier cycles of PISA. Between 2015 and 2018, in 28 countries/economies, the share of students who had attended pre-primary school for three years increased. Students who had attended pre-primary education for longer scored better in reading than students who had not attended pre-primary education at all – but only up to a certain point. The relationship between attendance at pre-primary education and student achievement later on was curvilinear, or u-shaped, after accounting for students' and schools' socio-economic profile.

Changes between PISA 2015 and 2018 in the percentage of students who had attended pre-primary school for one year were positively correlated with changes in mean reading performance over the same period, across all participating countries and economies. At the system level, across all participating countries and economies, education systems where more students had attended pre-primary education for three years or more generally showed higher mean performance in reading, even after accounting for per capita GDP. In addition, a positive association with equity was observed across OECD countries.

Not attending pre-primary education is associated with lower reading scores, and there are substantial differences between socio-economically advantaged and disadvantaged students (a 12 percentage-point difference). It is therefore important to provide access to pre-primary education to all students, but especially disadvantaged students. A strong beginning in early learning establishes neural pathways that are more difficult to develop later. Research has shown the benefits of pre-primary education in promoting the development of cognitive, language and numeracy skills, especially amongst the least advantaged students.

Ensuring pre-primary attendance for all students is not sufficient to create an equitable education system. PISA 2018 results showed that in countries/economies where more students had attended pre-primary education for at least two years but less than three, students' socio-economic profile was more strongly related to their performance at the age of 15. Further examination

is needed to fully understand this relationship, but these results may imply that advantaged students tend to benefit more than disadvantaged students from spending more time in pre-primary education – or that there is a difference between the two groups of students in the quality of the pre-primary education they had attended. When expanding and extending pre-primary education, care must be taken not to widen the gap between advantaged and disadvantaged students in access to and the quality of this level of education.

IS GIVING PARENTS MORE SCHOOL CHOICE BETTER FOR AN EDUCATION SYSTEM AS A WHOLE? WHAT ABOUT SELECTIVITY IN SCHOOL ADMISSIONS?

In theory, given students' diverse needs and interests, a larger number of options for schooling in any one school system offers better value by promoting competition for enrolment amongst schools and, in doing so, prompting schools to innovate, experiment with new pedagogies, become more efficient and improve the quality of the learning experience. Proponents of school choice argue that the social and cultural diversity of modern societies calls for greater diversification in the education landscape, including by allowing non-traditional providers and commercial companies to enter the market.

But critics of school choice argue that, when presented with more choice, students from advantaged backgrounds often opt to leave the public system, leading to greater social and cultural segregation in the school system. At the macro level, such segregation deprives children of opportunities to learn, play and communicate with children from different social, cultural and ethnic backgrounds, which, in turn, threatens social cohesion.

More concretely, many parents assume that private schools produce better learning outcomes for their children. PISA 2018 found that, on average across OECD countries and in 40 education systems, students in private schools (government-dependent and -independent combined) performed better in reading than students in public schools (the "raw" difference, i.e. before accounting for students' and schools' socio-economic profile). Amongst these 40 education systems, the raw score-point difference in favour of students in private schools ranged from 19 points in Korea to 102 points in Brazil.

But after accounting for students' and schools' socio-economic profile, students in public schools scored higher in reading than students in private schools, on average across OECD countries (by 14 score points, in favour of public schools) and in 21 education systems (ranging from 22 score points higher in Malaysia to 117 points higher in Serbia). Students in private government-dependent schools scored 4 points lower in reading, on average, while those in private independent schools scored 21 points lower than students in public schools.

At the system level, there were no clear patterns of correlation between the share of students in different types of schools and mean student performance or equity in education.

The share of students in schools whose principal reported that one or more schools compete for students in the same area was larger in socio-economically advantaged schools (85% of students) than in disadvantaged schools (72% of students), in urban schools (87% of students) than in rural schools (53% of students), and in private schools (90% of students) than in public schools (75% of students).

At the system level, across all participating countries/economies, the percentage of schools that compete with two or more schools was weakly but positively associated with reading scores, after accounting for per capita GDP. However, such a positive association was not observed across OECD countries.

Academic selectivity was not consistently correlated with mean student performance; however students in academically selective schools scored five points higher, on average across OECD countries, after accounting for socio-economic status. OECD countries with fewer academically selective schools generally showed greater equity in student performance. Furthermore, in systems with greater equity in education, students are sorted into different education programmes when they are older.

Across OECD countries, changes between 2009 and 2018 in the percentage of students attending a school where admission is never based on the student's record of academic performance were positively correlated with changes in equity in reading. This means that equity in education tended to improve in countries where the prevalence of academic selectivity decreased over the period.

Nurturing academic excellence for all students might entail having good schools easily accessible in every neighbourhood, providing adequate transportation and reducing the financial burden on parents, particularly those in low-income areas. To help families understand the full range of options available to them, systems that offer a choice of schools can create or improve websites or other information systems that provide parents with clear information about schools in their area, such as the schools' academic performance, graduation rates and admissions policy. These systems can also provide families who do not have access to such information with the additional support they need to obtain it.

WHAT KINDS OF ASSESSMENT AND EVALUATION POLICIES MAKE A REAL DIFFERENCE FOR SCHOOLS AND SCHOOL SYSTEMS?

On average across OECD countries, students in schools whose principals reported that their school seeks written feedback from students scored better in reading than students in schools that do not seek written feedback, even after accounting for students' and schools' socio-economic profile. In addition, equity in student performance tended to be greater amongst countries and economies that have a higher percentage of students in schools that seek written feedback from students.

Feedback from students is useful for identifying the aspects of teaching or school management that could be improved. Schools that seek feedback from students may be better prepared to correct deficiencies in the education process. Moreover, this type of feedback provides an incentive for teachers to improve their methods of instruction, especially if this feedback is in written form. Written feedback can give students a sense of agency, and a belief that they can influence their own learning. It can also strengthen schools' and teachers' sense of accountability.

In countries/economies with greater equity in education, student assessments are used to inform parents about their child's progress and to identify aspects of instruction/curriculum that could be improved. The importance of parents' involvement is also highlighted in Volume III of PISA 2018 Results. The average reading score was higher in those countries and economies where more parents discussed their child's progress on the initiative of teachers, and that positive association remained even after accounting for per capita GDP. For every 10 percentage-point increase in the share of parents who discussed their child's progress on the teachers' initiative, the average reading score improved by 10 points, on average across the 74 countries and economies with available data. While these results cannot be interpreted as cause and effect, the prevalence of parents discussing their child's progress on the initiative of teachers may be an indication of a school system's responsiveness. The results imply that schools' taking the initiative to share the results of student assessments and discuss with parents their child's progress may be one way for schools to be accountable for their students' learning.

To improve the quality of the education they provide, high-performing countries/economies find a balance between school autonomy and more centralised accountability measures. For example, countries and economies with greater equity in education often have some mandatory accountability arrangements that are set at the district or national level, such as seeking written feedback from students or having regular consultations on school improvement at least every six months, while schools are responsible for ensuring their students' learning by, for example, developing and disseminating written standards of student performance. Similarly, in high-performing countries/economies, implementation of a standardised policy for reading-related subjects taught at school (including a school curriculum with shared instructional materials, and staff development and training) tends to be mandatory and regulated at the district or national level, while schools encourage and make available teacher mentoring on their own initiative. This indicates that schools' professional autonomy and more centralised accountability measures work in concert to ensure the quality of all student learning.

Box V.9.2. **What are the characteristics common to successful education systems?**

While there is no silver bullet in education, as previous PISA assessments have shown, PISA 2018 results suggest that high-performing systems and/or systems with greater equity in education share several characteristics.[1]

In high-performing education systems:

- More students had attended pre-primary school for three years or more.

- Fewer students had repeated a grade.

- More students are in the modal grade.

- Ability grouping in classes in all subjects is less prevalent, while ability grouping in classes in some subjects is more prevalent.

- More teachers are fully certified.

- There are fewer students per class.

- The gap in the availability and quality of material resources between disadvantaged and advantaged schools is smaller or, in some cases, disadvantaged schools have more material resources than advantaged schools.

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- In terms of digital resources:

  - Schools have more digital devices, such as data projectors, and computers that are connected to the Internet with sufficient speed and that have sufficient computing capacity, and have an effective online learning support platform.

  - More schools have sufficient Internet speed and bandwidth.

  - The differences between disadvantaged and advantaged schools in Internet speed, digital devices' computing capacity, the availability of software and effective online learning support platform are small. In some cases, disadvantaged schools have more of these than advantaged schools.

  - Disparities between disadvantaged and advantaged schools in the likelihood of whether schools have their own written statement about the use of digital devices, and whether schools have their own written statement about using digital devices for pedagogical purposes are small. In some cases, disadvantaged schools are more likely to have them than advantaged schools.

  - More schools have a specific programme to prepare students for responsible Internet behaviour. Socio-economic disparities are also smaller and, in some cases, disadvantaged schools are more likely to have such a programme than advantaged schools.

  - More schools schedule time to discuss instructional materials using digital devices.

- More students spend a moderate amount of time in regular school lessons (24-27 hours per week for language-of-instruction, mathematics, science and foreign-language lessons), rather than 20 hours or less or 39 hours or more.

- More schools provide a room where students can do their homework and staff who help students with their homework.

- More schools provide extracurricular activities, such as band, orchestra or choir, lectures or seminars (e.g. guest speakers, such as writers or journalists) and work with local libraries.

- More schools organise teacher mentoring based on their own initiative.

- More schools implement a standardised policy for reading-related subjects taught at school (including a school curriculum with shared instructional materials, and staff development and training) based on district or national policies.

In systems with greater equity in education:

- Fewer students had attended pre-primary school at least two years but less than three.

- Fewer students had repeated a grade.

- More students are in the modal grade.

- Students are sorted into different education programmes when they are older.

- In terms of digital resources:

  - More schools have an effective online learning support platform.

  - More schools schedule time to discuss instructional materials using digital devices.

- Disadvantaged schools offer almost as much learning time for foreign languages in regular school lessons as advantaged schools do (or, in some cases, disadvantaged schools offer even more time than advantaged schools).

- More schools use student assessments to inform parents about their child's progress and to identify aspects of instruction or the curriculum that could be improved.

- More schools have written specifications for student performance based on the school's initiative, seek written feedback from students based on district or national policies, and have regular consultations on school improvement at least every six months, based on district or national policies.

HOW CAN EDUCATION SYSTEMS SHOW THAT THEY HAVE HIGH EXPECTATIONS FOR ALL OF THEIR STUDENTS?

What is the best way of helping struggling students? Retaining students in the same grade for an additional year may be a popular idea amongst policy makers and educators in many countries, but a growing body of research points to the negative consequences of grade repetition. PISA 2018, like previous PISA results, showed that countries/economies where grade repetition is more prevalent tended to have lower performance and less equity in education.

The results suggest that making struggling students repeat a grade is a less-efficient approach to attaining higher performance in the education system as a whole than advancing struggling students to the next grade with others while providing additional support for them. Furthermore, in countries/economies where many students had repeated a grade, students' socio-economic status strongly determined their performance. This is because, in a majority of countries/economies, disadvantaged students had a greater chance of having repeated a grade than advantaged students, even when comparing students from the two socio-economic groups who had similar reading scores. This suggests that factors other than academic performance influence the decision on whether a student has to repeat a grade – and this is more likely to happen to socio-economically disadvantaged students than to advantaged students. Consequently, the performance gap between disadvantaged and advantaged students increases through their education career.

It may be difficult for school systems to identify those cases where students are retained unfairly, so setting ambitious goals to reduce the use of such practices throughout the system may help limit abuses. But struggling students still need support. Additional guidance and learning time inside or outside of school, accompanied by the establishment of clear, challenging and achievable goals can help. Curricula are usually designed to be followed by all students; but designing individualised learning plans may allow students who are struggling to learn the material and to progress at their own pace, ultimately meeting the standards set for all students, but over a longer period of time.

Fortunately, there has been notable progress in reducing the use of grade repetition. The percentage of students who reported that they had repeated a grade at least once prior to sitting the PISA test decreased by three percentage points between 2003 and 2018, on average across OECD countries. The number of countries/economies where the incidence of grade repetition decreased over this period is larger than the number countries/economies where the incidence of grade repetition increased.

Despite these signs of progress, changing a school system's policies and practices does not happen overnight. Still, 11% of students had repeated a grade on average across OECD in 2018. What immediate actions can schools and teachers take to minimise the negative impact of grade repetition? PISA 2018 results show that in a majority of countries/economies students who had repeated a grade in primary or secondary school were less likely than students who had not repeated a grade to believe that their ability and intelligence can develop over time, i.e. they benefited from having a growth mindset. If a person thinks that his/her ability is more or less fixed and unchangeable, why would he/she make an effort to improve?

Volume III of PISA 2018 Results, *What School Life Means for Students' Lives*, examines the relationship between a growth mindset and various student characteristics. According to the results discussed in that volume, students who endorsed a growth mindset scored better in reading, set more ambitious learning goals, were more motivated to master tasks, and perceived more value in schooling, on average across OECD countries, than students who did not endorse a growth mindset. These results suggest that a lack of a growth mindset amongst grade repeaters may amplify performance gaps between students who had repeated a grade and those who had not.
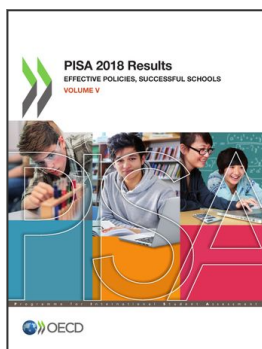
It is crucial for schools and teachers to provide feedback to students and guide students to the appropriate strategies to enhance their learning. Through positive learning experiences (e.g. persevering after failure and ultimately succeeding) students would see the importance of investing effort and trying various approaches. Instilling a growth mindset in students who had repeated a grade may lead to improvements in their performance, which, in turn, could result in higher overall performance in the school system and greater equity in education.

Similarly, instilling a growth mindset has the potential to mitigate the adverse impact of tracking on equity in education. Equity in reading performance was generally greater in countries and economies with a higher percentage of students enrolled in general, as opposed to vocational, programmes. In a majority of countries/economies, students enrolled in a general/academic school or programme at age 15 were more likely than students in vocational schools or programmes to endorse a growth mindset. Encouraging students who are enrolled in vocational schools and programmes to believe that they can develop their intelligence over time could reduce socio-economic disparities in student achievement.

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Note

1. The following cases are shown in this box: system-level correlation coefficients (both r and partial r) are significant at least for two subjects both across OECD countries and across all participating countries and economies, and at least one of the coefficients is above 0.35 in Tables V.B1.2.14, V.B1.3.12, V.B1.4.18, V.B1.5.21, V.B1.6.24 and V.B1.8.16.