

PISA 2018

Insights and Interpretations

Andreas Schleicher





Equipping citizens with the knowledge and skills necessary to achieve their full potential, to contribute to an increasingly interconnected world, and to convert better skills into better lives needs to become a more central preoccupation of policy makers around the world. Fairness, integrity and inclusiveness in public policy thus all hinge on the skills of citizens. In working to achieve these goals, more and more countries are looking beyond their own borders for evidence of the most successful and efficient education policies and practices.

PISA is not only the world's most comprehensive and reliable indicator of students' capabilities, it is also a powerful tool that countries and economies can use to fine-tune their education policies...That is why the OECD produces this triennial report on the state of education around the globe: to share evidence of the best policies and practices, and to offer our timely and targeted support to help countries provide the best education possible for all of their students."/>

Angel Gurría
OECD Secretary-General

About PISA

Up to the end of the 1990s, the OECD's comparisons of education outcomes were mainly based on measures of years of schooling, which are not reliable indicators of what people actually know and can do. The Programme for International Student Assessment (PISA) changed this. The idea behind PISA lay in testing the knowledge and skills of students directly, through a metric that was internationally agreed upon; linking that with data from students, teachers, schools and systems to understand performance differences; and then harnessing the power of collaboration to act on the data, both by creating shared points of reference and by leveraging peer pressure.

The aim with PISA was not to create another layer of top-down accountability, but to help schools and policy makers shift from looking upward within the education system towards looking outward to the next teacher, the next school, the next country. In essence, PISA counts what counts, and makes that information available to educators and policy makers so they can make more informed decisions.

The OECD countries that initiated PISA tried to make PISA different from traditional assessments in other ways too. In a world that rewards individuals increasingly not just for what they know, but for what they can do with what they know, PISA goes beyond assessing whether students can reproduce what they have learned in school. To do well in PISA, students have to be able to extrapolate from what they know, think across the boundaries of subject-matter disciplines, apply their knowledge creatively in novel situations and demonstrate effective learning strategies. If all we do is teach our children what we know, they

might remember enough to follow in our footsteps; but if they learn how to learn, and are able to think for themselves, and work with others, they can go anywhere they want.

Some people argued that the PISA tests are unfair, because they may confront students with problems they have not encountered in school. But then life is unfair, because the real test in life is not whether we can remember what we learned at school, but whether we will be able to solve problems that we can't possibly anticipate today.

But the greatest strength of PISA lies in its working methods. Most assessments are centrally planned and then contracted to engineers who build them. That's how tests are created that are owned by a company – but not by the people who are needed to change education. PISA turned that on its head. The idea of PISA attracted the world's best thinkers and mobilised hundreds of experts, educators and scientists from the participating countries to build a global assessment. Today, we would call that crowdsourcing; but whatever we call it, it created the ownership that was critical for success.

In a nutshell, PISA owes its success to a collaborative effort between the participating countries, the national and international experts and institutions working within the framework of the PISA Consortium, and the OECD. Subject-matter experts, practitioners and policy makers from the participating countries worked tirelessly to build agreement on which learning outcomes are important to measure and how to measure them best; to design and validate assessment tasks that can reflect

those measures adequately and accurately across countries and cultures; and to find ways to compare the results meaningfully and reliably. The OECD co-ordinated this effort and worked with countries to make sense of the results and compile the reports.

PISA 2018 was the seventh round of the international assessment since the programme was launched in 2000. Every PISA test assesses students' knowledge and skills in reading, mathematics and science; each assessment focuses on one of these subjects and provides a summary assessment of the other two. In 2018, the focus was on reading in a digital environment; but the design of the assessment also made it possible to measure trends in reading literacy over the past two decades. PISA 2018 defined reading literacy as understanding, using, evaluating, reflecting on and engaging with texts in order to achieve one's goals, to develop one's knowledge and potential, and to participate in society. PISA 2018 also collected extensive data on students' attitudes and well-being.

PISA 2018 assessed the cumulative outcomes of education and learning at a point at which most children are still enrolled in formal education: the age of 15. The 15-year-olds in the PISA sample must also have been enrolled in an educational institution at grade 7 or higher. All such students were eligible to sit the PISA assessment, regardless of the type of educational establishment in which they were enrolled and whether they were enrolled in full-time or part-time education. Not all of the students who were eligible to sit the PISA assessment were actually assessed. A two-stage sampling procedure first selected a representative sample of at least 150 schools, taking into account factors such as location (state or province; but also whether the school is located in a rural area, town or city) and level of education. Then, in the second stage, roughly 42 15-year-old students were randomly selected from each school to sit the assessment. Most countries assessed between 4 000 and 8 000 students. Students selected to sit the PISA assessment received sampling weights so as to represent the entire PISA-eligible cohort.

Over the past two decades, PISA has become the world's premier yardstick for comparing quality, equity and efficiency in learning outcomes across countries, and an influential force for education reform. It has helped policy makers lower the cost of political action by backing difficult decisions with evidence – but it has also raised the political cost of inaction by exposing areas where policy and practice have been unsatisfactory.

Since 2000, PISA has shown that education systems can provide both high-quality instruction and equitable learning opportunities for all, and that they can support academic excellence in an environment that also nurtures students' well-being. PISA shows what countries are doing to support their students and provides an opportunity for countries to learn from each other. This brochure summarises some of the initial findings from PISA 2018 and puts them into context. The full set of initial results can be found in *PISA 2018 Results (Volume I): What Students Know and Can Do*; *PISA 2018 Results (Volume II): Where All Students Can Succeed*; and *PISA 2018 Results (Volume III): What School Life Means for Students' Lives*. Three additional volumes of PISA 2018 Results – *Are Students Smart about Money?*; *Effective Policies, Successful Schools*; and *Are Students Ready to Thrive in Global Societies?* – will be published in 2020.

Improving education

Over ten million students represented by PISA in 2018 were not able to complete even the most basic reading tasks – and these were 15-year-olds living in the 79 high- and middle-income countries that participated in the test. In many countries, the quality of the education a student acquires can still best be predicted by the student's or his or her school's socio-economic background. In fact, the 10% most socio-economically advantaged students outperformed their 10% most disadvantaged counterparts in reading by 141 score points, on average across OECD countries. This adds up to the equivalent of over three years of schooling in the countries which were able to estimate learning progress across school grades, and this gap has essentially remained unchanged over the past decade. Moreover, there has also been no real overall improvement in the learning outcomes of students in OECD countries, even though expenditure on schooling rose by more than 15% over the past decade alone.

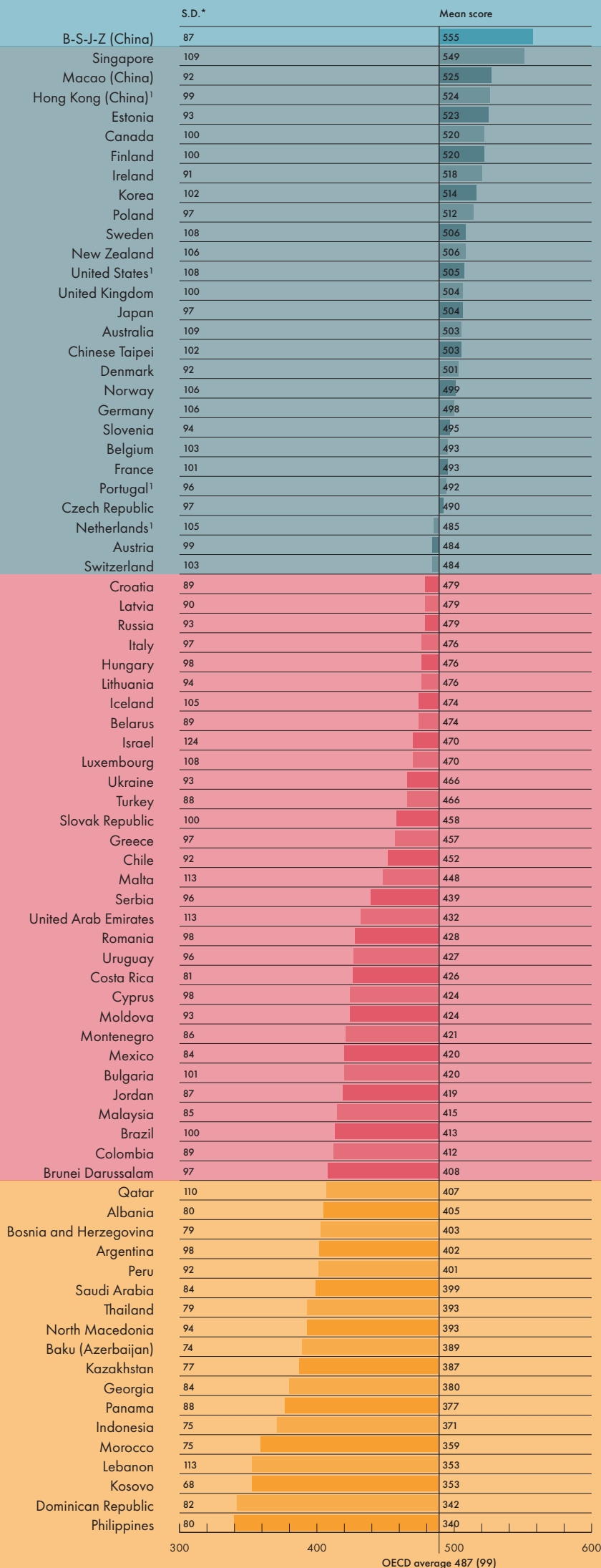
It might be tempting to drop this report, and any further thought about improving education, right about now. Impossible to change anything as big, complex and entrenched in vested interests as education.

But keep reading. Why? Because 15-year-old students in four provinces/municipalities of China – Beijing, Shanghai, Jiangsu and Zhejiang – outperformed their peers in all of the other 78 participating education systems – in mathematics and science by a wide margin, and in reading, only Singapore came close (Figures 1, 2 and 3). In fact, the 10% most disadvantaged students in these four provinces showed better reading skills than those of the

average student in OECD countries, and performed on a par with the 10% most advantaged students in some of them (Figure 4). True, these four provinces in eastern China are far from representing China as a whole, but the size of each compares to that of a typical OECD country, and their combined populations amount to over 180 million. What makes their achievement even more remarkable is that the level of income of these four Chinese regions is well below the OECD average. At the same time, they have a long way to go when it comes to improving the social and emotional outcomes, and other aspects of students' well-being that were measured by PISA 2018, areas where other countries excel (more on that later).

It is also noteworthy that some of today's highest-performing education systems have only recently attained their top positions. Less than 17% of 55-65 year-old Singaporeans scored at level 3 or higher in literacy in the Survey of Adult Skills (a product of the OECD Programme for the International Assessment of Adult Competencies, a kind of PISA for adults) – one of the smallest proportions amongst participating countries – while 63% of 16-24 year-olds did so, one of the largest proportions. And, as noted before, in PISA 2018, 15-year-old Singaporeans scored not statistically differently from the four provinces/municipalities of China in reading. Amongst OECD countries, Estonia has advanced steadily to the top, despite the fact that its expenditure per student remains about 30% lower than the OECD average (Figures 5 and 6).

Portugal advanced to the OECD average level despite being severely hit by the financial crisis. Some countries that still perform well below the



L. 4

Level 3

Level 2

Level 1

Figure 1

Reading

Comparing countries' and economies' performance in reading



*S.D. = standard deviation

1. Did not meet response-rate standards; further analyses could exclude a large bias in the published results due to non-response (see Annexes A2 and A4 in OECD (2019), *PISA 2018 Results (Volume I): What Students Know and Can Do*, PISA, OECD Publishing, Paris; <https://doi.org/10.1787/5f07c754-en>).

Source : OECD, PISA 2018 Database, Table I.B1.4; Figure I.4.1.

Level 6	Above 698.32 score points
Level 5	From 625.61 to less than 698.32 score points
Level 4	From 552.89 to less than 625.61 score points
Level 3	From 480.18 to less than 552.89 score points
Level 2	From 407.47 to less than 480.18 score points
Level 1a	From 334.75 to less than 407.47 score points
Level 1b	From 262.04 to less than 334.75 score points
Level 1c	From 189.33 to less than 262.04 score points
Below level 1c	Less than 189.33 score points

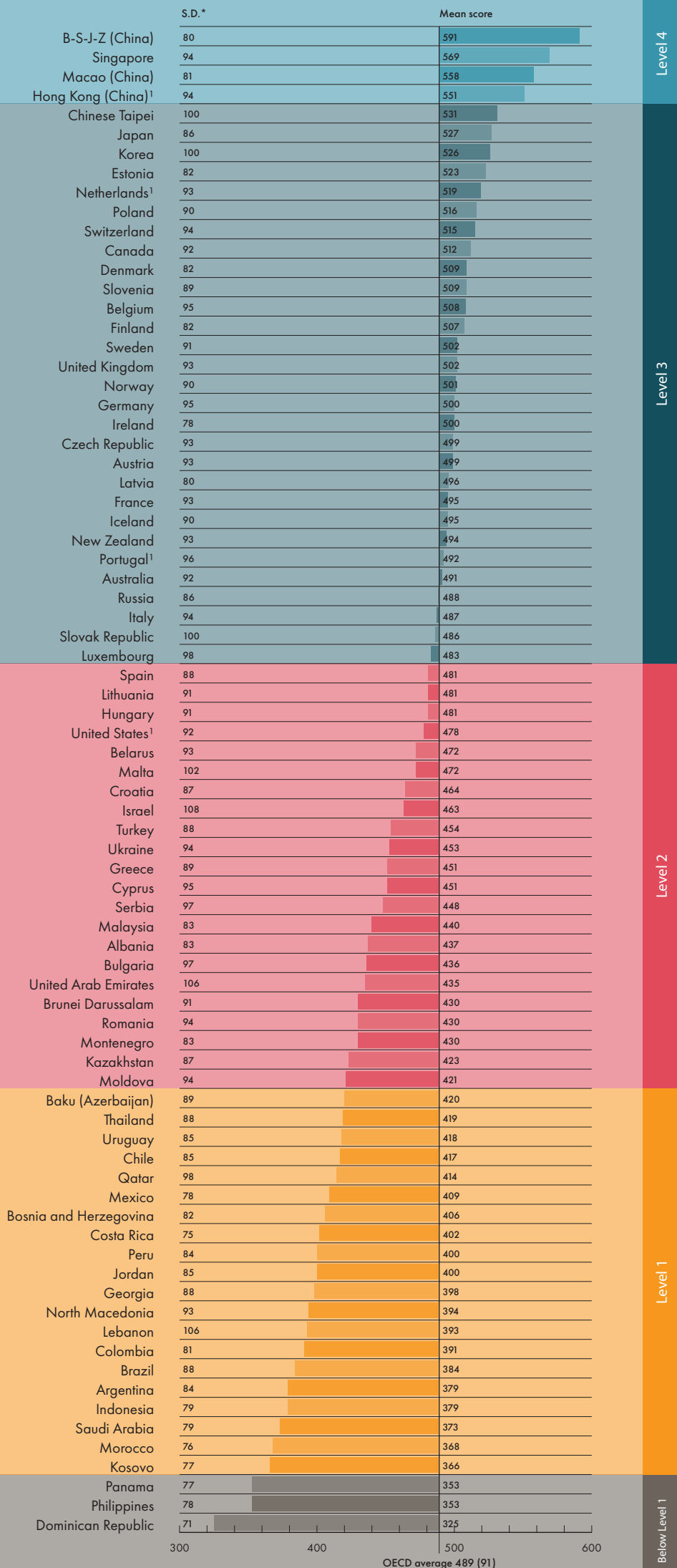
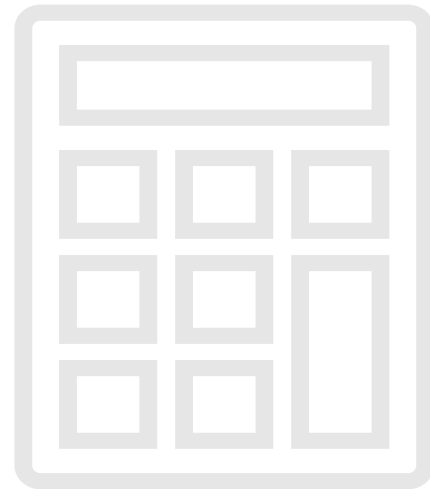


Figure 2

Mathematics

Comparing countries' and economies' performance in mathematics

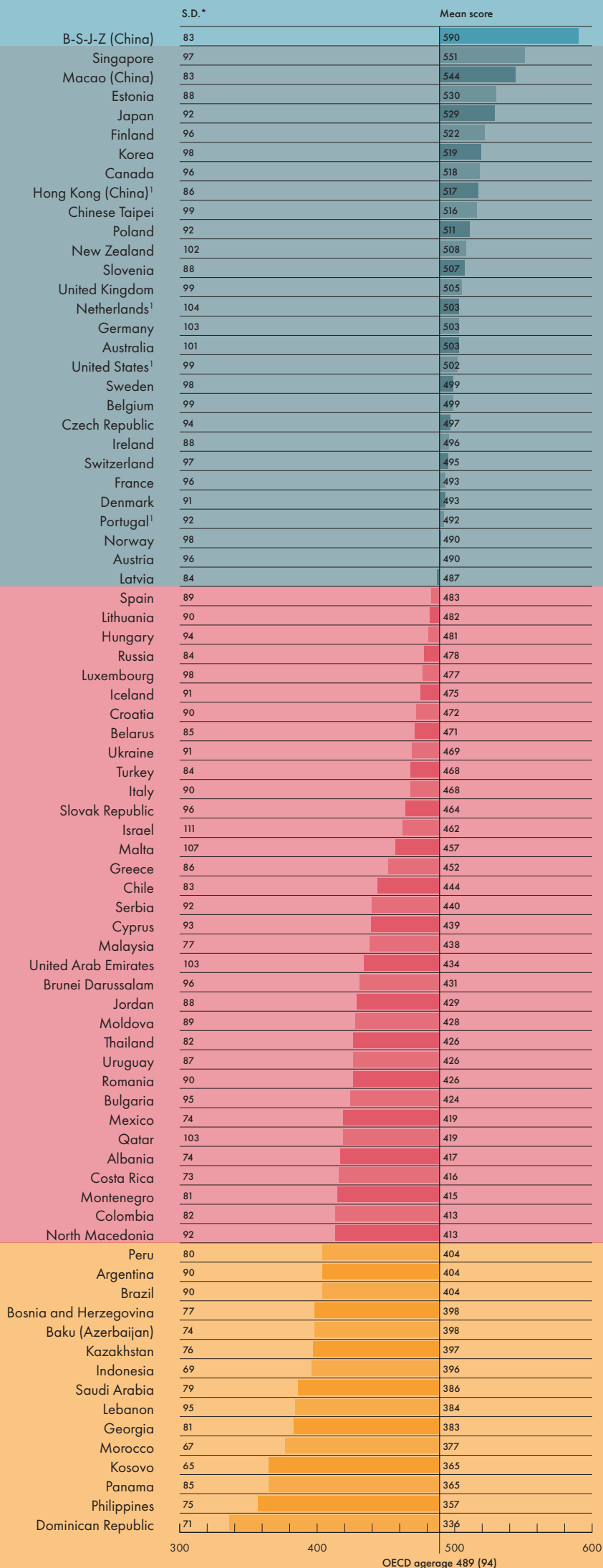


*S.D. = standard deviation

1. Data did not meet the PISA technical standards but were accepted as largely comparable (see Annexes A2 and A4 in OECD (2019), PISA 2018 Results (Volume I): *What Students Know and Can Do*, PISA, OECD Publishing, Paris; <https://doi.org/10.1787/5f07c754-en>).

Source : OECD, PISA 2018 Database, Table I.B1.5; Figure I.4.2.

Level 6	Above 669.30 score points
Level 5	From 606.99 to less than 669.30 score points
Level 4	From 544.68 to less than 606.99 score points
Level 3	From 482.38 to less than 544.68 score points
Level 2	From 420.07 to less than 482.38 score points
Level 1	From 357.77 to less than 420.07 score points
Below level 1	Below 357.77 score points



L. 4

Level 3

Level 2

Level 1

Figure 3

Science

Comparing countries' and economies' performance in science



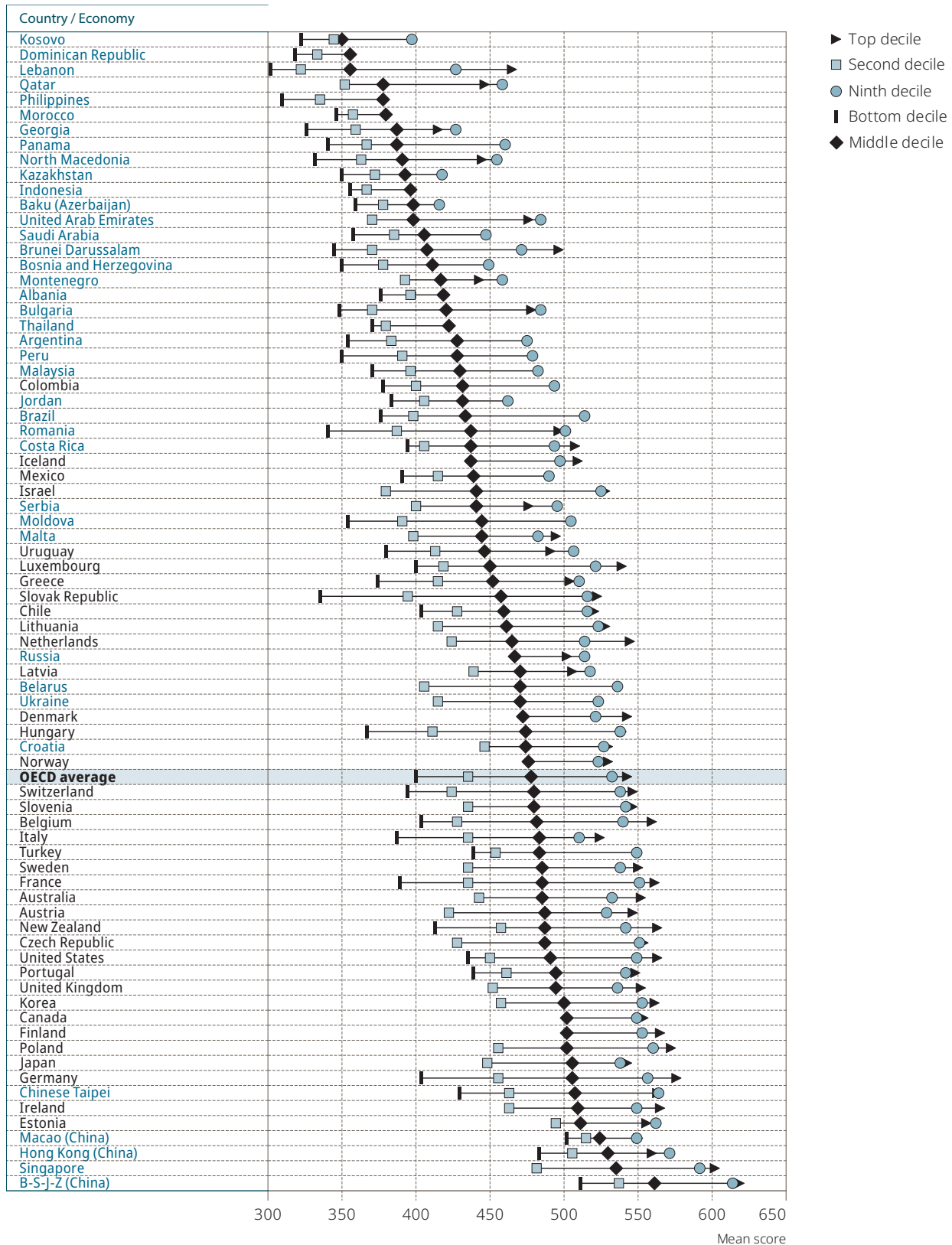
*S.D. = standard deviation

1. Data did not meet the PISA technical standards but were accepted as largely comparable (see Annexes A2 and A4 in OECD (2019), *PISA 2018 Results (Volume I): What Students Know and Can Do*, PISA, OECD Publishing, Paris; <https://doi.org/10.1787/5f07c754-en>).

Source : OECD, PISA 2018 Database, Table I.B1.6; Figure I.4.3.

Level 6	Above 707.93 score points
Level 5	From 633.33 to less than 707.93 score points
Level 4	From 558.73 to less than 633.33 score points
Level 3	From 484.14 to less than 558.73 score points
Level 2	From 409.54 to less than 484.14 score points
Level 1a	From 334.94 to less than 409.54 score points
Level 1b	From 260.54 to less than 334.94 score points
Below level 1b	Below 260.54 score points

Figure 4 • Mean performance in reading, by international decile of socio-economic status



Note: Bottom, second, ninth and top deciles correspond to the average performance of students who are in the corresponding deciles of the distribution of the PISA index of economic, social and cultural status across all countries and economies; the middle decile corresponds to students whose socio-economic status ranges from the 45th to the 55th percentile of this distribution.

Only results of countries and economies with at least 3% of students in each international decile are shown.

Countries and economies are ranked in ascending order of the mean reading performance of students in the international middle decile of socio-economic status.

Source: OECD, PISA 2018 Database, Table II.B1.2.2; Figure II.2.2.

OECD average saw remarkable improvements in their students' performance, most notably Albania, the Republic of Moldova, Peru and Qatar. Turkey's improvement between 2003 and 2018 may look somewhat less impressive, but Turkey was able to double the coverage of the 15-year-olds who are enrolled in school and covered by PISA from 36% to 73% during that period. Five other countries – namely Albania, Brazil, Indonesia, Mexico and Uruguay – also significantly increased enrolment rates in secondary education over their participation in PISA and maintained or improved their mean reading, mathematics and science performance. This shows that the quality of education does not have to be sacrificed when increasing access to schooling.

Some countries were able to move to a more positive trajectory in recent years after a period of stagnation or decline. Sweden showed an improving trend in all three subjects between 2012 and 2018, reversing earlier declines in mean performance. Argentina, the Czech Republic and Ireland saw recent improvements in reading; Denmark, Ireland, Jordan, Slovenia and the United Kingdom in mathematics; and Jordan and Montenegro in science. In some countries, some of these trends can be related to changes in the demographic composition of the student body; but in no country do such demographic changes alter the picture dramatically.

PISA also shows that in most countries excellence in education is apparent amongst some of the most disadvantaged students and schools. On average across OECD countries, one in ten disadvantaged students was able to score in the top quarter of reading performance in his or her country, indicating that disadvantage is not destiny. In fact, in Australia, Canada, Estonia, Ireland and the United Kingdom, all of which scored above the OECD average, more than 13% of disadvantaged students were academically resilient. Similarly, more than 30% of immigrant students in Brunei Darussalam, Jordan, Panama, Qatar, Saudi Arabia and the United Arab Emirates scored in the top quarter of reading performance. These successes do not come about by chance. Factors that PISA shows to be positively associated with academic resilience include support from parents, a positive school climate and having a growth mindset (see more on this later).

In the same way as social disadvantage does not automatically lead to poor educational performance for students and schools, the world is no longer divided between rich and well-educated nations and poor and badly educated ones. When comparing countries that score similarly in PISA, their income levels vary widely. History shows that countries with

the determination to build a first-class education system can achieve this even in adverse economic circumstances, and their schools today will be their economy and society tomorrow. So it can be done.

And it must be done. Without the right education, people will languish on the margins of society, countries will not be able to benefit from technological advances, and those advances will not translate into social progress. It will not be possible to develop fair and inclusive policies and engage all citizens if a lack of education prevents people from fully participating in society.

But change can be an uphill struggle. Young people are less likely to invest their time and energy in better education if that education seems irrelevant to the demands of the “real” world. Businesses are less likely to invest in their employees' lifelong learning if those workers might move away for a better job. Policy makers often prioritise the urgent over the important – even if the latter includes education, an investment in the future well-being of society.

Read more about these issues in Chapters 4 and 9 in *PISA 2018 Results (Volume I): What Students Know and Can Do*.

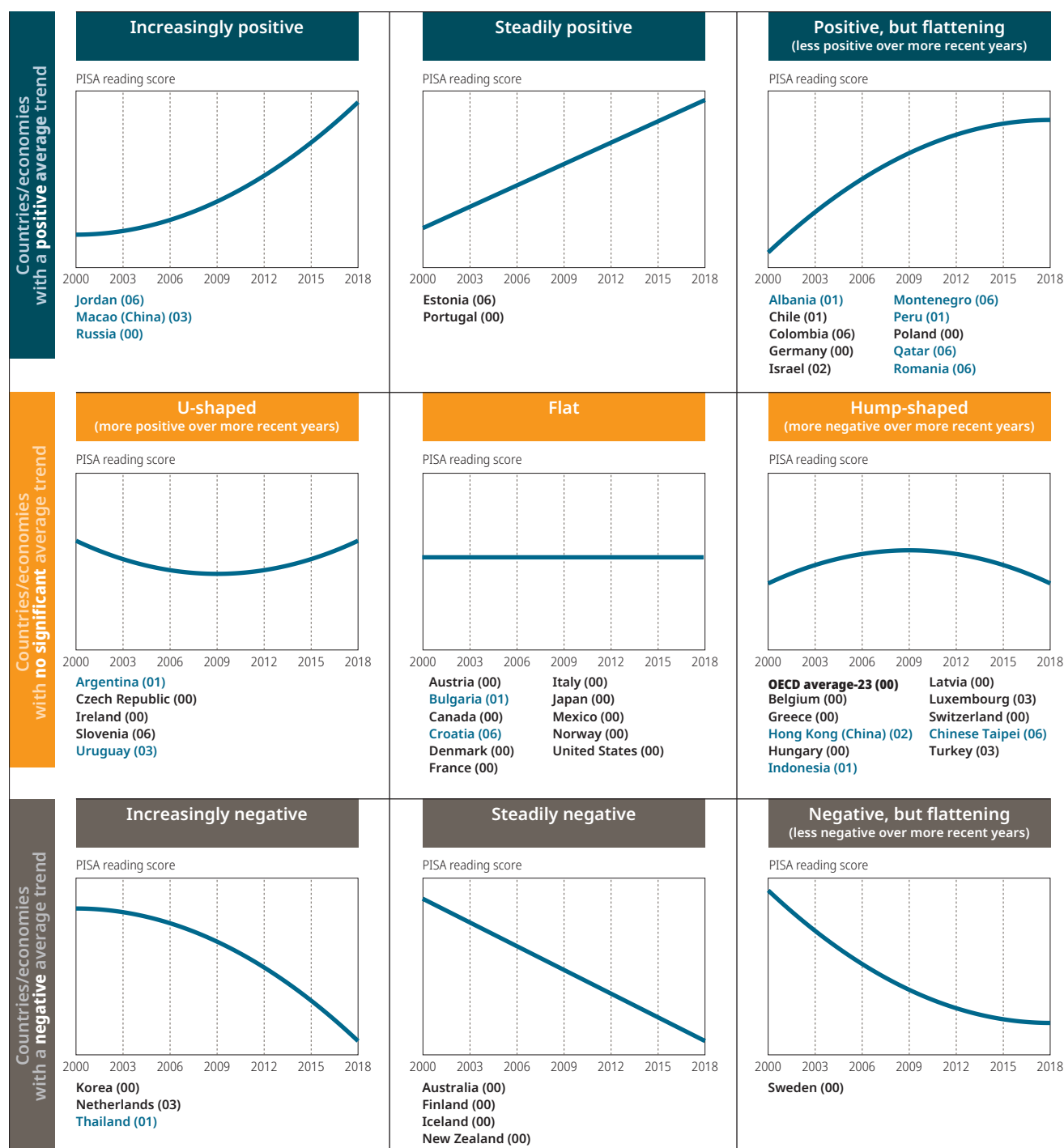
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And in Chapter 2 in *PISA 2018 Results (Volume II): Where All Students Can Succeed*.

<https://doi.org/10.1787/b5fd1b8f-en>

Figure 5 • Curvilinear trajectories of average performance in reading across PISA assessments

Direction and trajectory of trend in mean performance



Notes: Figures are for illustrative purposes only. Countries and economies are grouped according to the overall direction of their trend (the sign and significance of the average three-year trend) and to the rate of change in the direction of their trend (the sign and significance of the curvature in the estimate of quadratic trends). Only countries and economies with data from at least five PISA reading assessments are included. Not all countries and economies can compare their students' performance over the same period. For each country/economy, the base year, starting from which reading results can be compared, is indicated in parentheses next to the country's/economy's name ("00" = 2000, "01" = 2001, etc.). Both the overall direction and the change in the direction may be affected by the period considered. OECD average-23 refers to the average of all OECD countries with valid data in all seven assessments; Austria, Chile, Estonia, Israel, Luxembourg, the Netherlands, the Slovak Republic, Slovenia, Spain, Turkey, the United Kingdom and the United States are not included in this average.

Source: OECD, PISA 2018 Database, Table I.B.1.10; Figure I.9.1.



Getting ready for the digital world

While people have different views on the role that digital technology can and should play in schools, we cannot ignore how digital tools have so fundamentally transformed the world outside of school. Everywhere, digital technologies are offering firms new business models and opportunities to enter markets and transform their production processes. They can make us live longer and healthier, help us with boring or dangerous tasks, and allow us to travel into virtual worlds. People who cannot navigate through the digital landscape can no longer participate fully in our social, economic and cultural life.

PISA shows how access to new technologies has increased at a remarkable rate. In the 2009 PISA assessment, about 15% of students in OECD countries, on average, reported that they did not have access to the Internet at home. By 2018, that proportion had shrunk to less than 5%. The growth in access to online services is likely to be even steeper than suggested by these percentages, which hide the improvements in the quality of Internet services and the explosion of mobile Internet access over the past decade.

Furthermore, in all countries that distributed an optional questionnaire on students' familiarity with these technologies as part of PISA 2018, the amount of time that 15-year-old students in OECD countries spent on line outside of school increased between 2012 and 2018 – by an average of more than 1 hour per day (on both weekdays and weekends). Students now spend about 3 hours on line outside of school on weekdays, on average, and almost 3.5 hours on line

on weekend days. For young people, the digital world is becoming a sizeable part of the real world.

While improved access to new technologies provides unprecedented opportunities, it also raises the bar of what it means to be proficient in reading. Students growing up with a great smartphone but a poor education will face real risks. The smartphone has transformed the ways in which people read and exchange information; and digitalisation has resulted in the emergence of new forms of text, ranging from the concise (text messages; annotated search-engine results) to the lengthy and unwieldy (tabbed, multipage websites or complex archival material). In the past, students could find clear and often singular answers to their questions in carefully curated and government-approved textbooks, and they could generally trust those answers to be true. Today, they will find hundreds of thousands of answers to their questions on line, and it is up to them to figure out what is true and what is false, what is right and what is wrong. While in many offline situations readers can assume that the author of the text they are reading is competent, well-informed and benevolent, when reading online blogs, forums or news sites readers must constantly assess the quality and reliability of the information, based on implicit or explicit cues related to the content, format or source of the text.

This is not exactly a new phenomenon, but the speed, volume and reach of information flows in the current digital ecosystem have created the perfect conditions for fake news to thrive, affecting public opinion and

political choices. In this “post-truth” climate, quantity seems to be valued more than quality when it comes to information. Assertions that “feel right” but have no basis in fact become accepted as truth. Algorithms that sort people into groups of like-minded individuals create social media echo chambers that amplify views, and leave individuals uninformed of and insulated from opposing arguments that may alter their beliefs. There is a scarcity of attention, but an abundance of information.

The more knowledge that technology allows students to search and access, the more important becomes deep understanding and the capacity to make sense of content. Understanding involves knowledge and information, concepts and ideas, practical skills and intuition. But fundamentally it involves integrating and applying all of these in ways that are appropriate to the learner’s context. Reading is no longer mainly about extracting information; it is about constructing knowledge, thinking critically and making well-founded judgements. Contrast this with the findings from this latest round of PISA, which show that fewer than 1 in 10 students in OECD countries was able to distinguish between fact and opinion, based on implicit cues pertaining to the content or source of the information. Education has won the race with technology throughout history, but there is no guarantee that it will do so in the future.

The PISA assessments have evolved to better capture these demands. In the 2018 assessment, the description of what top-performing students are able to do in reading included not only being able to understand and communicate complex information, but also the capacity to distinguish between fact and opinion when reading about an unfamiliar topic. The nature of texts and the type of problems included in the PISA 2018 assessment of reading reflected the evolving nature of reading in increasingly digital societies. Specifically, the 2018 reading assessment placed greater emphasis on the ability to find, compare, contrast and integrate information across multiple sources. In order to assess multiple-source reading, new assessment tasks were designed, based on texts composed of several smaller units, each created by a different author or authors or at different times. Examples of these kinds of texts are an online forum with multiple posts and a blog that links to a newspaper article. Computer delivery made it possible to use various digital navigation tools, such as hyperlinks or tabs, and to present such tasks in realistic scenarios, in which the amount of available text

sources increases as the student progresses through the assessment. (To see what some of these tasks were like, go to www.oecd.org/pisa/test/)

The results from the PISA 2018 assessment suggest that improvements in education have not kept up with these rising demands. The proportion of 15-year-old students who scored at the highest levels rose only marginally across OECD countries, from 7% in 2009 to 9% in 2018. These students, who attained Level 5 or 6 in the PISA reading test, were able to comprehend lengthy texts, deal with concepts that are abstract or counterintuitive, and establish distinctions between fact and opinion, based on implicit cues pertaining to the content or source of the information. Even in Singapore, the country with the largest share of top performers, only one in four 15-year-old students was able to reach this level. In the four participating Chinese provinces/municipalities, Canada, Finland and Hong Kong (China), at least one in seven students were able to do so.

Beyond the requisite knowledge and skills, PISA also shows that students seem to read less for leisure and to read fewer books of fiction, magazines or newspapers because they want to (as opposed to because they have to). Instead, they read more to fulfil practical needs, and they read more in online formats, such as chats, online news or websites containing practical information. In 2018, more students considered reading “a waste of time” (+5 percentage points, on average across OECD countries) and fewer students read for enjoyment (-5 percentage points) than their counterparts did in 2009.

Humans were always better at inventing new tools than using them wisely, but as the influence that schools – and families – have over what students read declines, it is essential that schools redouble their efforts to promote reading proficiency to meet the demands of the digitalised world. All students need to be able to read complex texts, distinguish between credible and untrustworthy sources of information, and between fact and fiction, and question or seek to improve the accepted knowledge and practices of our times.

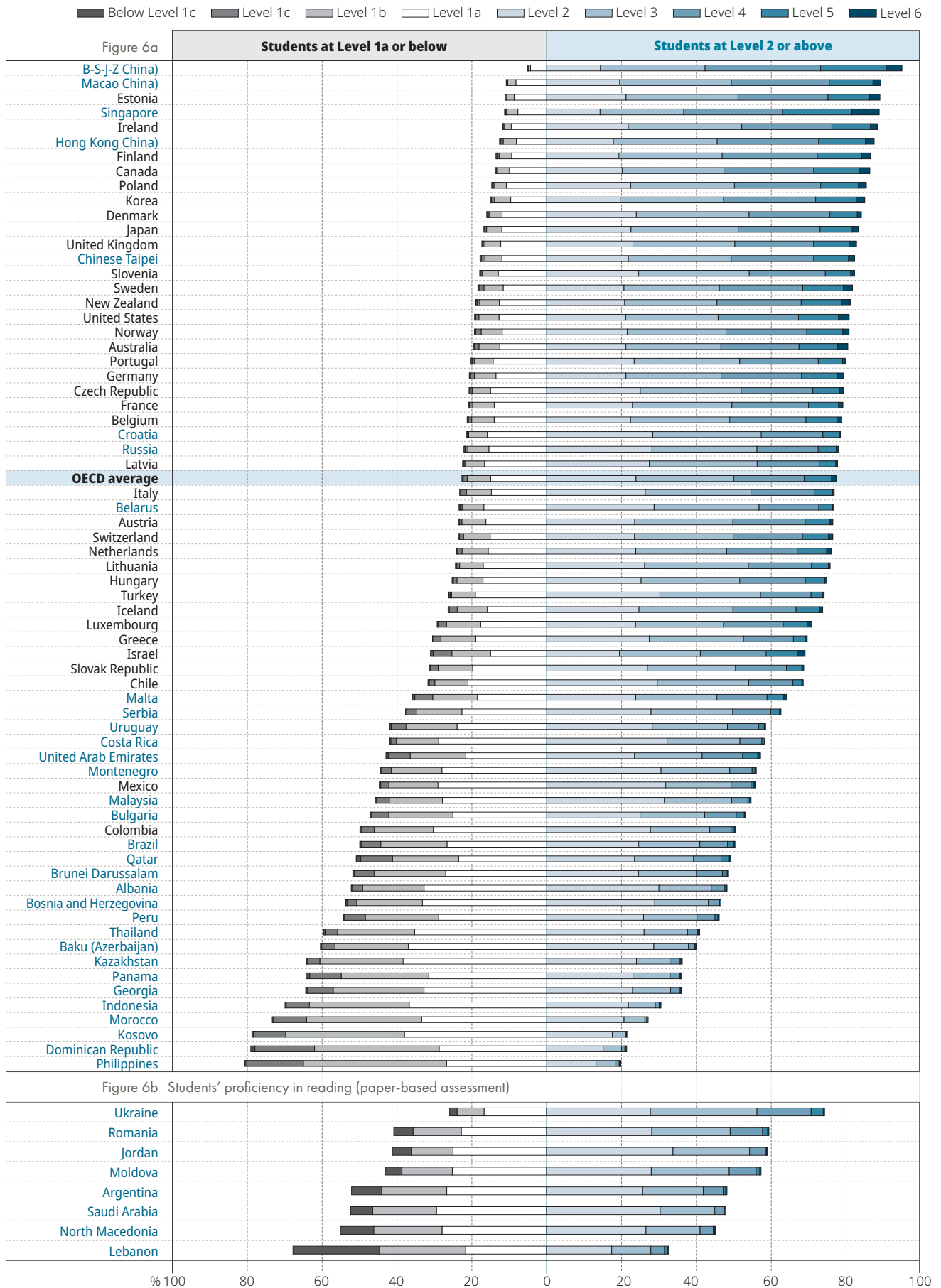
Beyond that, in a world shaped by artificial intelligence, education is no longer just about teaching people something, but about helping people build a reliable compass and the navigation tools to find their own way through an increasingly volatile, uncertain and ambiguous world. Tomorrow’s schools will need to help students think for themselves and join others, with empathy, in work and citizenship. They

will need to help students develop a strong sense of right and wrong, a sensitivity to the claims that others make on them, and a grasp of the limits on individual and collective action. At work, at home and in the community, people will need a deep understanding of how others live, in different cultures and traditions, and how others think, whether as scientists or artists. The PISA 2018 assessment of global competence explored some of these capacities. Results from that assessment will be published in 2020.

Read more about these issues in Chapters 1 and 5 in *PISA 2018 Results (Volume I): What Students Know and Can Do*.

<https://doi.org/10.1787/5f07c754-en>

Figure 6 • Students' proficiency in reading (6a: computer-based assessment/6b: paper-based assessment)



Note: Countries and economies are ranked in descending order of the percentage of students who performed at or above Level 2.

Source: OECD, PISA 2018 Database, Tables I.B1.1 and I.A2.1; Figures I.5.1 and I.5.2.

Building strong foundations

The rising bar of success in education in the digital age puts even greater pressure on education systems to secure strong foundations. There is a great risk that technology will super-empower those with strong knowledge and skills while leaving those with weak foundations further behind.

Only 77% of students, on average across OECD countries, attained Level 2 proficiency in reading (Figure 6). Level 2 marks the point at which students have acquired the technical skills to read, and can use reading for learning. At a minimum, these students are able to identify the main idea in a text of moderate length, find information based on explicit criteria, and reflect on the purpose and form of texts when explicitly directed to do so.

The share of 15-year-old students, in grade 7 and above, who reached this basic level of proficiency in reading ranged from close to 90% in the four provinces/municipalities of China, Estonia, Macao (China) and Singapore, to less than 10% in Cambodia, Senegal and Zambia (countries that participated in the PISA for Development assessment in 2017). The share of 15-year-old students who attained minimum levels of proficiency in mathematics (at least Level 2) varied even more – between 98% in Beijing, Shanghai, Jiangsu and Zhejiang (China) and 2% in Zambia. These numbers show that all countries still have some way to go towards reaching the global goals for quality education, as defined in the UN Sustainable Development Goal for education, and for many countries it remains a long way. Some 78% of students attained Level 2 or higher in science, on

average across OECD countries. These students can recognise the correct explanation for familiar scientific phenomena and can use such knowledge to identify, in simple cases, whether a conclusion is valid based on the data provided.

In some education systems low performers are spread across many different schools, while in others, low performers tend to be clustered in certain schools, often compounded with social disadvantage. In some of these countries the between-school variation in performance is the result of stratification and selection, and thus an in-built feature of the school system. In systems where low performers are more often concentrated in specific schools or types of schools, such as Germany, Hungary, Israel, Lebanon, the Netherlands, the Slovak Republic and Turkey, it is important to ensure that especially those schools with low performance receive adequate resources and support.

Interventions can also be targeted at socio-economically disadvantaged students and/or schools. In almost all countries that participated in PISA 2018, students who were disadvantaged compared with their peers in their country were less likely to attain the minimum level of proficiency in reading. However, the strength of the relationship between a student's socio-economic status and his or her performance varied greatly across countries and economies. In systems where the relationship between the two was particularly strong, including Belarus, France, Hungary, Luxembourg, Peru, the Philippines, Romania and the Slovak Republic, interventions targeting disadvantaged students

would be particularly important. Since in Belarus, Hungary, Peru, the Philippines and the Slovak Republic disadvantaged students were clustered in certain schools, interventions targeting these schools would be most appropriate.

In many countries, immigrant students tended to be less likely than their native-born peers to attain the minimum level of proficiency in reading. Targeted support for immigrant students would seem most appropriate in Belgium, Denmark, Finland, Germany, Iceland, the Netherlands, Slovenia and Sweden, where at least 5% of students have an immigrant background. These students are at least three times as likely as students without an immigrant background to score below the minimum level of proficiency in reading.

Boys, especially disadvantaged boys, also need special support if they are to improve their reading performance. In all but 3 PISA-participating countries and economies (the exceptions are the 4 PISA-participating provinces/municipalities of China, Estonia and Macao [China]) at least 20% of disadvantaged boys did not attain the minimum level of proficiency in reading. In 24 countries and economies, more than 70% of disadvantaged boys scored below that level.

Perhaps most worryingly, the proportion of low performers, both girls and boys, increased between 2009 and 2018, on average across OECD countries. While in all PISA-participating countries and economies girls outperformed boys in reading in 2018, in 20 countries and economies girls' reading performance declined over the past decade. Iceland, Italy, Japan and New Zealand, in particular, need to monitor this decline closely, even though boys' performance remained stable in these countries over the period.

Evidence from PISA shows that boys and girls can improve their performance. In the Czech Republic, Denmark, Estonia, Ireland, Macao (China), Singapore, Slovenia, the United Kingdom and the United States, the proportion of top performers in reading increased amongst both boys and girls, while the proportion of low performers in reading remained stable or shrank. The Czech Republic, Denmark, Macao (China), Singapore and Slovenia also saw a narrowing of the gender gap in mathematics performance while achieving at high levels.

Some worry that if efforts and resources are directed towards low-performing students, high-performing students will suffer. However, PISA results show that countries can pull up low performers without adversely affecting other students. For example, 22 countries and economies saw improvements in the average

reading score amongst the lowest-performing 10% of students; none of them saw a decline in average performance and 14 saw improvements. In only two of these 22 countries and economies did the scores of the highest-performing 10% of students actually decline.

Read more about these issues in Chapters 4-10 in *PISA 2018 Results (Volume I): What Students Know and Can Do*.

<https://doi.org/10.1787/5f07c754-en>

And in Chapters 2, 4, 7, 9 and 10 in *PISA 2018 Results (Volume II): Where All Students Can Succeed*.

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Reconciling equity and excellence

For those with the right knowledge and skills, digitalisation and globalisation have been liberating and exciting; but for those who are insufficiently prepared, they often mean vulnerable and insecure work, and a life with few prospects. Economies are shifting towards regional hubs of production that are linked together by global chains of information and goods, but that are concentrated where comparative advantage can be built and renewed. This makes the distribution of knowledge and wealth crucial, and that is linked to the distribution of education opportunities.

For a start, PISA shows that the performance gap between top-performing and low-achieving students varies widely across education systems. The largest gaps were found in Israel, Lebanon, Malta and the United Arab Emirates, meaning that learning outcomes at age 15 in these countries are highly unequal. Not surprisingly, the smallest differences between high and low-achieving students tended to be observed amongst countries and economies with the lowest mean scores. In Kosovo, Morocco and the Philippines, even the highest-performing students scored only around the OECD average. Countries also differed in the performance variation that lay between schools. In Finland, less than 7% of that variation lay between schools, so the closest school is always the best school. In Israel, that proportion was 78% (Figure 7).

Equity and socio-economic status

However, equity does not mean that all students have equal outcomes in every subject; rather it means that whatever variations there may be in education outcomes, these should not be related to students'

background, including socio-economic status, gender or immigrant background. In other words, there can be numerous reasons why some students perform better than others, but the performance differences should not be the result of the conditions in which students learn. Therefore, PISA measures equity by the extent to which education outcomes, such as student performance, students' attitudes and beliefs, and students' expectations for their future, are related to students' personal background. The weaker the relationship, the more equitable PISA considers a school system to be.

The motivation for that approach to defining equity is simple: children from wealthier families may find many open doors to a successful life, but children from poor families often have just one chance in life – and that is a good teacher and school that give them an opportunity to develop their potential. Those who miss that boat rarely catch up, and OECD data show that subsequent education opportunities in life tend to reinforce early education outcomes.

In France, Germany, Hungary, Israel, Peru and the Slovak Republic, the gap in reading performance between the 10% most socio-economically advantaged and the 10% most disadvantaged students was over 170 score points – the equivalent of well over four years of schooling in the countries that were able to estimate progress across school grades. Of course, where there are students with economic or social advantages, it is likely that they will be better equipped to do well. This is not just about poverty of material resources, but equally about poverty of aspirations and hope. However, and as noted before, in some countries even the most disadvantaged

students do well by international standards, which shows that this relationship is not inevitable.

More generally, PISA shows that the impact of social background on success in education varies greatly across countries. The most impressive outcome of world-class school systems is that they deliver high-quality education across the entire system. In Australia, Canada, Denmark, Estonia, Finland, Hong Kong (China), Japan, Korea, Macao (China), Norway and the United Kingdom, for example, average reading performance was higher than the OECD average while the relationship between socio-economic status and reading performance was weaker than the OECD average.

There seems to be no association between trends in mean performance and a widening or narrowing of performance gaps. Some countries improved in PISA mainly as a result of low-achieving students catching up to higher-performing students; others improved by nurturing high performance amongst their top-performing students; and many improved by helping all students succeed at higher levels.

The issue is more pertinent for education policy when it comes to the interplay between a student's and a school's social background and how these are related to learning outcomes. In many countries, the school's socio-economic context influences the kind of education children are acquiring, and the quality of schooling can shape the socio-economic contexts of schools. If schools are popular, house prices in their catchment areas can rise, further segregating the population. People with fewer assets, lower income and less education end up finding housing where education and social opportunities are poorer. The result is that in most countries, differences in education outcomes related to social inequalities are stubbornly persistent, and too much talent remains latent. Although private schools tend to be more selective, which contributes to social segregation in the school system, in many countries most of the social segregation across schools comes from within the public sector rather than from social segregation between public and private schools (Figure 8).

Some countries still have a long way to go in moderating between-school differences. In Argentina, Bulgaria, the Czech Republic, Hungary, Peru, the Slovak Republic and the United Arab Emirates, a typical disadvantaged student has only a one-in-eight chance of attending the same school as high achievers (those who score in the top quarter of reading performance in PISA). By contrast, in 14 countries, including the OECD countries Canada, Denmark, Estonia, Finland,

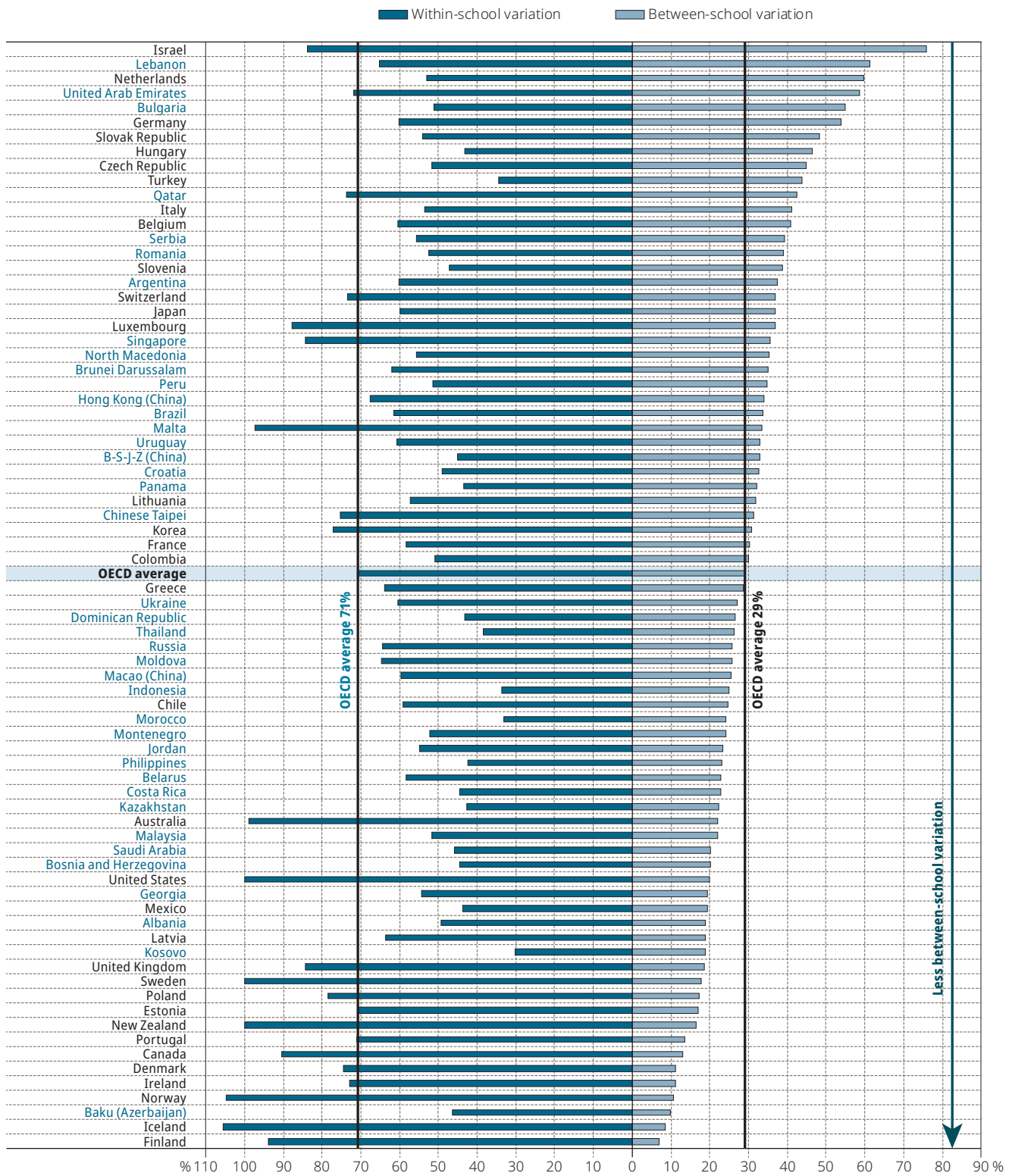
Iceland, Ireland, Norway, Portugal and Sweden, disadvantaged students have at least a one-in-five chance of having high-achieving schoolmates.

High levels of social and ability stratification between schools can have an impact on the learning opportunities available to students and thus on education outcomes. Limited social diversity in schools implies that disadvantaged students are more likely to be enrolled in schools that have disproportionately large concentrations of low achievers – which, may negatively affect their performance. Unless disadvantaged schools are allocated sufficient resources to compensate for their shortfalls, social and academic segregation between schools may widen the gaps in outcomes related to socio-economic status.

The good news is that improving education is not all about the volume of resources. PISA results show that there is a positive relationship between investment in education and average performance – up to a threshold of USD 50 000 in cumulative expenditure per student from age 6 to 15 (Figure 9). However, after that threshold, there is almost no relationship between the amount invested in education and student performance. For example, Estonia and Latvia invest similarly in primary and lower secondary education (a cumulative expenditure of about USD 65 000 per student), yet Estonia scored more than 40 points above Latvia in reading. In turn, Australia, the United Kingdom and the United States all spend more than USD 107 000 per student from age 6 to 15, yet scored no better than (and in some cases, below) Canada, Ireland and New Zealand, all of which spend between 10% and 30% less. The results are similar when it comes to the relationship between spending per student and the impact of social background on reading performance, i.e. the countries spending more do not necessarily show a weaker relationship between students' socio-economic status and their performance.

What may matter more after a threshold is reached is how resources are allocated. The picture is similar when comparing the learning time that students invest (Figure 10). In Finland, the country where students spend the least time learning, student performance is comparatively high, whereas in the United Arab Emirates, the country with the longest study hours, learning outcomes are comparatively poor. The lack of a correlation between the amount of learning time and learning outcomes illustrates that learning outcomes are always the product of the quantity of learning time, and the quality of learning and the instructional environment.

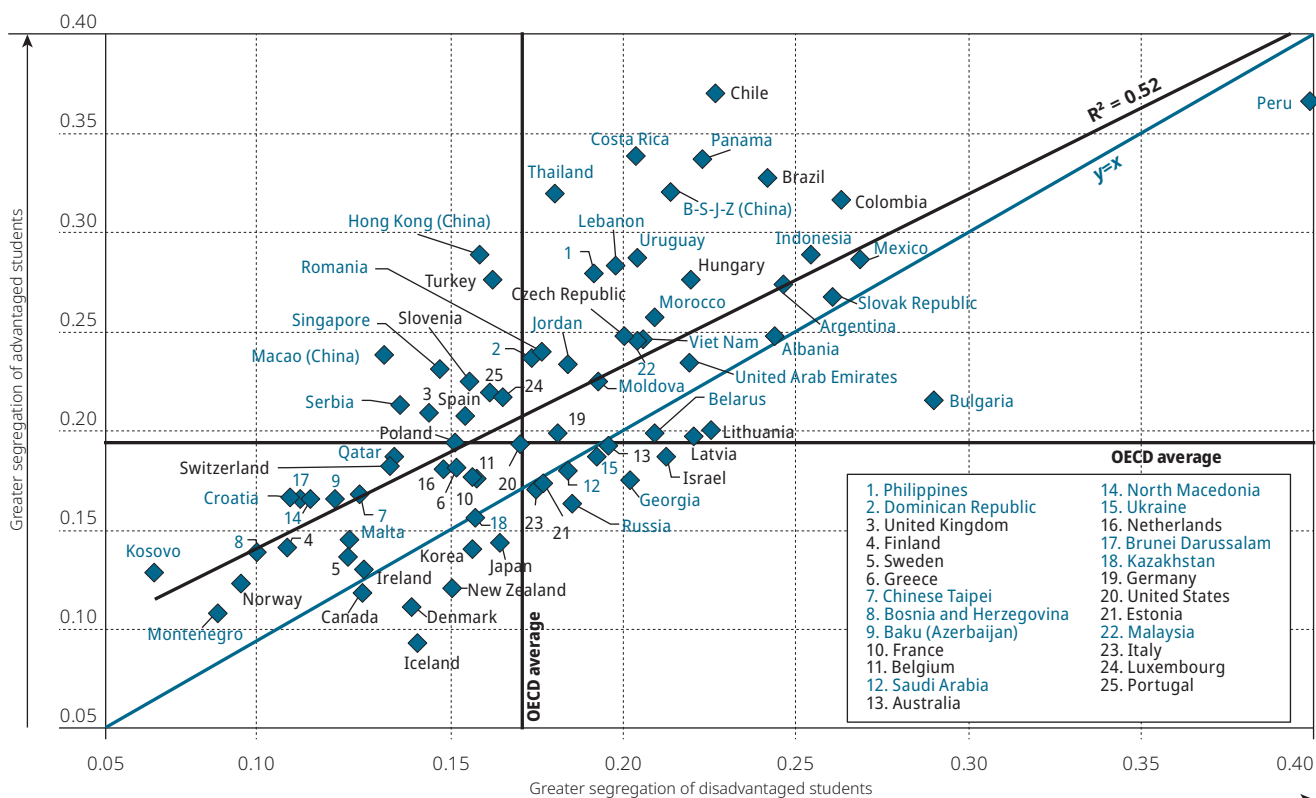
Figure 7 • Variation in reading performance between and within schools



Note: All analyses are restricted to schools with the modal ISCED level for 15-year-old students. Countries and economies are ranked in descending order of the between-school variation in reading performance, as a percentage of the total variation in performance across OECD countries.

Source: OECD, PISA 2018 Database, Table II.B1.4.1; Figure II.4.1.

Figure 8 • Segregation of advantaged and disadvantaged students



Notes: All analyses are restricted to schools with the modal ISCED level for 15-year-old students. The isolation index measures whether students of type A are more concentrated in some schools. The index is related to the likelihood of a representative type A student to be enrolled in schools that enrol students of another type. It ranges from 0 to 1, with 0 corresponding to no segregation and 1 to full segregation. A socio-economically advantaged student is a student in the top quarter of the PISA index of economic, social and cultural status (ESCS) in his or her own country/economy. A socio-economically disadvantaged student is a student in the bottom quarter of the PISA index of economic, social and cultural status (ESCS) in his or her own country/economy.

Source: OECD, PISA 2018 Database, Table II.B1.4.7; Figure II.4.5.

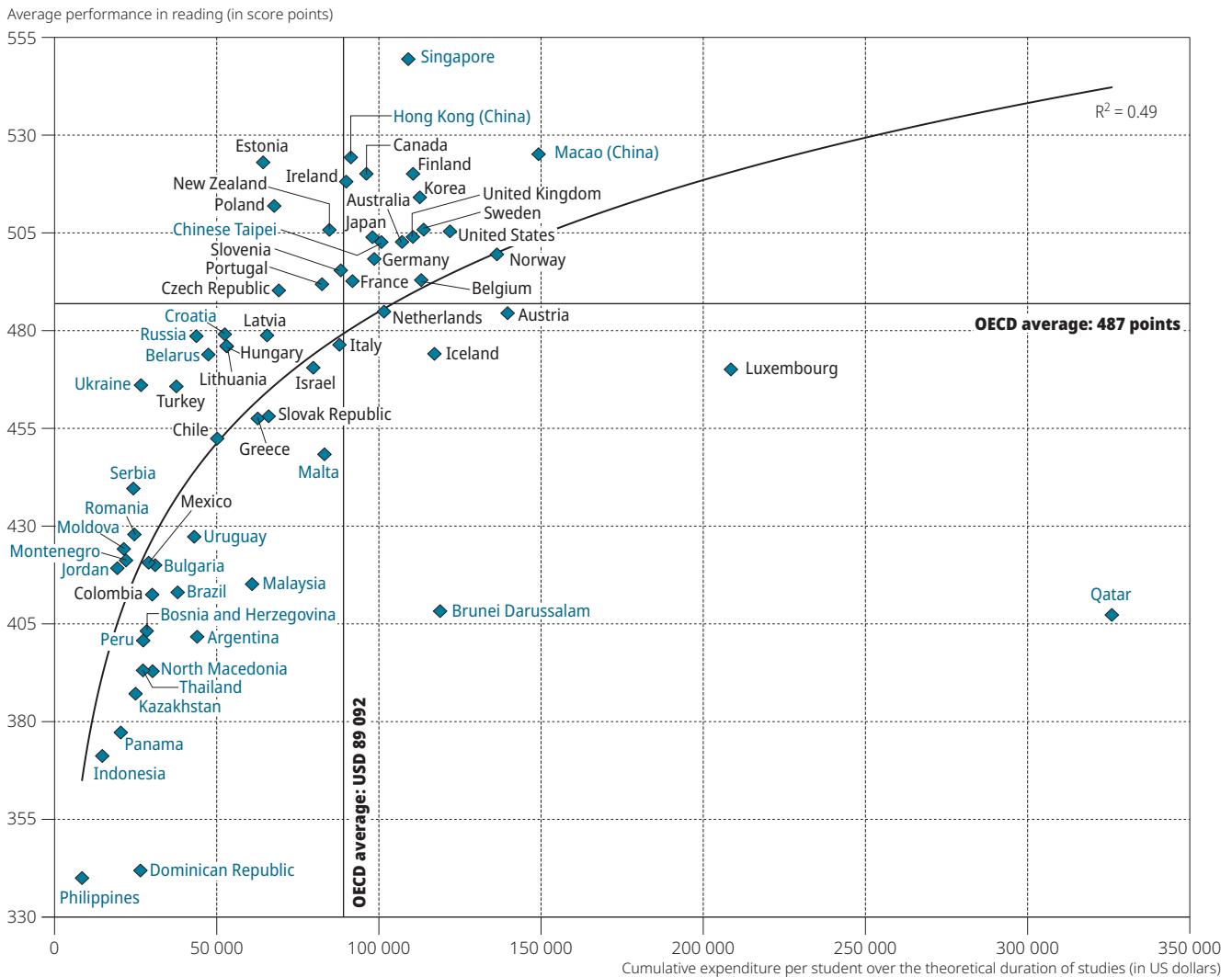
Many education systems can do better in aligning resources with needs and moderate social inequality amongst schools. When it comes to the allocation of material resources, much progress has been achieved. According to PISA, some school systems succeed in providing sufficient material and staff resources to all schools, including disadvantaged schools. In Bulgaria, Denmark, Latvia, Norway and Poland, instruction appeared not to be hindered by shortages of educational material or staff, according to school principals, and there was no significant difference in these reports between principals of advantaged schools and those of disadvantaged schools (Figure 11). Many countries have introduced formula-based approaches to funding whereby the resources allocated to a school depend on its socio-economic context.

However, attracting the most qualified teachers to the most challenging classrooms remains a major challenge for most countries. For example, PISA results show that in several countries, more teachers are allocated to disadvantaged schools than advantaged schools, but these teachers tend to be less experienced and hold lower qualifications. On average across

OECD countries, 40% of teachers in disadvantaged schools but 48% of teachers in advantaged schools had at least a master’s degree; and in 42 countries and economies, principals of disadvantaged schools were significantly more likely than those of advantaged schools to report that their school’s capacity to provide instruction was hindered by a shortage of education staff. PISA also found that in 7 of the 19 countries and economies that distributed an optional questionnaire for teachers, the proportion of teachers with less than five years of experience was larger in disadvantaged schools than in advantaged schools. Students then face a double disadvantage: one that comes from their home background and another that is created by the school system (Figure 12).

OECD analyses show that it is not as simple as paying teachers who work in disadvantaged schools more; it requires holistic approaches in which teachers feel supported in their professional and personal lives when they take on additional challenges, and when they know that additional effort will be valued and publicly recognised. Some education systems have been moving in this direction. Singapore sends its best teachers to work with the students who are having the

Figure 9 • Reading performance and spending on education



Source: OECD, PISA 2018 Database, Tables I.B1.4 and Figure; 1.4.4.

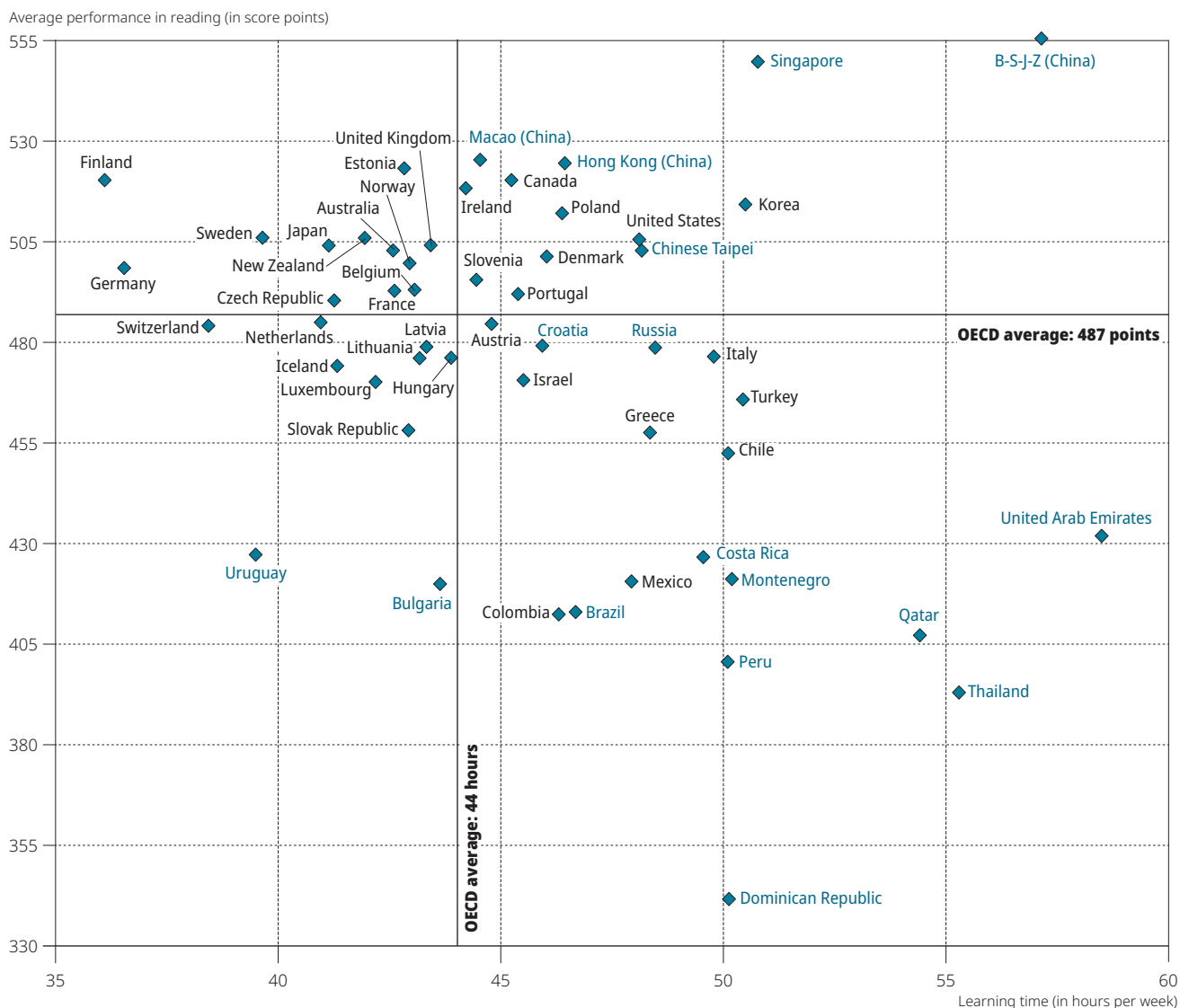
greatest difficulty meeting Singapore’s high standards. In Japan, officials in prefectural offices will transfer effective teachers to schools with weak faculties to make sure that all students have equally capable instructors. Shanghai has established a system of financial transfer payments to schools serving disadvantaged students and career structures that incentivise high-performing teachers to teach in disadvantaged schools. Shanghai also pairs high-performing districts and schools with low-performing districts and schools, so that the authorities in each can exchange and discuss their development plans with each other, and institutes for teachers’ professional development can share their curricula, teaching materials and good practices. The government commissions “strong” public schools to take over the administration of “weak” ones by having the “strong” school appoint one of its experienced leaders, such as the deputy principal, to be the principal of the “weak” school, and sending a team of experienced teachers to lead in teaching. The

underlying expectation is that the ethos, management style and teaching methods of the high-performing school can be transferred to the poorer-performing school.

In the state of Ceará, in Brazil, the highest-performing schools receive a significant reward in additional financial resources that allows them to hire more specialised teachers and experts. They do not use these additional resources in their own school; but are required to allocate them to the schools that struggle most. So everyone wins: the high-performing schools gain additional prestige and an expanded team, and the low-performing schools benefit from the expertise of high-performing schools – which might have been more valuable to them than additional money.

All this being said, it is often difficult for teachers to allocate scarce additional time and resources to the children with the greatest needs. People who laud

Figure 10 • Reading performance and total learning time per week



Note: Learning time is based on reports by 15-year-old students in the same country/economy in response to the PISA 2015 questionnaire. For Beijing-Shanghai-Jiangsu-Zhejiang (China) (labelled as B-J-S-Z [China] on the figure), data on learning time amongst students from Beijing-Shanghai-Jiangsu-Guangdong (China) were used.
Source: OECD, PISA 2018 Database, Table I.B1.4; and OECD, PISA 2015 Database, Figure II.6.23; and PISA 2018 Figure I.4.5.

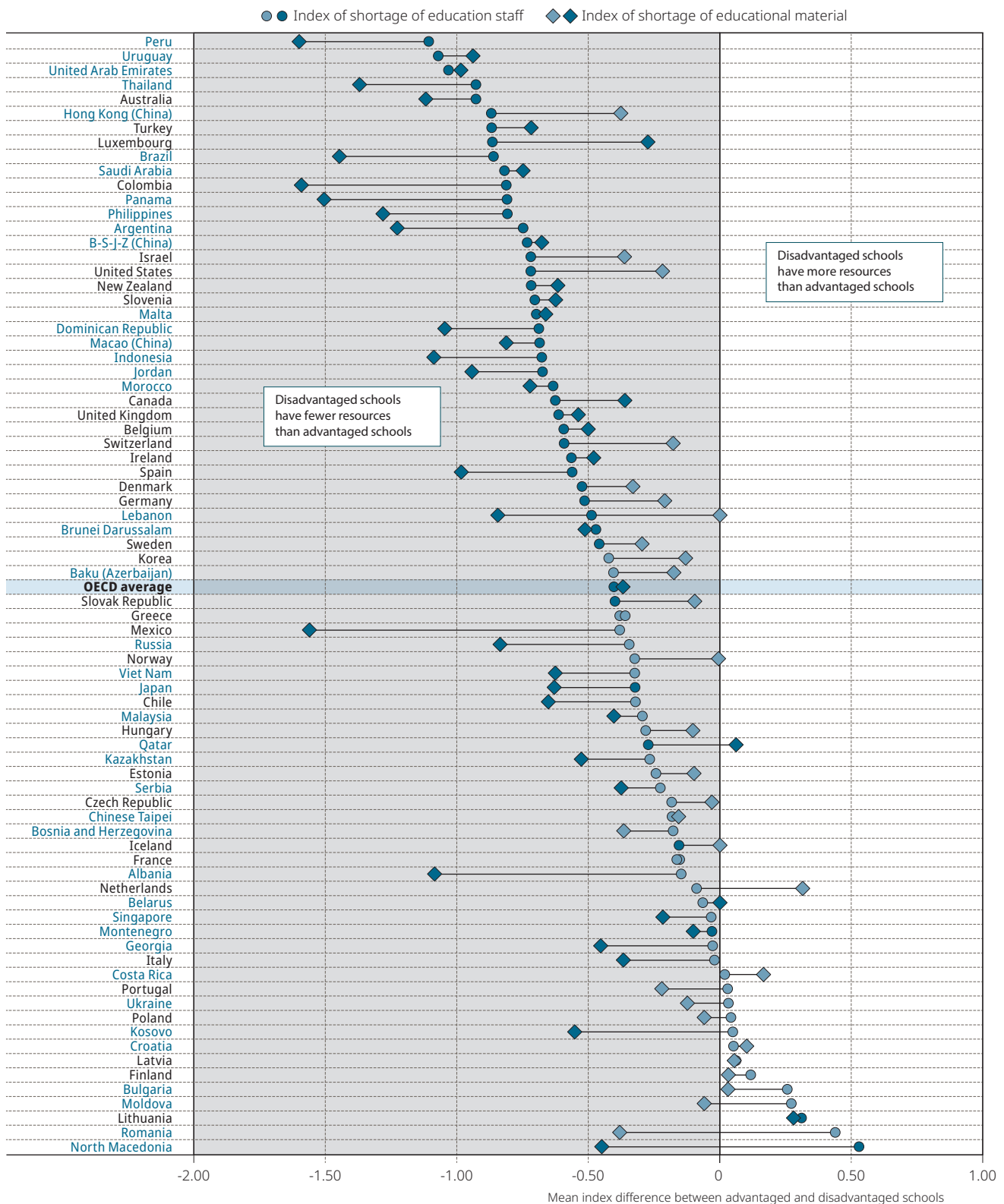
the value of diversity in classrooms are often talking about the classes other people’s children attend. It is challenging to convince socio-economically advantaged parents whose children go to school with other privileged children that everyone is better off when classes are socially diverse. Policy makers, too, find it hard to allocate resources where the challenges are greatest and where those resources can have the biggest impact, often because poor children usually don’t have someone lobbying for them. It is worth studying how countries that have addressed these challenges successfully have dealt with the political economy of these changes.

In sum, all countries have excellent students, but too few countries have enabled all of their students to excel and fulfil their potential to do so. The education that wise parents want for their children is what

public policy should strive to achieve for all children. Achieving greater equity in education is not only a social justice imperative, it is also a way to use resources more efficiently, increase the supply of skills that fuel economic growth, and promote social cohesion. Not least, how we treat the most vulnerable students and citizens shows who we are as a society.

Figure 11 • Difference in shortage of educational material and staff, by schools' socio-economic profile

Results based on principals' reports



Notes: Statistically significant differences are shown in a darker tone.

The socio-economic profile is measured by the school's average PISA index of economic, social and cultural status.

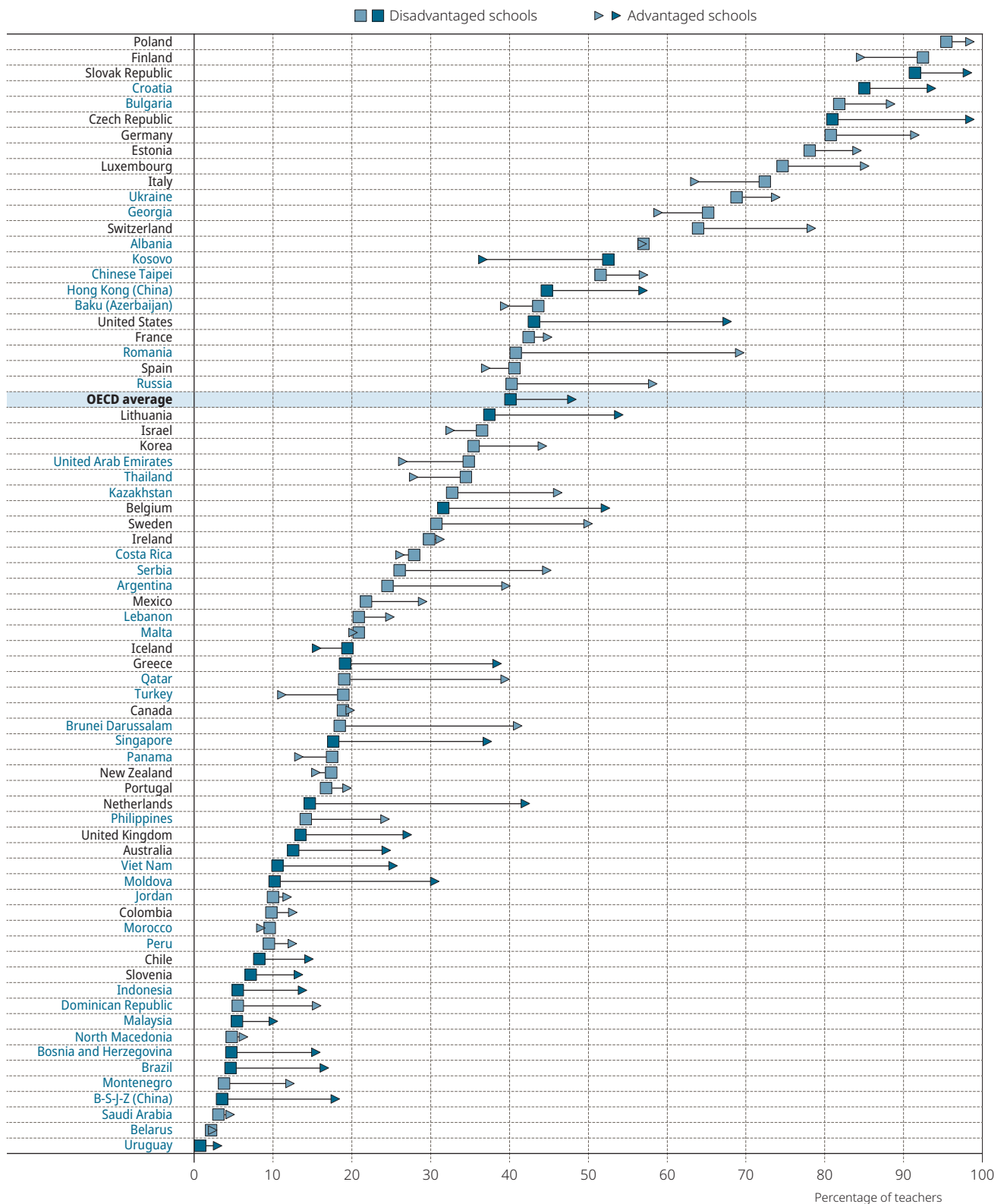
For this analysis, the sample is restricted to schools with the modal ISCED level for 15-year-old students.

Countries and economies are ranked in ascending order of the difference in the mean index of shortage of education staff.

Source: OECD, PISA 2018 Database, Tables II.B1.5.13 and II.B1.5.14; Figure II.5.5.

Figure 12 • Percentage of teachers with at least a master’s degree, by schools’ socio-economic profile

Results based on principals’ reports



Notes: Statistically significant differences are shown in a darker tone.
 Education levels correspond to level 5A master’s degree and level 6 of the International Standard Classification of Education (ISCED-1997).
 The socio-economic profile is measured by the school’s average PISA index of economic, social and cultural status.
 For this analysis, the sample is restricted to schools with the modal ISCED level for 15-year-old students.
 Countries and economies are ranked in descending order of the percentage of teachers in disadvantaged schools with at least an ISCED 5A qualification.
 OECD average-36 refers to the arithmetic mean across OECD countries (and Colombia), excluding Spain.
Source: OECD, PISA 2018 Database, Table II.B1.5.4; Figure II.5.1.

Equity and immigration

The number of students with an immigrant background has grown considerably over the past 20 years in most OECD countries. In 2015 alone, an estimated 4.8 million immigrants arrived in OECD countries, a wave that reinforced a long and steady upward trend. How schools and education systems respond to the challenges and opportunities that arise with immigrant flows has profound implications for the economic and social well-being of all members of society, including immigrants themselves.

On average across OECD countries, some 13% of students in 2018 had an immigrant background, up from 10% in 2009. In most countries, immigrant students tended to be socio-economically disadvantaged, with the largest proportions in Austria, Denmark, Finland, France, Germany, Greece, Iceland, the Netherlands, Norway, Slovenia and Sweden, where nearly one in two immigrant students was disadvantaged.

However, despite media-stoked concern, this growth in the share of students with an immigrant background did not lead to a decline in the education standards in host communities. That may be surprising, but only at first glance. While it is true that migrants often endure economic hardship and precarious living conditions, many immigrants bring to their host countries high aspirations for education, and valuable knowledge and skills. On average across OECD countries, the majority of the first-generation immigrant students who took part in the PISA 2015 assessment had at least one parent who had attended school for as many years as the average parent in the host country.

Still, many children with an immigrant background face enormous challenges at school. They need to adjust quickly to different academic expectations, learn in a new language, forge a social identity that incorporates both their background and their adopted country of residence – and withstand conflicting pressures from family and peers. These difficulties are magnified when immigrants are segregated in poor neighbourhoods with disadvantaged schools. It should thus come as no surprise that PISA data have consistently shown, in most countries, a performance gap between students with an immigrant background and native-born students.

In 2018, the average difference in reading performance across OECD countries between immigrant and non-immigrant students was 41 score points in favour of non-immigrant students. The difference shrank to 24 score points after accounting for students' and schools' socio-economic profile (Figure 13).

However, the considerable cross-country variation in performance between immigrant students and students without an immigrant background is striking, even after accounting for socio-economic status. Even if the culture and the education acquired before migrating have an impact on student performance, the country where immigrant students settle seems to matter significantly.

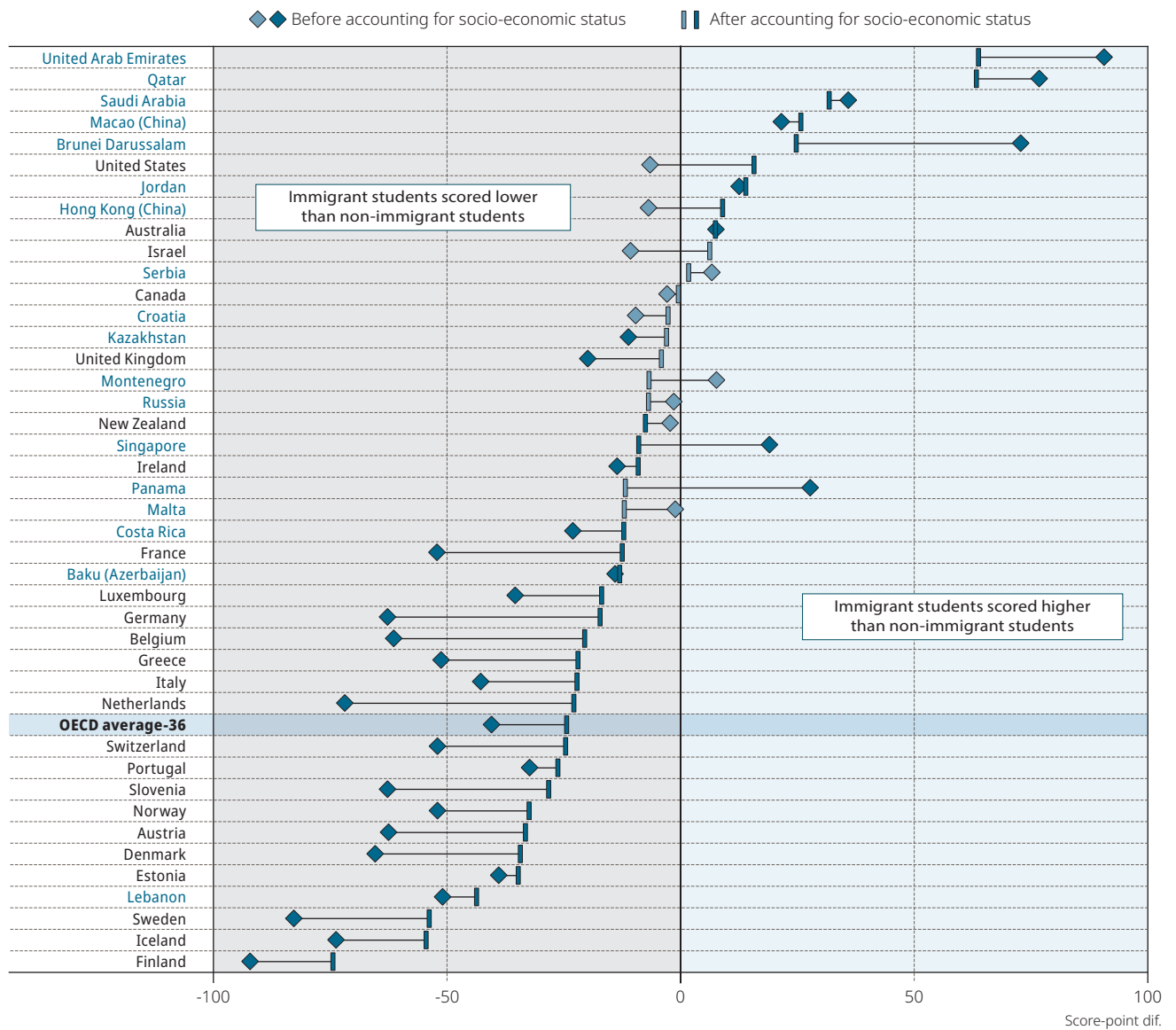
The average performance disadvantage of immigrants should not mask the finding that many immigrant students overcome considerable obstacles and excel academically. On average across OECD countries, 17% of immigrant students scored in the top quarter of reading performance in the country where they sat the PISA test. In Brunei Darussalam, Jordan, Panama, Qatar, Saudi Arabia and the United Arab Emirates, more than 30% of immigrant students performed at that level. Similarly, in Australia, Brunei Darussalam, Jordan, Macao (China), Panama, Qatar, Saudi Arabia, Singapore and the United Arab Emirates, immigrant students scored higher than or at least at the same level as their native-born peers. Despite the considerable challenges they face, they succeed in school – a testament to the great drive, motivation and openness that they and their families possess.

In 1954, the United States opened its borders to an immigrant from Syria. His son, Steve Jobs, became one of the world's most creative entrepreneurs who revolutionised six industries: personal computers, film, music, telephony, tablet computing and digital publishing. Jobs's life story may sound like a fairy tale, but it is firmly rooted in reality. While immigrants are over-represented amongst poor performers in PISA, in half of PISA-participating countries and economies, one in five immigrant students managed to score in the top quarter performance in their host countries. Amongst countries where more than 45% of immigrant students are disadvantaged (including Austria, Denmark, Greece and Slovenia), the share of immigrant students who attained the top quarter of reading performance in their country was as large as the share of disadvantaged students who attained that level. In France and Germany, more immigrant students than disadvantaged students attained that level. These students, who manage to overcome the double disadvantage of poverty and an immigrant background, have the potential to make exceptional contributions to their host countries.

Most immigrant students and their parents hold an ambition to succeed that in some cases surpasses the aspirations of families in their host country. That is remarkable, given that immigrant students in most countries are more disadvantaged and do not

Figure 13 • Difference in reading performance, by immigrant background

Score-point difference in reading performance between immigrant and non-immigrant students, before and after accounting for socio-economic status



Notes: Statistically significant differences in reading performance are shown in a darker tone. Countries where less than 5% of students had an immigrant background are not represented in the figure. Countries and economies are ranked in descending order of the gap in reading performance related to immigrant background, after accounting for students' socio-economic status. OECD average-36 refers to the arithmetic mean across OECD countries (and Colombia), excluding Spain.

Source: OECD, PISA 2018 Database, Table II.B1.9.3; Figure II.9.6.

perform as well as students without an immigrant background. When comparing students of similar socio-economic status, the difference between immigrant and non-immigrant students in their expectations for their future education grows even larger. This is important, as students who hold ambitious yet realistic expectations about their future are more likely to put effort into their learning and make better use of the opportunities available to them to achieve their goals (Figure 14).

The large variation in performance between immigrant and non-immigrant students in different countries, even after accounting for socio-economic background and country of origin, suggests that policy can play a significant role in minimising those disparities. The key is to dismantle the barriers that usually make it harder for immigrant students to succeed at school. The crunch point is not necessarily the point of entry, but afterwards, when educators and school systems decide whether or not to offer programmes and support specifically designed to help immigrant students succeed.

Designing education policies to address immigrant students' needs – particularly language instruction – is not easy, and education policy alone is insufficient. For example, immigrant students' performance in PISA is more strongly (and negatively) associated with the concentration of disadvantaged students in schools than with the concentration of immigrants or of students who speak a language at home that is different from the language of instruction.

Reducing the concentration of disadvantage in schools might require changes in other social policy, such as housing or welfare, to encourage a more balanced social mix in schools. Consider this: when the influx of low-skilled immigrants to Europe began to grow rapidly in the 1970s, the Netherlands chose to accommodate the migrants in large, specially constructed urban housing blocks. The neighbouring Flemish Community of Belgium, whose schools are run on policies very similar to those in the Netherlands, chose to give vouchers to migrant workers to supplement the amount that they would otherwise have to spend on housing. They could use these vouchers wherever they wished. The result was that there were fewer Flemish schools composed entirely of the sons and daughters of migrant workers. Years later, the Netherlands faced an enormous challenge to educate students from the public housing projects whom they had not been able to integrate into their education system and who continued to be low achievers. By contrast, in the Flemish Community of Belgium, where the migrants had been more dispersed, students

from immigrant families were doing far better than their counterparts in the Netherlands, where housing segregation had led to school segregation.

Over the years, OECD's analyses have established some pointers for policy. A quick-win policy response is to provide language support for immigrant students with limited proficiency in the language of instruction. Common features of successful language-support programmes include sustained language training across all grade levels, centrally developed curricula, teachers who are specifically educated in second-language acquisition, and a focus on academic language, and integrating language and content learning.

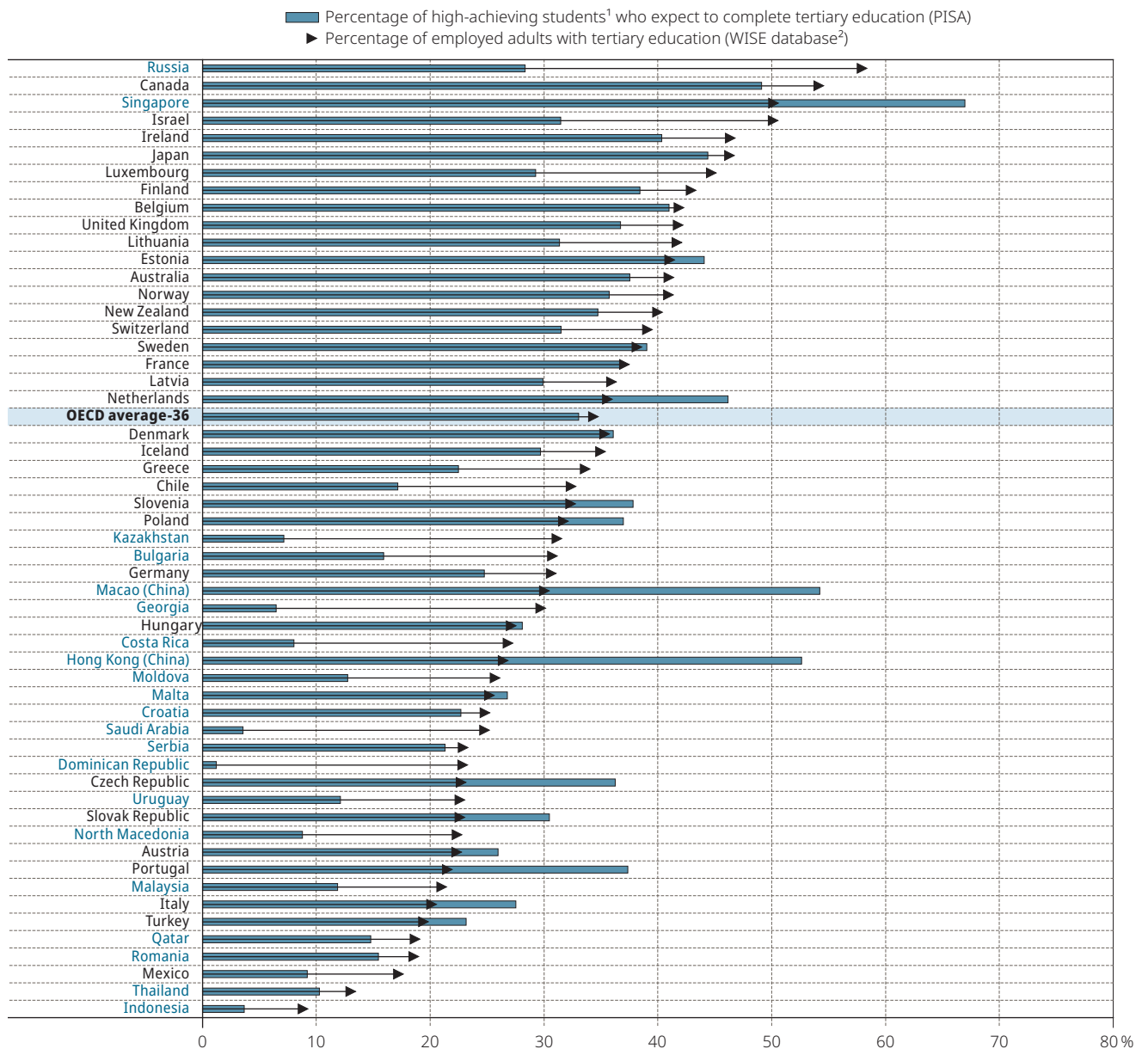
Since language development and general intellectual development are intertwined, it seems best not to postpone teaching the mainstream curriculum until students fully master their new language. What is important is to ensure close co-operation between language teachers and classroom teachers, an approach that is widely used in countries that seem most successful in educating immigrant students, such as Australia, Canada and Sweden.

Offering high-quality early childhood education, tailored to language development, is another policy response. Participating in early education programmes can improve the chances that immigrant students start school at the same level as non-immigrant children. Targeted home visits can encourage enrolment in early childhood education and can help families support their child's learning at home.

However, spending on early childhood education, in and of itself, is not enough. Key to success is helping children from disadvantaged backgrounds develop the kinds of cognitive, social and emotional skills that they might not acquire at home.

A third high-impact policy option is to build specialist knowledge in the schools receiving immigrant children. This can involve providing special education for teachers to better tailor instructional approaches to diverse student populations and support second-language learning. It can also help if teacher turnover is reduced in schools serving disadvantaged and immigrant populations, and if high-quality and experienced teachers are encouraged to work in these schools. Hiring more teachers from ethnic minority or immigrant backgrounds can help reverse the growing disparity between an increasingly diverse student population and a largely homogeneous teacher workforce, especially in countries where immigration is a more recent phenomenon.

Figure 14 • Proportion of high-skilled employees in the labour force and students with realistic and ambitious expectations
Based on students' reports in PISA and WISE database



1. Students who attain at least Level 2 in all three core domains and Level 4 in one of them.

2. WISE refers to the World Indicators of Skills for Employment; for more information, please refer to <https://www.oecd.org/employment/skills-for-employment-indicators.htm>.

Notes: Only countries and economies with available data are shown in this figure.

Tertiary education corresponds to ISCED levels 5A, 5B or 6 according to the International Standard Classification of Education (ISCED-1997).

Countries and economies are ranked in descending order of the percentage of employed adults with tertiary education.

OECD average-36 refers to the arithmetic mean across OECD countries (and Colombia), excluding Spain.

Source: OECD, PISA 2018 Database, Table II.B1.6.8; Figure II.6.3.

The harder challenge is avoiding concentrating immigrant students in the same, underachieving schools. Schools that struggle to do well for native-born students will struggle even more with a large population of children who cannot speak or understand the language of instruction. Countries use different approaches to address the concentration of immigrant and other disadvantaged students in particular schools. One way is to attract other students to these schools, including more advantaged students. A second is to better equip immigrant parents with information on how to select the best school for their child. A third is to limit the extent to which advantaged schools can select students.

Extra support and guidance for immigrant parents can also help. While immigrant parents may have high aspirations for their children, they may feel limited in their capacity to support their children if they have poor language skills or an insufficient understanding of the school system. Programmes to support immigrant parents can include home visits to encourage these parents to participate in educational activities, employing specialised liaison staff to improve communication between schools and families, and reaching out to parents to involve them in school-based activities.

Equity and gender

Technically, the industrialised world had closed the gender gap in education – as measured in average years of schooling – by the 1960s. That made a huge difference, as about half of the economic growth in OECD countries over the past 50 years was due to higher educational attainment, mainly amongst women. But women still earn 15% less than men, on average in OECD countries, and 20% less amongst the highest-paid workers. Some analyses suggest that this is because men and women who do similar work are not paid the same. But a more important factor is that men and women pursue different careers, and those career choices are often made early in life.

In mathematics and science, PISA 2018 suggests that gender differences are generally small (Figure 15). Boys outperformed girls just by five score points in mathematics, on average across OECD countries, and girls outperformed boys in science just by two score points. Only in Argentina, the four provinces/municipalities of China, Colombia, Costa Rica and Mexico did boys significantly outperform girls in science, while the opposite was true in 33 countries and economies. However, while claiming victory in having closed gender gaps in girls' and boys' cognitive abilities, education may have lost sight of

other social and emotional dimensions of learning that may have a stronger impact on children as they think about what they want to be when they grow up.

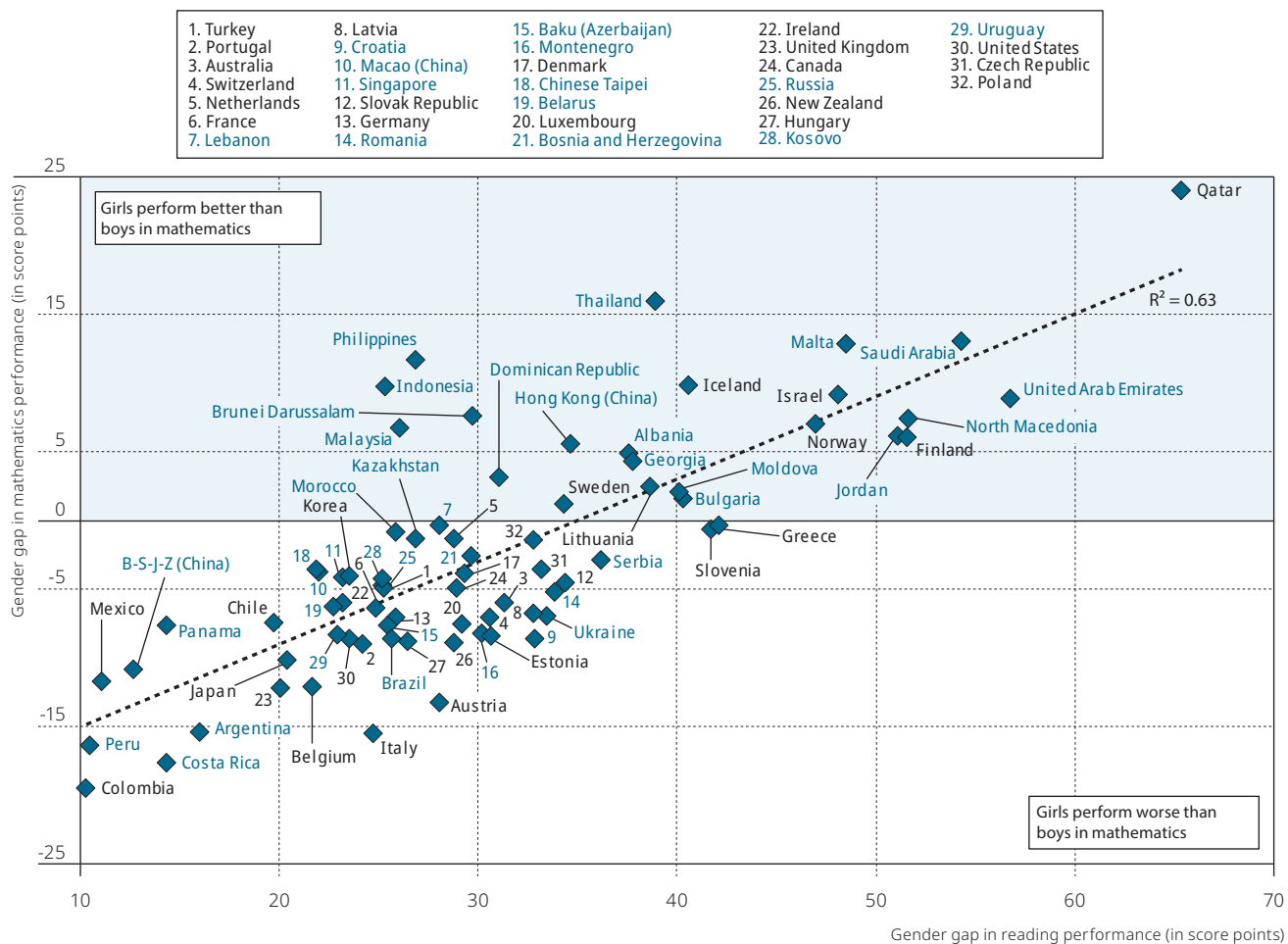
Amongst the 15-year-olds assessed by PISA, only 1% of girls reported that they want to work in ICT-related occupations, compared with 8% of boys who so reported, on average across OECD countries. In Bulgaria, Estonia, Lithuania, Poland, Serbia and Ukraine, more than 15% of boys reported that they expect to work in an ICT-related profession; but in no PISA-participating country or economy did more than 3% of girls so report. It seems even when they excel in mathematics or science in PISA, boys and girls have very different expectations for their future occupation (Figures 16a and 16b). More than one in four boys reported that they expect to work as an engineer or science professional when they are 30 years old, but fewer than one in six girls so reported. Almost one in three high-performing girls, but only one in eight boys with the same proficiency reported that they expect to work as health professionals.

Data from earlier PISA assessments suggest that girls do not seem to be getting much encouragement from their parents either. In all countries and economies surveyed on this question in 2012, parents were more likely to expect their sons, rather than their daughters, to work in a STEM field – even when boys and girls performed equally well in mathematics and science. In 2012, some 50% of parents in Chile, Hungary and Portugal reported that they expect their sons to have a career in science, technology, engineering or mathematics, but less than 20% of parents held such expectations for their daughters.

The picture is very different when it comes to reading. In all countries and economies that participated in PISA 2018, girls significantly outperformed boys in reading – by 30 score points. The narrowest gender gaps (less than 20 score points) were observed in Argentina, the four provinces/municipalities of China, Chile, Colombia, Costa Rica, Mexico, Panama and Peru; the widest (more than 50 score points) were observed in Finland, Jordan, the Republic of North Macedonia, Qatar, Saudi Arabia and the United Arab Emirates.

A comparison of results in reading performance between 2009, when reading was also the main subject assessed in PISA, and 2018 shows that, in several countries and economies, the gender gap in reading performance narrowed over time. It shrank significantly in 36 of the 62 countries and economies that participated in both the 2009 and 2018 PISA assessments. In 17 of those countries

Figure 15 • Gender gap in reading and mathematics performance



Note: Gender gap refers to the difference between girls and boys (girls minus boys).

Source: OECD, PISA 2018 Database, Tables II.B1.7.1 and II.B1.7.3; Figure II.7.3.

and economies, the narrowing of the gender gap in reading performance was due to an improvement in boys' performance. However, in 11 countries, namely Bulgaria, Hungary, Indonesia, Italy, Japan, Kazakhstan, Latvia, Mexico, New Zealand, the Slovak Republic and Switzerland, the narrowing of the gender gap in reading performance was due not to an improvement in boys' performance but to a decline in girls' performance.

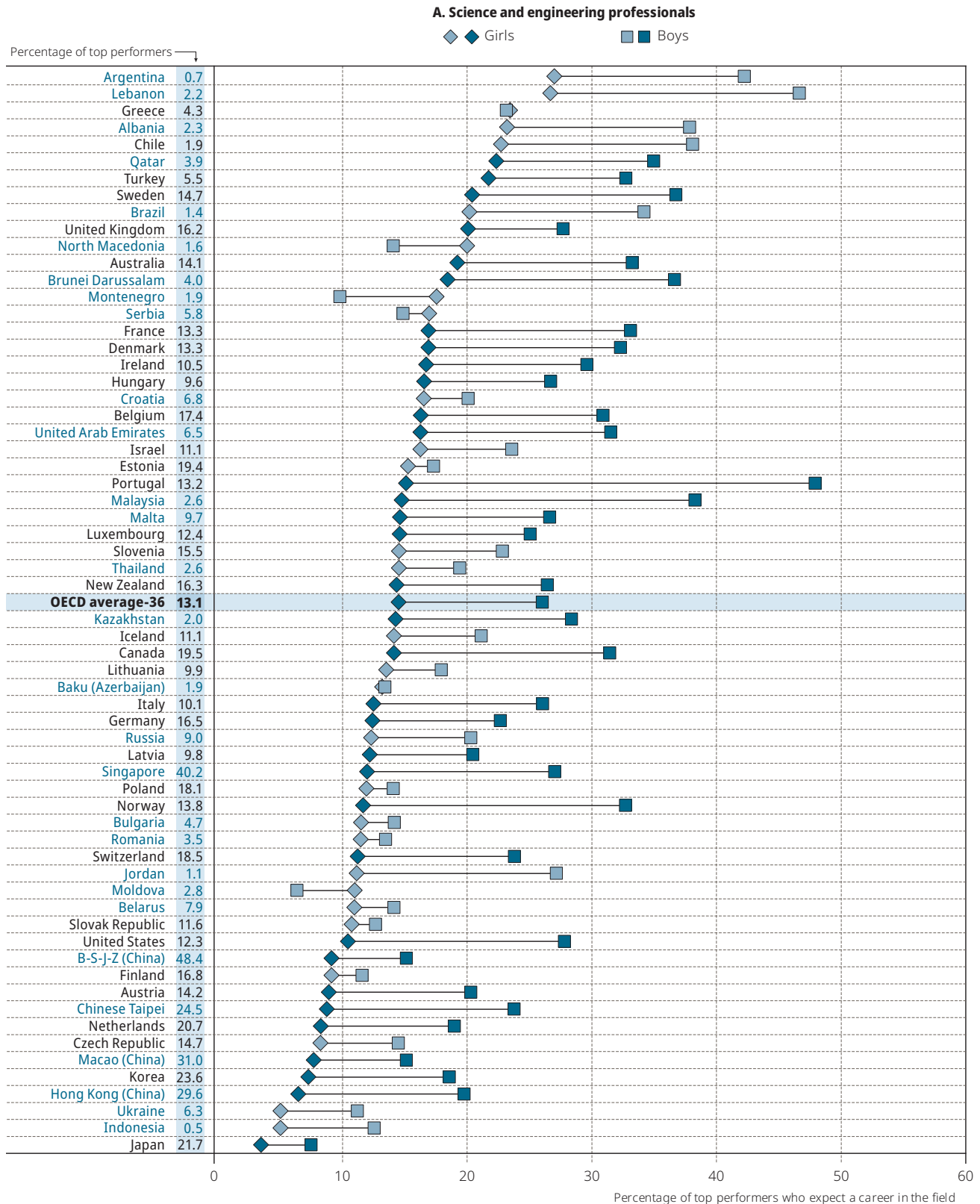
Students' attitudes towards reading have changed over time too. In 2018, 24% of 15-year-old boys and 44% of girls the same age agreed that "Reading is one of my favourite hobbies", while 60% of boys and 39% of girls agreed that "I read only to get information that I need". But compared with 2009 results, in 2018 larger proportions of both boys (an increase of 7 percentage points) and girls (an increase of 9 percentage points) agreed that "I read only if I have to". When asked how much time they usually spend reading for enjoyment, more than 75% of boys reported either none at all or less than 30 minutes a day; less than 3% reported that they read more than two hours a day. By contrast,

43% of girls reported that they read at least 30 minutes a day, and 8% of them reported reading more than 2 hours a day.

Perhaps surprisingly, the large gender gap in reading performance observed amongst 15-year-olds in PISA virtually disappears amongst the 16-29 year-olds who were assessed by the OECD Survey of Adult Skills. Why? To some extent this may have to do with differences in the cohorts; but another explanation is that young men are much more likely than young women to read at work. This suggests that there are many ways to narrow or even eliminate gender gaps in education and skills, as long as education enlists parents, teachers, school leaders and employers in giving men and women the same opportunities and encouragement to learn.

The good news is that narrowing these gender gaps does not require expensive reform. Rather, it requires concerted efforts by parents, teachers and employers to become more aware of their own conscious or unconscious biases so that they give girls and boys equal chances for success at school and beyond.

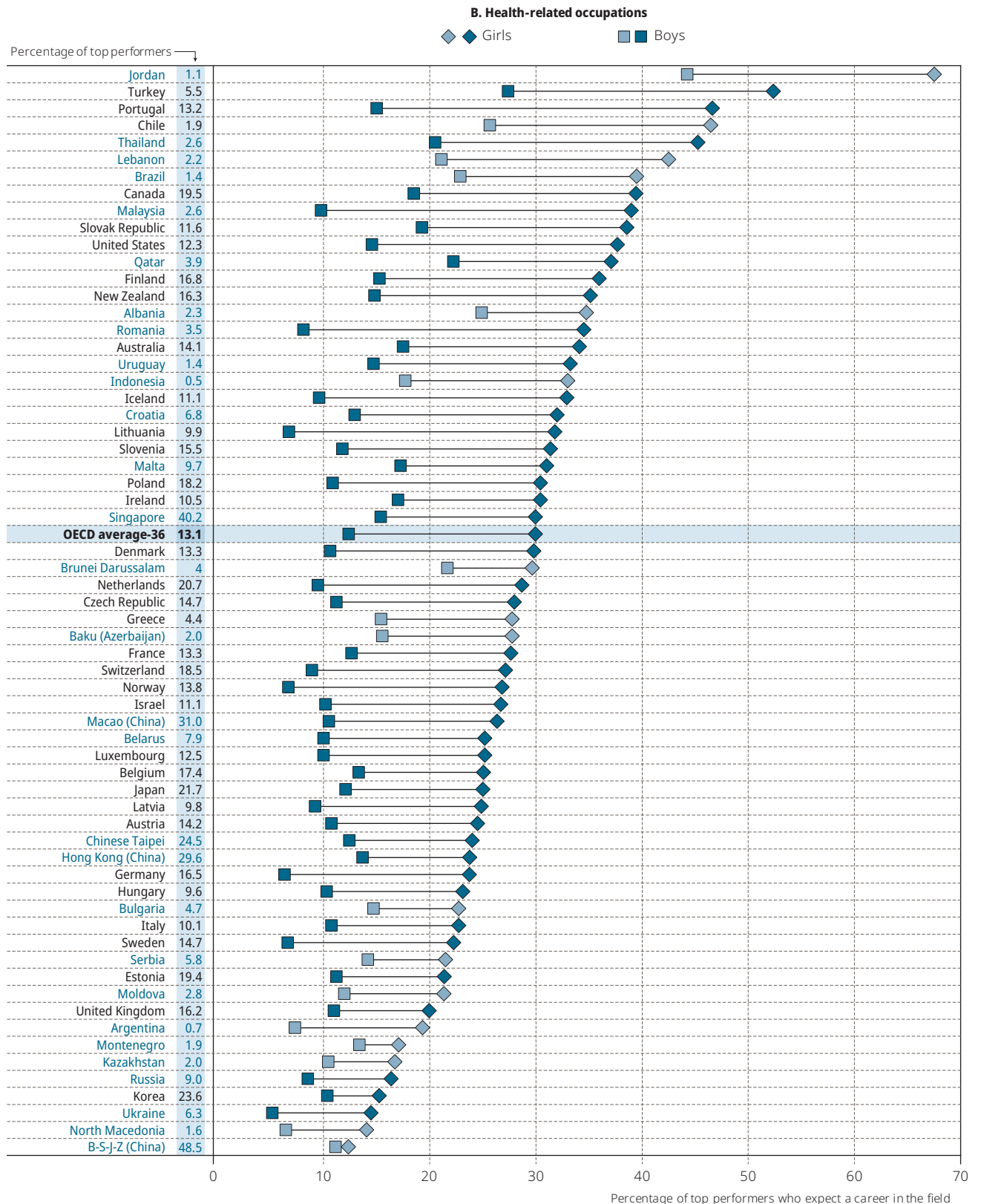
Figure 16a • Gender gap in career expectations amongst top performers in mathematics and/or science



Notes: Statistically significant differences between girls and boys are shown in a darker tone. For students' career expectations, results are only available for the French Community of Belgium. In this figure, "top performers" refers to students who attain at least Level 2 in all three core subjects and Level 5 or 6 in mathematics and/or science. Countries and economies are ranked in descending order of the percentage of top performing girls who expect a career in the field. OECD average-36 refers to the arithmetic mean across OECD countries (and Colombia), excluding Spain.

Source: OECD, PISA 2018 Database, Tables II.B1.8.22 and II.B1.8.23; Figure II.8.8.

Figure 16b • Gender gap in career expectations amongst top performers in mathematics and/or science



Notes: Statistically significant differences between girls and boys are shown in a darker tone. For students' career expectations, results are only available for the French Community of Belgium. In this figure, "top performers" refers to students who attain at least level 2 in all three core subjects and level 5 or 6 in mathematics and/or science. Countries and economies are ranked in descending order of the percentage of top performing girls who expect a career in the field. OECD average-36 refers to the arithmetic mean across OECD countries (and Colombia), excluding Spain.

Source: OECD, PISA 2018 Database, Tables II.B1.8.22 and II.B1.8.23; Figure II.8.8.

For example, PISA shows clearly that boys and girls have different reading preferences. Girls are far more likely than boys to read novels and magazines for enjoyment while boys prefer comic books and newspapers. If parents and teachers were to give boys a greater choice in what they read, they might help boys develop an enjoyment of reading, which could, in turn, lead to at least a narrowing of the gender gap in reading performance.

PISA 2015 also found that boys spend more time playing video games and less time doing homework than girls. While excessive video gaming is shown to be a drag on student performance, a moderate amount of video gaming is related to boys' better performance in digital reading than in print reading (although boys still lag behind girls in both types of reading). Anyone with teenage children knows how difficult it is to tell them how to spend their free time; but all parents should be aware that convincing their children that completing homework comes before playing video games will significantly improve their children's life chances.

One of the most revealing findings from PISA 2009 was that teachers consistently give girls better marks in mathematics than boys, even when boys and girls perform similarly on the PISA mathematics test. That might be because girls are "good students" – attentive in class and respectful of authority – while boys may have less self-control. But while higher marks may mean success at school, they are not necessarily an advantage for girls in the long run, particularly when they do not lead to higher aspirations. Labour markets ultimately reward people for what they know and what they can do with what they know, not for their grades at school.

When it comes to preparing for entry into the labour market, PISA shows that girls are more likely than boys to get information about future studies or careers through Internet research, while boys are more likely than girls to get hands-on experience, by working as interns, job shadowing, visiting a job fair or speaking to career advisers outside of school (more on that later). This implies that employers and guidance counsellors can do far more to engage girls in learning about potential careers.

Read more about these issues in Chapter 8 of *PISA 2018 Results (Volume II): Where All Students Can Succeed*.

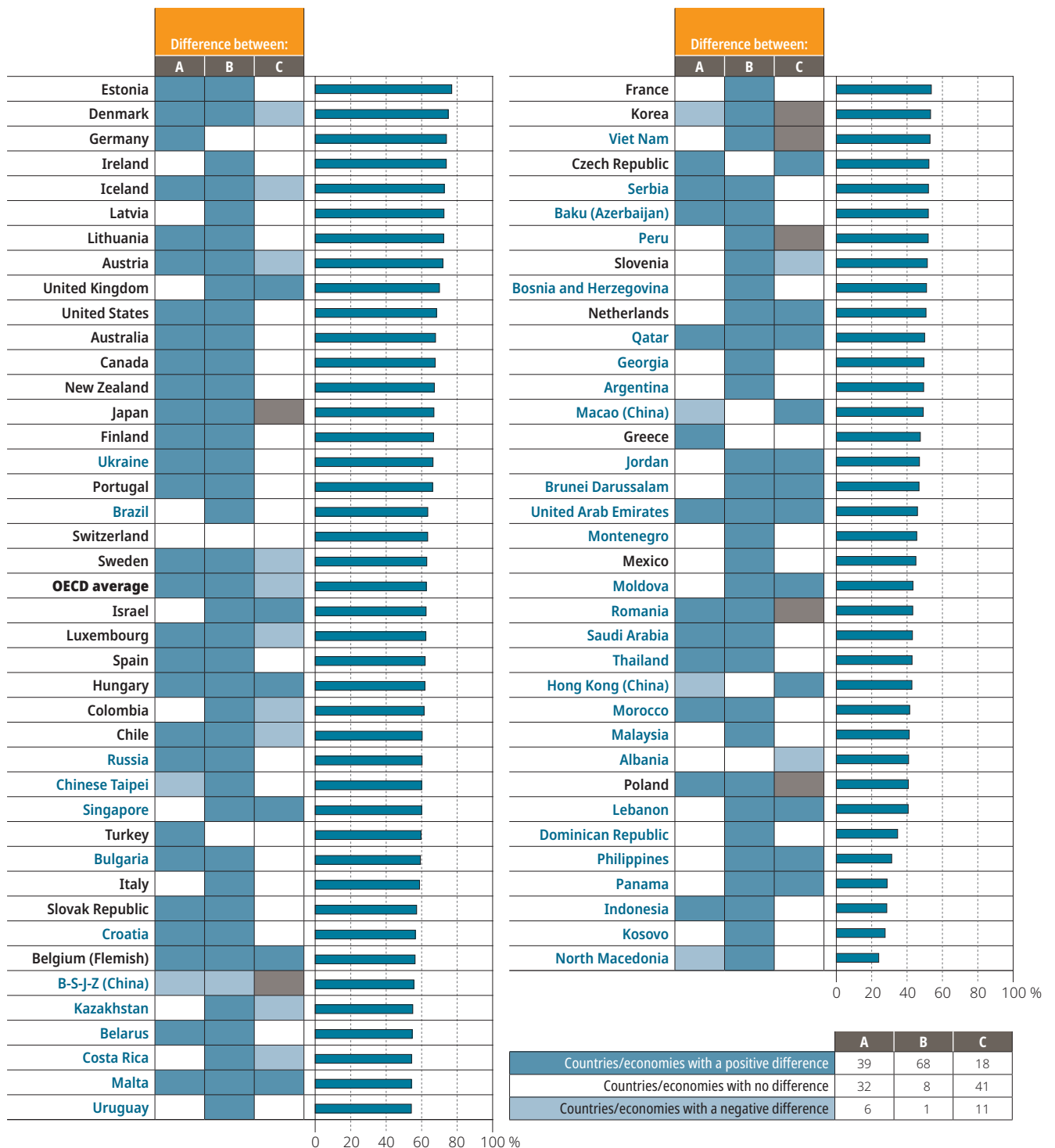
<https://doi.org/10.1787/b5fd1b8f-en>

Figure 17 • Growth mindset, by student characteristics

Percentage of students who disagreed or strongly disagreed with the statement: “Your intelligence is something about you that you can’t change very much”

Positive difference Negative difference Difference is not significant Missing values

A Girls - boys B Advantaged - disadvantaged students C Immigrant - non-immigrant students



Countries and economies are ranked in descending order of the percentage of students who disagreed or strongly disagreed with the statement.

Source: OECD, PISA 2018 Database, Tables III.B1.14.1 and III.B1.14.3; Figure III.14.1.

Fostering a growth mindset

When students struggle and teachers respond by lowering standards, teachers may imply that low achievement is the consequence of an inherent lack of ability. Unlike effort, talent is seen as something that students have no control over, so students may be more likely to give up rather than try harder. According to some research, teachers also give more praise, more help and coaching, and lengthier answers to questions to those students whom they perceive as having greater ability. When teachers don't believe that pupils can develop and extend themselves through hard work, they may feel guilty pressing students whom they perceive to be less capable of achieving at higher levels. This is also concerning because research shows that when a teacher gives a student an easier task and then praises that student excessively for completing it, the student may interpret the teacher's behaviour as reflecting a belief that the student is less able.

All of this is important because of all the judgements people make about themselves, the most influential is how capable they think they are of completing a task successfully. More generally, research shows that the belief that we are responsible for the results of our behaviour influences motivation, such that people are more likely to invest effort if they believe it will lead to the results they are trying to achieve.

In this context, it is worrying that in one-third of countries and economies that participated in PISA 2018, more than one in two students said that intelligence is something about them that they can't change very much (Figure 17). In the Dominican Republic, Indonesia, Kosovo, the Republic of North Macedonia, Panama and the Philippines, at least 60% of students agreed or strongly agreed with

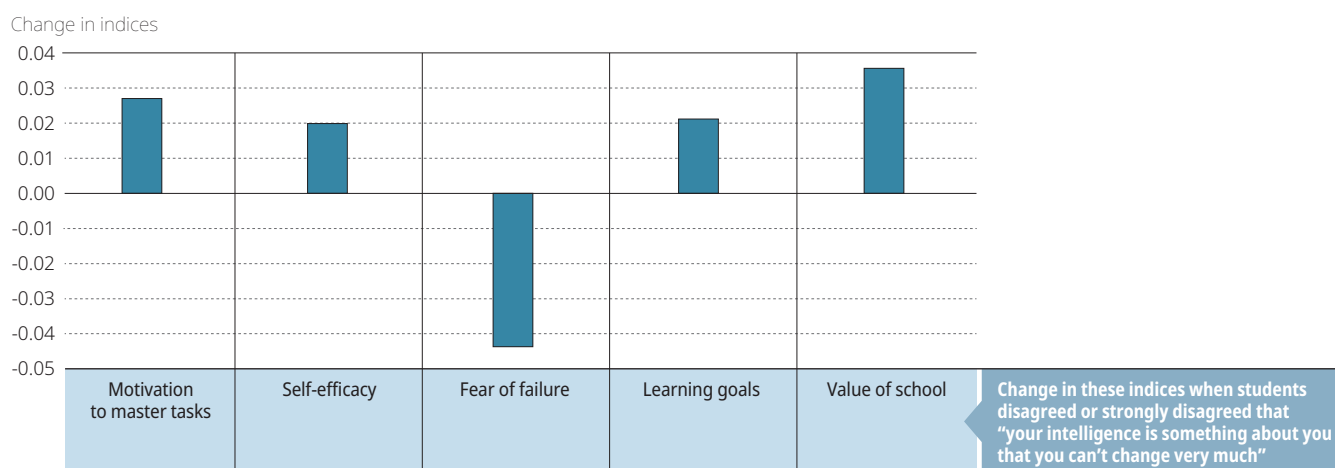
that statement. Those students are unlikely to make the investments in themselves that are necessary to succeed in school and in life.

Perhaps not surprisingly then, students who disagreed or strongly disagreed with the statement "Your intelligence is something about you that you can't change very much" scored 32 points higher in reading than students who agreed or strongly agreed, after accounting for the socio-economic profile of students and schools. Students who believe that their abilities and intelligence can be developed over time (those with a "growth mindset") also expressed less fear of failure than students who believe their abilities and intelligence are "fixed" (Figure 18). In PISA 2018, the students with a growth mindset reported greater motivation to master tasks and self-efficacy, set more ambitious learning goals for themselves, attached greater importance to school, and were more likely to expect to complete a university degree.

There are various ways a growth mindset can be instilled in students. It can begin by teaching students more about the brain's capacity to learn through reading, class discussions and other activities. Research has shown that students who are exposed to these school-based interventions tend to show stronger beliefs about the brain's capacity to change, and are less likely to attribute failure to a lack of talent, than students who are assigned to control groups. Other successful interventions include encouraging students to explain the growth mindset to other students, instilling a growth mindset amongst parents and teachers, offering a single online session about the growth mindset, and playing with a social robot that displays growth-mindset beliefs.

Figure 18 • Growth mindset and student attitudes

OECD average



Notes: All coefficients are statistically significant.

All linear regression models account for students' and schools' socio-economic profile. The socio-economic profile is measured by the PISA index of economic, social and cultural status.

Source: OECD, PISA 2018 Database, Table III.B.1.14.7; Figure III.14.5.

However, a lot comes down to the instructional system. In East Asia, mastery learning is often used to strengthen a growth mindset. It builds on the understanding that learning is sequential, and that mastery of earlier tasks is the foundation on which proficiency in subsequent tasks is built. According to this approach, student learning outcomes reflect the amount of time and instruction a student needs to learn, and whether the opportunity to learn and quality of instruction are sufficient to meet students' needs. For teachers, that means that they do not vary the learning goals, which hold for the entire class, but that they do whatever is needed to ensure that each student has the opportunity to learn the material in ways that are appropriate to him or her. Some students will require additional instruction time, others will not; some students will require different learning environments than others. Behind this thinking is the belief that all students can learn and succeed, and that the task of teachers is to design the learning environments, whether inside or outside the classroom, that help students realise their potential. Because all students succeed in completing each successive task, the result is often less variation and a weaker impact of socio-economic status on learning outcomes.

However, regardless of whether or not students believe that they can develop their intelligence, students may find it challenging to do so if they are not given the necessary tools and support. Parents, teachers and principals need to create an environment where children are encouraged to participate, and where educators believe in students' potential to develop their skills and provide students with the necessary support

and feedback. In this regard, PISA 2018 results reveal that students who perceived their teachers to be more supportive scored higher in reading, particularly after accounting for their socio-economic status. Policy makers, in turn, need to provide educators with the necessary resources and time to achieve their goals. When the role played by educators is not recognised as essential for encouraging a growth mindset to take root and flourish, the responsibility for failing lies entirely with the student, even when they do not have the resources necessary to reach their full potential.

Finland's special teachers work closely with classroom teachers to identify students in need of extra help, and then work individually or in small groups with struggling students to help them keep up with their classmates. It is not left solely to the regular classroom teacher to identify a problem and alert the special teacher; every comprehensive school has a "pupils' multiprofessional care group" that meets at least twice a month for two hours. The group consists of the principal, the special teacher, the school nurse, the school psychologist, a social worker, and the teachers whose students are being discussed. The parents of any child being discussed are contacted prior to the meeting and are sometimes asked to attend.

In many countries, it has taken time to move from a belief that only a few students can succeed to embracing the idea that all students can achieve at high levels. It takes a concerted, multifaceted programme of policy making and capacity building to attain that goal. But one of the patterns observed amongst the highest-performing countries is the gradual move from a system in which students were

stratified into different types of secondary schools, with curricula demanding various levels of cognitive skills, to a system in which all students go to secondary schools with similarly demanding curricula.

Amongst OECD countries, Finland was the first to take this route in the 1970s; Poland was the most recent, with its school reform in the 2000s. These countries “levelled-up”, requiring all students to meet the standards that they previously expected only their elite students to meet. Students who start to fall behind are identified quickly, their problem is promptly and accurately diagnosed, and the appropriate course of action is quickly taken. Inevitably, this means that some students are targeted for more resources than others; but it is the students with the greatest needs who benefit from the most resources.

It takes strong leadership, and thoughtful and sustained communication to bring parents along in this effort, particularly those benefiting from the more selective tracks. In the end, education systems are unlikely to sustain high performance and equitable opportunities to learn without the premise that it is possible for all students to achieve at high levels – and that it is necessary for them to do so.

Students’ confidence in their abilities and their fear of failure also affect both their performance and their well-being. While a moderate sense of fear can spur students to expend greater effort on academic tasks, an excess of fear could compel students to avoid challenging tasks and situations that are essential for their personal growth. PISA found that, on average, the greater the fear of failure expressed by students, the higher a country’s reading score. This was observed in a large number of English-speaking and East Asian education systems.

However, fear of failure can be a double-edged sword, and parents, teachers and school principals should be aware that instilling a fear of failure in children may also adversely affect their well-being. For instance, PISA results show that, in virtually all school systems, students reported less satisfaction with life when they expressed a greater fear of failure. Policy makers may be interested in learning more about the Flemish Community of Belgium, Estonia, Finland and Germany – education systems where students scored above the OECD average in reading, but expressed less fear of failure than the typical student across OECD countries. Interestingly, PISA also found that, in every school system except the Flemish Community of Belgium and Germany, students who exhibited a growth-mindset – i.e. they believe that abilities and intelligence can be developed over time – reported

less fear of failure than students with a fixed mindset.

PISA results also show that students who see themselves as more competitive scored higher in reading than those who do not, especially when they reported trying harder when in competition with others, and this holds for both boys and girls. However, parents, teachers, school principals and policy makers should be aware that when they create a competitive learning environment, not all students may respond in the same way. For example, PISA results show that in a competitive environment, boys and students who perceived themselves as competitive reported better well-being outcomes than girls and students who did not perceive themselves as competitive. In the debate about how much competition and co-operation are needed, some researchers argue that when co-operative and competitive behaviours are intertwined, as in inter-team competitions, the performance and enjoyment of participants are even higher than in a purely co-operative or competitive environment.

Read more about these issues in Chapters 12, 13 and 14 in *PISA 2018 Results (Volume III): What School Life Means for Students’ Lives*.
<https://doi.org/10.1787/acd78851-en>



Aligning education and career aspirations

Across the world, young people who leave education today are entering the labour market with often considerably more years of schooling than their parents or grandparents had when they started working. And yet, young people continue to struggle in the labour market, employers continue to complain that they cannot find the new talent they need, and governments continue to worry about the mismatch between what the labour market demands and what the education system supplies. The bottom line is that, for young people, academic success alone is not sufficient to ensure easy transitions into good employment.

The PISA 2018 assessment collected data not only on the knowledge and skills of 15-year-olds, but also on their expectations for further education and a career (Table 1). These data allow for an examination of how young people's career aspirations compare with future-focused labour market information about specific occupations – their potential for growth and their likelihood of succumbing to automation. It is also possible to examine how closely young people's career aspirations correlate with their strengths and skills, and to identify gaps where additional awareness and support could help young people discover, pursue and secure careers in which they might be successful.

These data also make it possible to examine whether gender-related differences in career expectations have already taken root by the age of 15. Location data can also be leveraged to analyse differences in ambition across countries and between urban and rural environments. They can also be used to identify regional factors to be borne in mind when

giving young people information about labour-market opportunities. The PISA 2018 report includes an initial analysis on this, and more detailed analyses are underway.

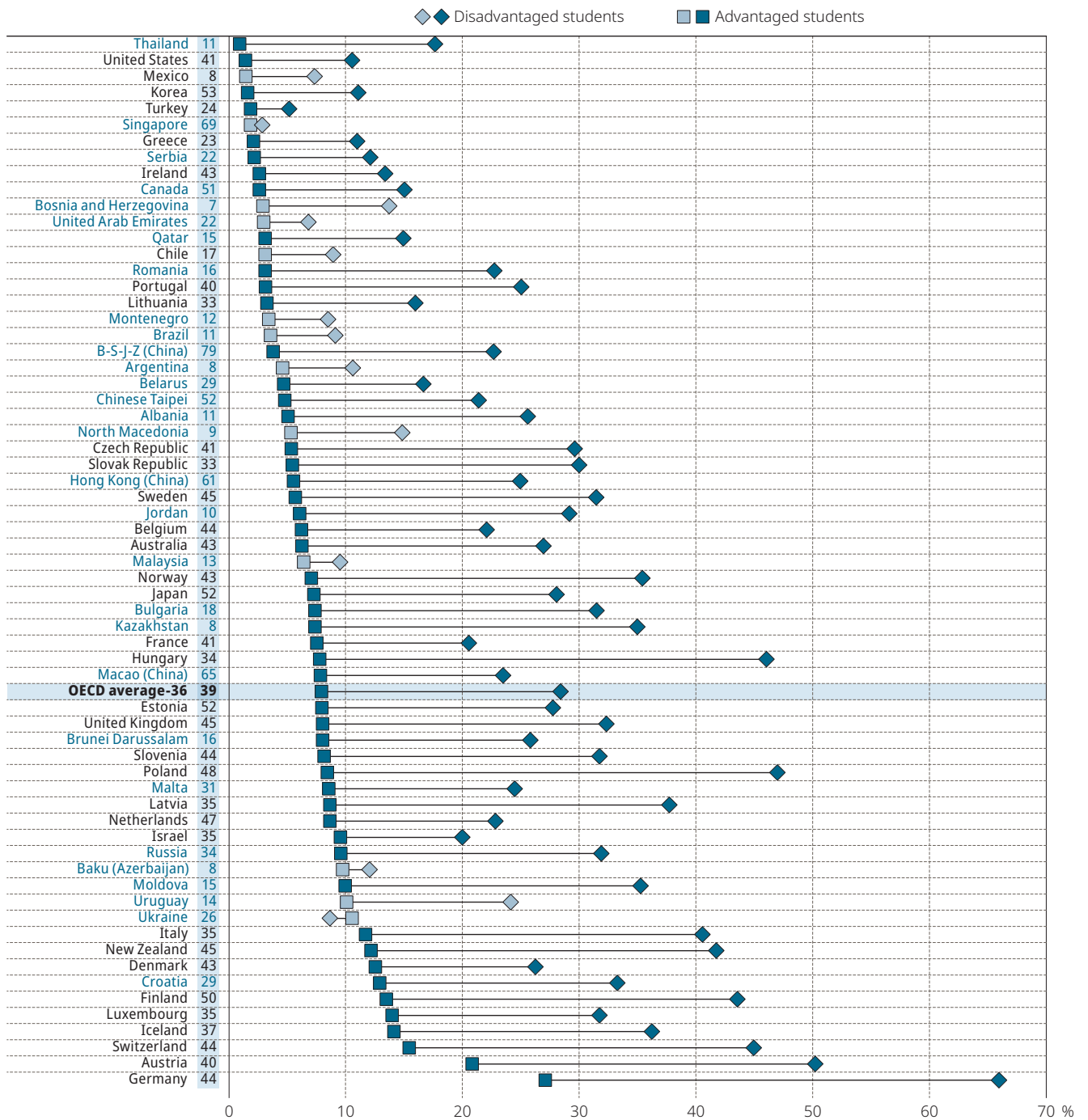
Of course, not all 15-year-olds have a clear vision of their future career, and some 25% of students, on average across OECD countries, provided only vague answers to the question about their career expectations. However, longitudinal studies in four countries that followed students who had sat the PISA test in the early 2000s as they became young adults found that those who, at the age of 15, had expected to work in a high-skilled job were more likely to be doing so as young adults than those who had not held high expectations when they were 15.

The results from PISA 2018 show that disadvantaged students tend to hold lower ambitions than would be expected given their academic achievement (Figure 19). More than nine in ten high-achieving advantaged students, but only seven in ten high-achieving disadvantaged students reported that they expect to complete tertiary education. As a result, more than 30% of high-achieving disadvantaged students did not expect to complete tertiary education; and even when disadvantaged students aspired to high-skilled occupations, a considerable proportion of them held expectations of future education that were not aligned with their career goals.

Encouraging all students, especially disadvantaged students, to have ambitious and realistic education and career expectations is necessary not only to improve equity but as an investment in the future. Only in a few

Figure 19 • High performers who do not expect to complete tertiary education, by socio-economic status

Percentage of students amongst those who have attained at least minimum proficiency (Level 2) in the three core PISA subjects and are high performers (Level 4) in at least one subject



Notes: The percentage of high performers is shown next to the country/economy name. Statistically significant differences are marked in a darker tone. Only countries and economies with sufficient proportions of high performers amongst advantaged/disadvantaged students are shown in this figure. Countries and economies are ranked in ascending order of the percentage of advantaged students. OECD average-36 refers to the arithmetic mean across OECD countries (and Colombia), excluding Spain.

Source: OECD, PISA 2018 Database, Table II.B1.6.7; Figure II.6.5.

Table 1 • Top 10 career expectations of 15-year-old students, by gender

	Boys	Girls
1st	Police officers	Specialist medical practitioners
2nd	Athletes and sports players	Generalist medical practitioners
3rd	Engineering professionals	Lawyers
4th	Generalist medical practitioners	Teaching professionals
5th	Business services and administration managers	Nursing professionals
6th	Motor vehicle mechanics and repairers	Medical doctors
7th	Armed forces occupations, other ranks	Psychologists
8th	Policy and planning managers	Police officers
9th	Lawyers	Veterinarians
10th	Teaching professionals	Policy and planning managers

Source: OECD, PISA 2018 Database; Table II.6.1.

countries, such as Canada, Chile, Korea, Singapore, Ukraine and the United States, were students' expectations of further education both ambitious and aligned with their academic performance, regardless of the students' socio-economic status.

In addition, disadvantaged students are often more at risk of lacking relevant information about future education and career choices. In many countries, schools that enrol more disadvantaged students were less likely to provide opportunities for students to discuss their career plans with a specialised advisor, on average. In fact, PISA 2018 finds that only a small proportion of disadvantaged students reported knowing how to get information about student financing (e.g. student loans or grants) for higher education.

A misalignment between academic performance, on the one hand, and education and career expectations, on the other, can be partly due to the anticipated difficulties in progressing through a long and costly education. For example, an experiment conducted in the Dominican Republic suggests that eighth-grade boys from poor backgrounds largely underestimated the returns to higher education, and that providing them with accurate information had a positive impact on their schooling.

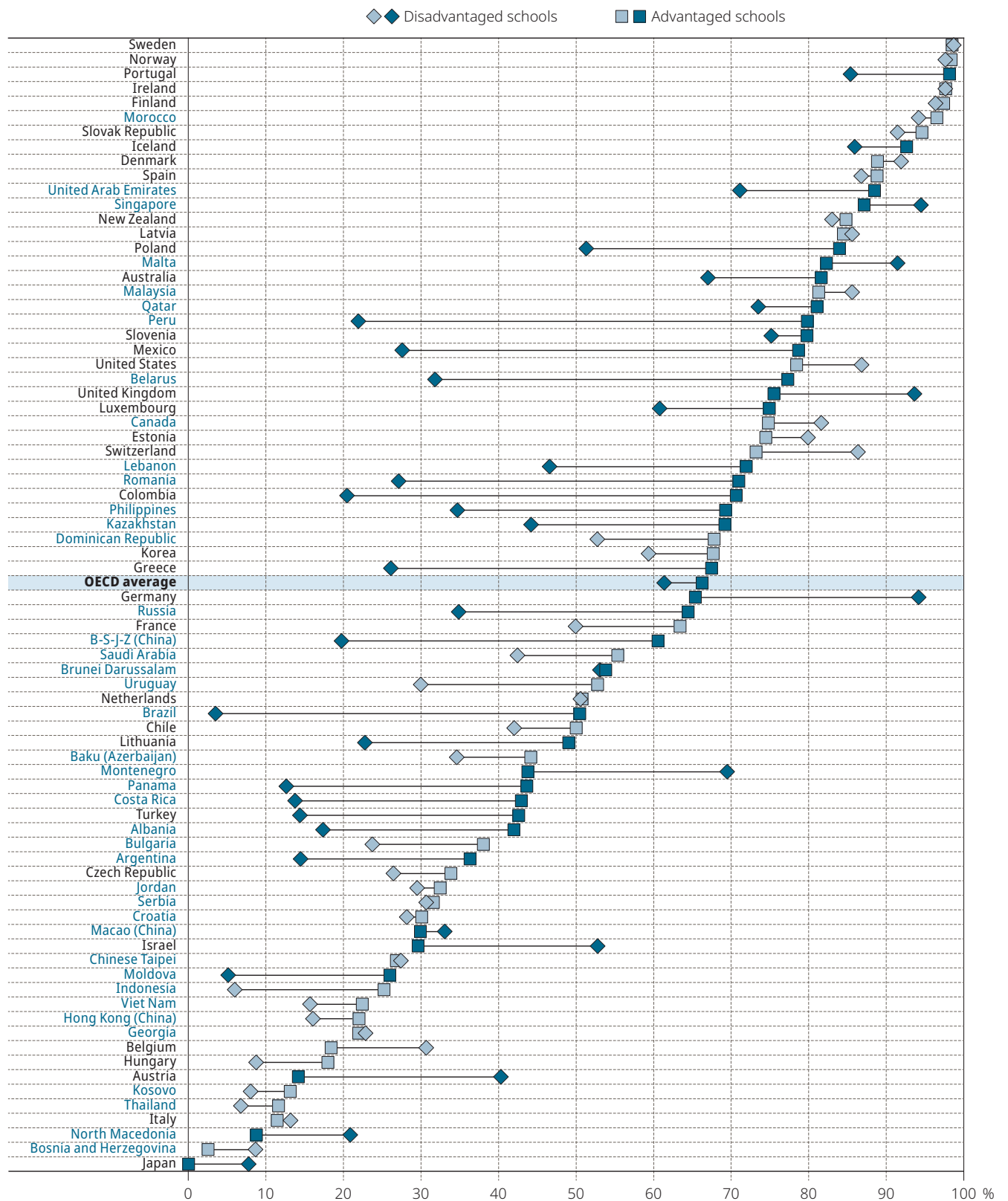
A study in the United States showed the potential of intensive college counselling provided to college-aspiring, low-income students. These interventions are typically run by community-based non-profit organisations, and provide personalised guidance to students throughout the college search, application and financial aid processes. They shift the focus towards enrolment in four-year colleges that are

less expensive and have higher graduation rates than the alternatives that students would otherwise choose. Counselling also improves students' persistence through at least the second year of college, suggesting a potential to increase the rate of degree completion amongst disadvantaged students. Similar results were observed with another intervention, which showed that mailing high-achieving seniors an information packet and application fee waivers made low-income students more likely to enrol in colleges that have stronger academic records and higher graduation rates than those to which students with similar profiles would normally have applied.

An experiment in disadvantaged high schools in Toronto, Canada, found that watching a video about the benefits of post-secondary education and being invited to try out a financial-aid calculator significantly assuaged the concerns of disadvantaged high school students about the costs of higher education, and raised their expectations to earn a degree. Results from another controlled trial conducted in German high schools suggest that similar low-cost interventions may eventually lead to greater tertiary enrolment amongst students whose parents did not attain that level of education. Students in selected schools who had attended a simple, in-class presentation on the benefits and costs of higher education, and on possible funding options, more often applied to university and were more often enrolled than students who had not been exposed to these interventions.

Similarly, in several countries, schools that enrol mostly disadvantaged students were less likely than schools that mostly enrol advantaged students to provide opportunities for students to discuss their career plans with a specialised advisor (Figure 20).

Figure 20 • Advantaged/disadvantaged schools where one or more dedicated counsellor(s) provide career guidance
 Percentage of students in schools that provide career guidance



Notes: Statistically significant differences are marked in a darker tone.
 For this analysis, the sample is restricted to schools with the modal ISCED level for 15-year-old students.
 Countries and economies are ranked in descending order of the percentage of students in advantaged schools.
Source: OECD, PISA 2018 Database, Table II.B1.6.9; Figure II.6.6.

The Mexican anti-poverty programme, PROGRESA, shows that simply being exposed to highly educated professionals, such as doctors and nurses, raises the aspirations of poor families for their children's education, and has a positive impact on students' achievement at school.

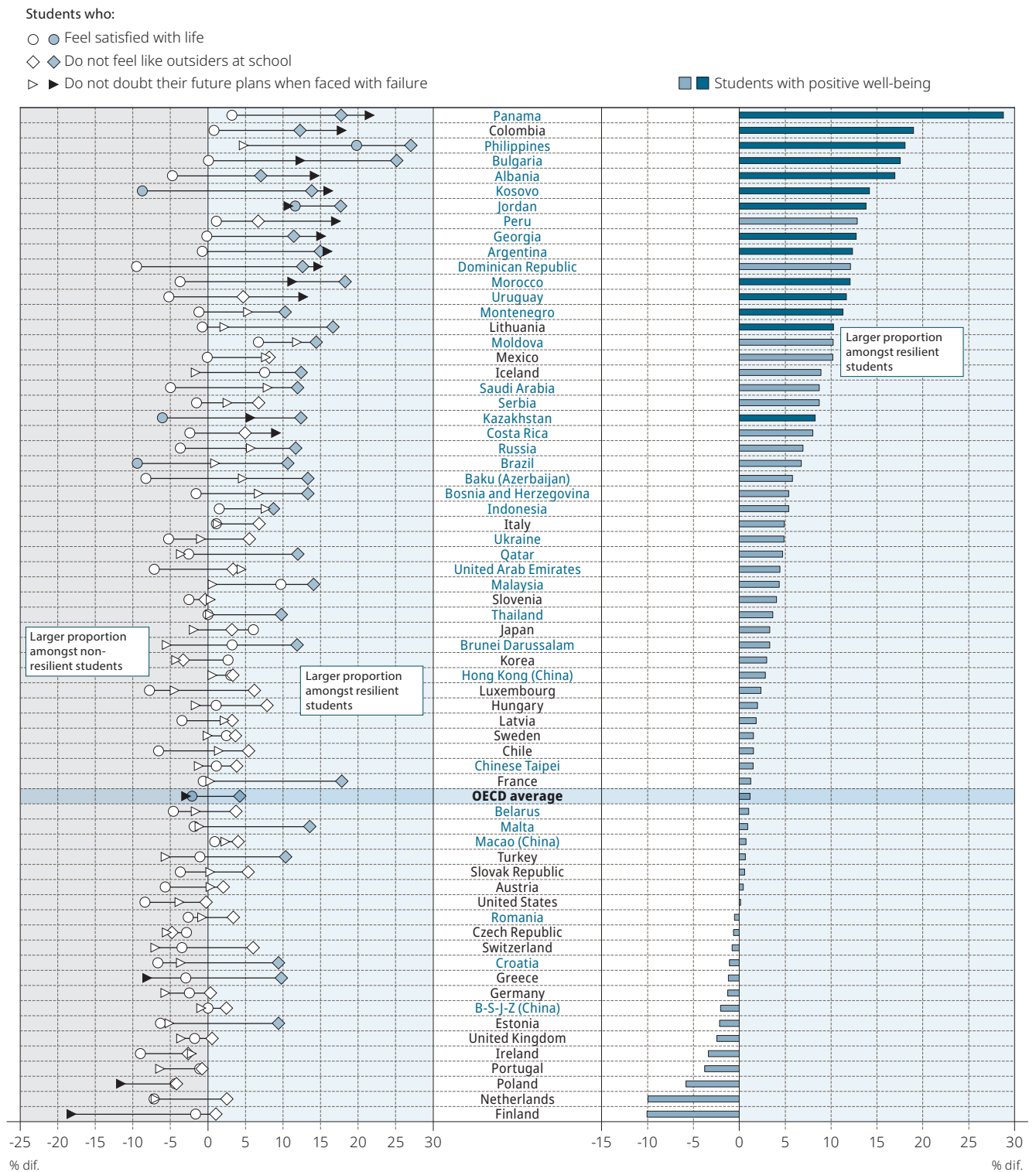
Clearly, school-to-work transitions have become more complex and prolonged. This reflects both changes in labour market demand, and a growing disparity with what education systems supply. This generation of young citizens requires curiosity, entrepreneurship and resilience to work effectively in the new labour market. They will need confidence to create their own employment and to manage their careers in new ways. Education systems need to prepare young people to be effective in applying what they know to ever-changing situations, expose them to relevant role models, and provide guidance that helps them discover their passions, areas where they can excel, and where and how they can find or create a job.

Read more about these issues in Chapter 6 in *PISA 2018 Results (Volume II): Where All Students Can Succeed*.

<https://doi.org/10.1787/b5fd1b8f-en>

Figure 21 • Students' well-being, by academic resilience

Percentage-point difference between students who are academically resilient and those who are not



Notes: Statistically significant differences between students who are resilient and those who are not are shown in a darker tone. Resilient students are disadvantaged students who score in the top quarter of performance in reading amongst students in their own country. Non-resilient students are disadvantaged students who do not score in the top quarter of performance in reading. Students with positive well-being refers to students who reported that they are satisfied with their lives, do not feel like outsiders at school and do not doubt their future plans when facing failure. For the index do not doubt their future plans when faced with failure, data are only available for the Flemish Community of Belgium. Countries and economies are ranked in descending order of the percentage-point difference between students who are academically resilient and those who are not.

Source: OECD, PISA 2018 Database, Table II.B1.3.5; Figure II.3.8.

School life, student life and student well-being

From its first assessment, PISA has been asking students about their motivations and dispositions towards learning, such as their enjoyment of reading and their anxiety towards mathematics. In more recent assessments, PISA also asked students about their more general social and emotional state, including their satisfaction with life, their feelings and their fear of failure, in order to establish a more holistic appreciation of education outcomes and student well-being. In addition, an optional questionnaire on well-being was distributed as part of PISA 2018. All of these questions connect school life with the broader ecosystem in which students live – the family, their peers, the community – and provide information on the development of 15-year-old students.

Across OECD countries, about two in three students reported that they are satisfied with their lives, a percentage that shrank by five percentage points between 2015 and 2018. More than 85% of students reported sometimes or always feeling happy, cheerful or joyful; but about 6% of students reported always feeling sad. In almost every education system, girls expressed greater fear of failure than boys, even when they outperformed boys in reading by a large margin, and this gender gap was considerably wider amongst top-performing students. Positive student well-being was also associated with a higher proportion of resilient students (Figure 21).

PISA 2018 shows that school life is closely related to the well-being of 15-year-old students. For instance, the three aspects of students' lives that are more strongly associated with expressions of sadness are how satisfied students are with the way they look, with

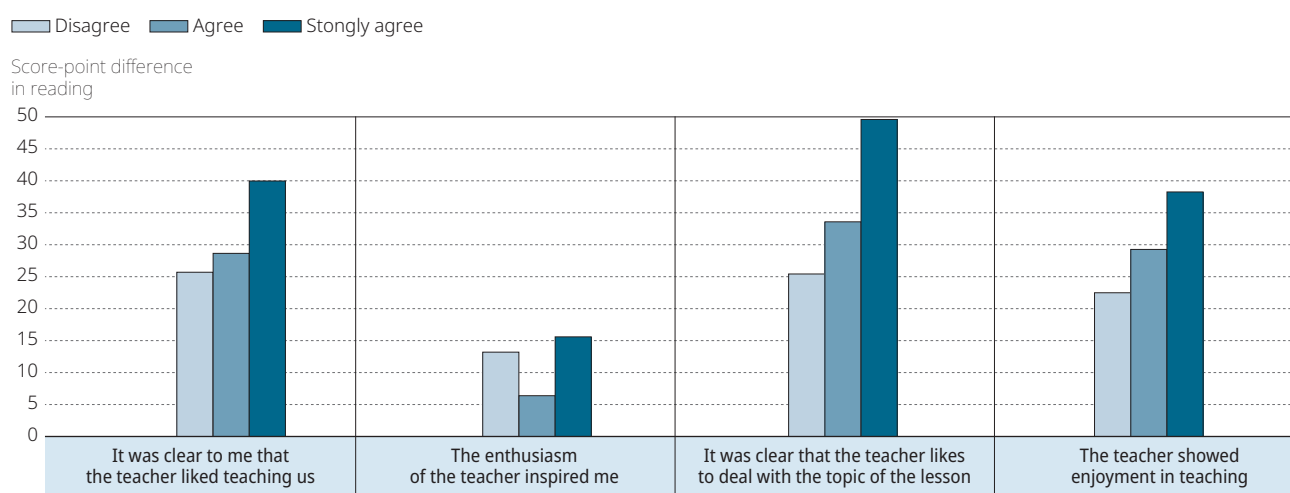
their relationships with their parents, and with school life. Ultimately, the well-being of students may also affect their academic performance. In this regard, PISA data show that students who were frequently bullied were more likely to have skipped school and scored lower in reading.

A positive school climate is one of those things that is difficult to define and measure, but everyone recognises it when they see it. Students appreciate a school environment where bullying is unusual, where students do not feel out of place, and where establishing genuine and respectful relationships with teachers is the norm. PISA 2018 shows that school climate is closely associated with students' sense of well-being.

The disciplinary climate in language-of-instruction lessons is also one of the strongest predictors of reading performance. In all countries and economies, students who reported fewer disciplinary problems in their language-of-instruction lessons performed better in reading, after accounting for the socio-economic profile of students and schools. More specifically, on average across OECD countries, students who reported that students cannot work well in every or most language-of-instruction lessons scored 25 points lower in reading than students who reported that this never happened or happened only in some lessons, after accounting for socio-economic status. Even occasional disciplinary problems were negatively associated with reading performance. Students who reported that disciplinary problems occur in some language-of-instruction lessons scored between 5 and 9 points lower in reading than students who reported that the problems never, or hardly ever, occur.

Figure 22 • Prevalence of teacher enthusiasm and reading performance

OECD average; reference category "strongly disagree"



Notes: All values are statistically significant.

Results based on linear regression analysis, after accounting for students' socio-economic profile, gender and immigrant background. The socio-economic profile is measured by the PISA index of economic, social and cultural status.

Source: OECD, PISA 2018 Database, Table III.B.1.5.7; Figure III.5.3.

The good news is that the disciplinary climate in school generally improved between 2009 and 2018, according to students' reports, especially in Albania, Korea and the United Arab Emirates. For example, on average across OECD countries, the percentage of students who reported that their classmates in their language-of-instruction lessons always, or almost always, listen to what the teacher says, or can work well, increased by about four percentage points during that period. That's good news because all types of students appeared to benefit from a positive disciplinary climate. The relationship between disciplinary climate and reading performance was relatively stable across students' gender, socio-economic status and immigrant background.

PISA 2018 also asked students whether their language-of-instruction teacher supports them in their schoolwork and is enthusiastic about teaching. Around three in four students reported that, in most or every lesson, the teacher gives extra help when students need it and that the teacher helps students with their learning. In most countries and economies, students scored higher in reading when they perceived their teachers as more enthusiastic, especially when they said their teachers were interested in the subject (Figure 22). On average across OECD countries and in 43 education systems, students who perceived greater support from teachers scored higher in reading, after accounting for the socio-economic profile of students and schools. Equally important, teacher enthusiasm and teachers' stimulation of reading engagement were the teaching practices most strongly

(and positively) associated with students' enjoyment of reading (Figure 23).

Of course, most teachers care about having positive relationships with their students; but some teachers might be insufficiently prepared to deal with difficult students and classroom environments. Effective classroom management consists of far more than establishing and imposing rules, rewards and incentives to control behaviour; it requires the ability to create a learning environment that facilitates and supports students' active engagement in learning, encourages co-operation, and promotes behaviour that benefits other people. A stronger focus on classroom and relationship management in professional-development programmes may give teachers some of the tools they need to connect better with their students. Teachers also need the time to share information about students' strengths and weaknesses with their colleagues, so that, together, they can find the best approaches to make students feel part of the school community.

Clearly, what goes on at school can have an impact not only on students' attitudes towards learning, but on their feelings, in general (Figure 24). Parents recognise this, too, as they cited school safety, school climate and school reputation as the most important criteria when choosing a school for their child, followed closely by students' academic achievement and the offering of specific subjects or courses. PISA 2018 finds that in all 65 countries and economies with available data, students were more likely to express positive feelings, in general, when they reported a stronger sense of belonging at school; and in virtually all school systems,

students who perceived their peers to be more co-operative were more likely to express positive feelings.

Teachers and principals often count on parents to help them create a positive learning environment in their schools. According to school principals, about 41% of students' parents discussed their child's progress with a teacher on their own initiative and 57% did so on the initiative of teachers. PISA finds that parents' involvement in their child's education is positively associated with student performance. The average score in reading 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 and for other forms of parental involvement in school-related activities. In fact, 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 in the country or economy improved by 10 points on average across the 74 countries and economies with available data, after accounting for national income and other factors. The prevalence of parents discussing their child's progress on the initiative of teachers may be an indication of a school system's responsiveness.

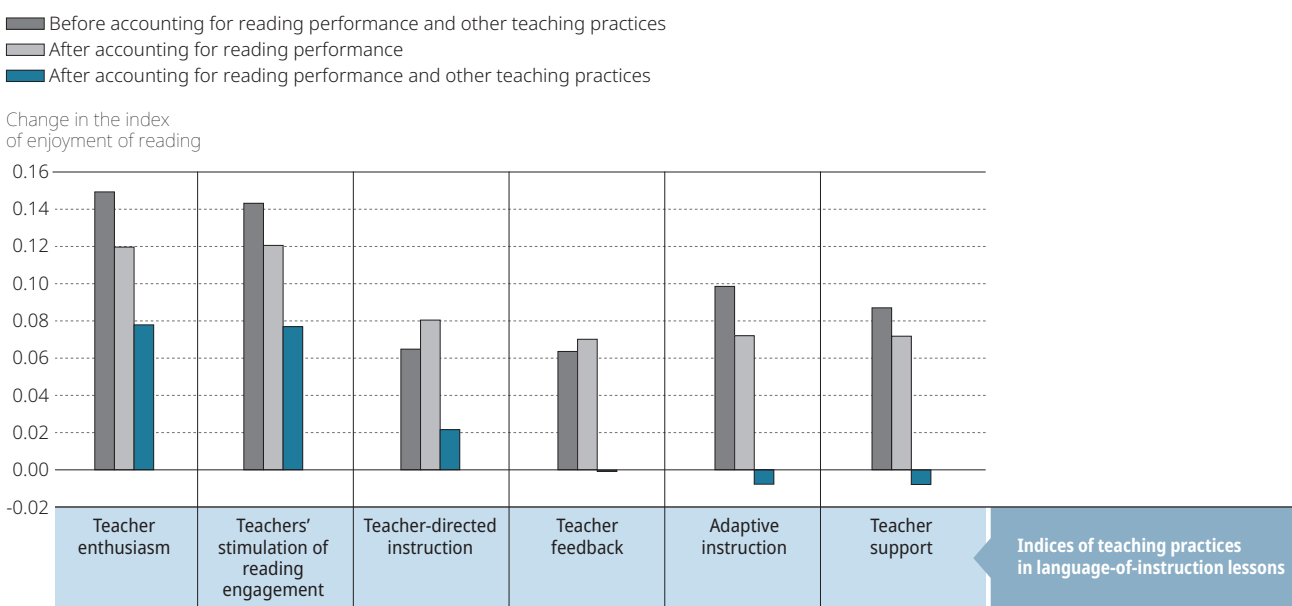
At the same time, PISA 2018 also finds that fewer than one in five parents was involved in school government

or volunteered to participate in extracurricular activities in their child's school. Why were so few parents involved in these school-based activities? On average across the nine OECD countries and economies that distributed the parent questionnaire, the issues that parents most commonly cited as hindering their participation in these activities were time-related, and included the need to work (34%) and the inconvenience of meeting times (33%). Only 5% of parents reported that they felt unwelcome at school. Given these results, school leaders and educators can perhaps do more to accommodate working parents so that everyone – schools, teachers, students and the parents themselves – can benefit from greater parental involvement in school activities.

All in all, one way to promote students' well-being is to encourage all parents to be more aware of their children's interests and concerns, and show interest in their school life, including in the challenges children face at school. Schools can create an environment of co-operation with parents and communities. Teachers can be given better tools to enlist parents' support, and schools can address some critical deficiencies amongst disadvantaged children, such as the lack of a quiet space for studying. If parents and teachers were to establish relationships based on trust, schools could rely on parents as valuable partners in the education of their students.

Figure 23 • Enjoyment of reading and teaching practices in language-of-instruction lessons

Based on students' reports, OECD average

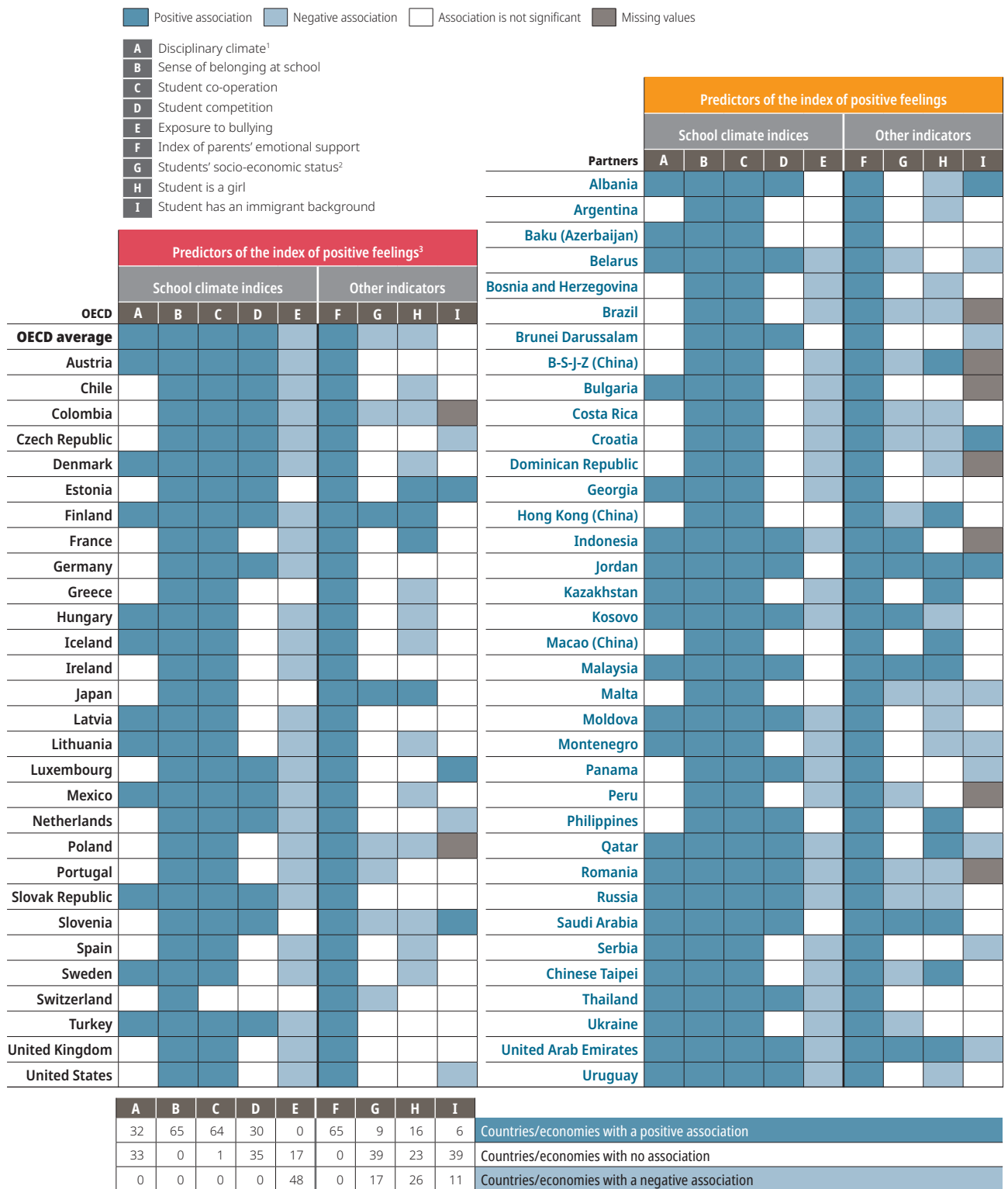


Notes: All values are statistically significant, except for teacher feedback after accounting for reading performance and other teaching practices. Results based on linear regression analysis, after accounting for students' and schools' socio-economic profile. The socio-economic profile is measured by the PISA index of economic, social and cultural status.

Source: OECD, PISA 2018 Database, Table III.B1.6.10; Figure III.6.5.

Figure 24 • Predictors of positive feelings

Based on students' reports



1. Higher values indicate a more positive disciplinary climate.

2. The socio-economic status of students is measured by the PISA index of economic, social and cultural status.

3. The index of positive feelings is based on three items: "happy", "joyful" and "cheerful".

Note: All predictors were included in the same linear regression model.

Source: OECD, PISA 2018 Database, Table III.B.1.12.19; Figure III.12.5.

Yet school principals and teachers may be overlooking some challenges if they only pay attention to what is happening inside the classroom. Although a majority of students reported that they feel they belong at school – across OECD countries, about 7 in 10 students agreed or strongly agreed that they feel like they belong at school – students' sense of belonging at school weakened considerably between 2003 and 2015 and waned even further between 2015 and 2018. Even students in Japan and Korea, who enjoyed one of the best disciplinary climates of all PISA-participating countries – e.g. they rarely skipped school or arrived late for school, and a clear majority of them reported that they had never been bullied – were some of the most dissatisfied with their lives, at least according to their own reports. In addition, they expressed greater fear of failure, and were about twice as likely as students in other OECD countries to report that they always feel scared or sad.

Furthermore, the share of students who reported being frequently bullied increased by around four percentage points since 2015, on average across OECD countries. More than one in five students reported being bullied at school at least a few times a month (Figure 25). Most of the reported bullying was verbal or relational – others made fun of the student, the student was the object of nasty rumours, or the student was left out of things on purpose – rather than physical. For example, more than 10% of students in 67 out of 75 countries and economies reported that their peers made fun of them at least a few times a month; but on average across OECD countries, around 7% of students reported that they got hit or pushed around by other students that often.

Bullying can have adverse – and potentially long-lasting – effects on students' performance at school and general well-being. Students who reported being frequently bullied scored 21 points lower in reading than students who did not report so, after accounting for socio-economic status. Frequently bullied students reported feeling sad, scared and less satisfied with their lives. These students were also more likely to have skipped school in the two weeks prior to the PISA test – an indication that they missed out on valuable learning opportunities.

Yet when asked about their feelings towards bullying, students overwhelmingly reported negative attitudes towards bullying – and positive attitudes towards defending the victims of bullying (Figure 26). For example, on average across OECD countries, 90% of students agreed or strongly agreed that they like it when someone stands up for other students who are being bullied; and 88% agreed or strongly agreed that

it is a good thing to help students who can't defend themselves. Policy makers and local educators can capitalise on these sentiments to put in place measures and programmes to combat and prevent bullying.

Co-operation amongst students, independent of good relations with teachers, is also associated with higher performance – and with students' well-being: in every participating school system, students were more likely to feel they belong at school when their peers were more co-operative.

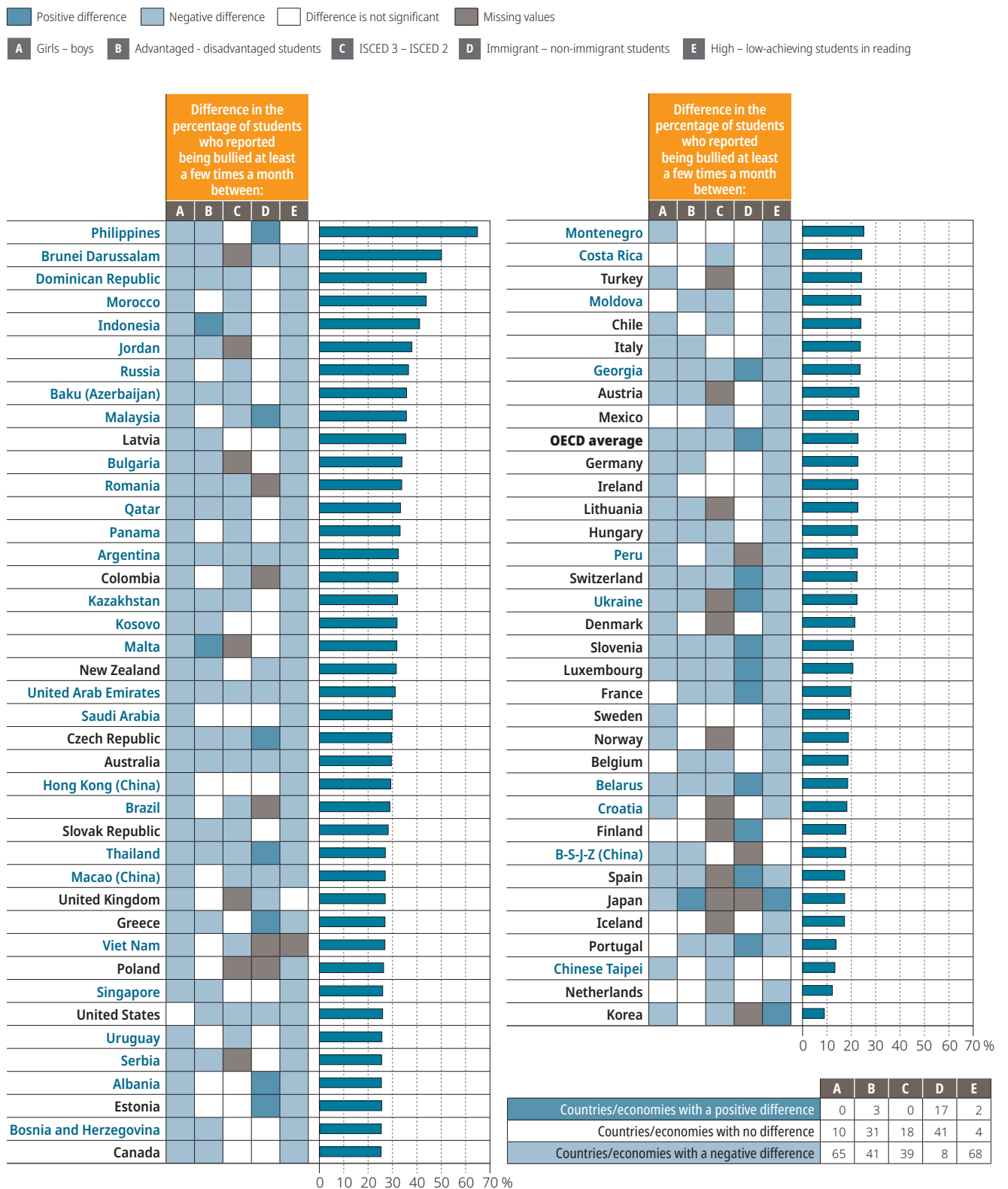
Given the harmful consequences that bullying can have on students' well-being, policy makers, principals and teachers need to devise effective policies and practices to limit bullying. Previous OECD studies suggest, in particular, that:

- » Early signs of bullying should not be overlooked.
- » All types of bullying need to be taken seriously, including the less “visible” ones, such as relational forms of bullying. Considering all types of bullying may draw greater attention to the bullying most typically suffered by girls. While boys are more likely than girls to be frequently – and physically – bullied, the gender gap almost disappears when students were asked about relational types of bullying, such as spreading nasty rumours and being left out of things on purpose.
- » Monitoring students' attitudes towards bullying can provide valuable insights into how to address bullying. For instance, students' attitudes can be used as a predictive tool, to understand the role played by bystanders, or to identify students who would stand up against bullies. Changing bystanders' reactions to bullying may be an effective way to reduce the incidence of bullying.
- » Building a culture of good behaviour, establishing clear anti-bullying rules, and creating a positive school climate, where students feel engaged and socially connected, is essential for preventing bullying.
- » Students and teachers should be taught how to recognise and respond to bullying.
- » Communication with the parents of the bullied students and the bully him/herself is important.

Compared to the average student across OECD countries, students in Spain reported being bullied less frequently, were more satisfied with their lives, expressed more positive and fewer negative feelings, and their sense of belonging at school was amongst the strongest across all PISA-participating school systems. Yet, according to students' reports, the disciplinary climate in language-of-instruction lessons

Figure 25 • Being bullied, by student characteristics

Based on students' reports

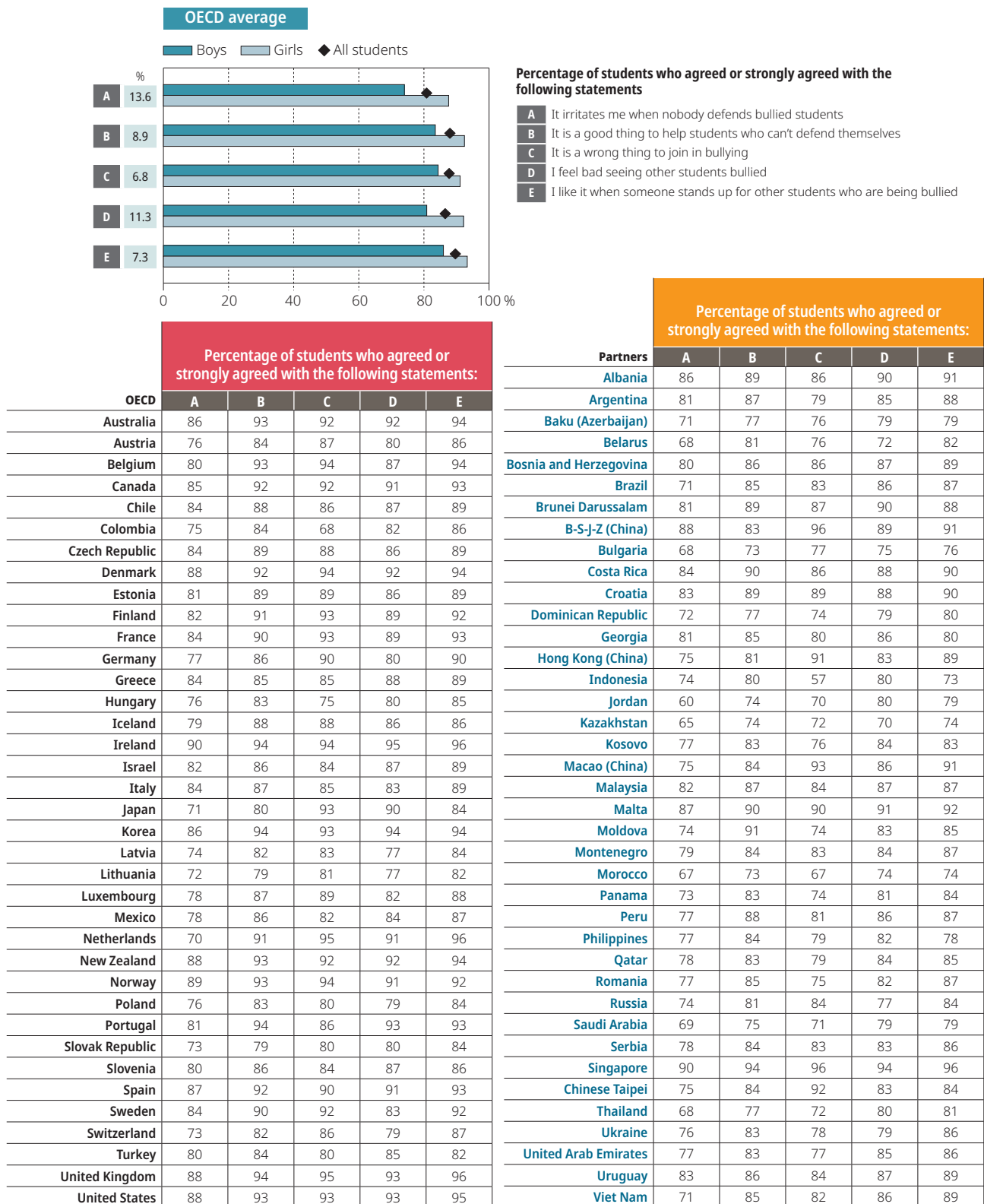


Note: Low-achieving (high-achieving) students are students who score amongst the bottom 25% (the top 25%) of students within their country or economy on the PISA test. Countries and economies are ranked in descending order of the percentage of students being bullied at least a few times a month.

Source: OECD, PISA 2018 Database, Tables III.B1.2.1 and III.B1.2.4; Figure III.2.3.

Figure 26 • Students' attitudes towards bullying, by gender

Based on students' reports



Note: Differences between girls and boys on average across OECD countries are shown next to the item on attitudes towards bullying. All differences are statistically significant.

Source: OECD, PISA 2018 Database, Tables III.B.1.2.15 and III.B.1.2.16; Figure III.2.5.

was far from ideal, and the share of students who had skipped school or lessons in the two weeks prior to the PISA test was clearly above the OECD average. A similar picture emerged in Costa Rica and Portugal.

In Sweden, students' reports on bullying, the disciplinary climate and student truancy were more positive than the reports of the average student across OECD countries. Moreover, students in Sweden were as satisfied with life and expressed a similar sense of belonging at school and fear of failure as the average student across OECD countries. However, students in Sweden were more frequently late for school and were somewhat less likely to express positive feelings than students in other OECD countries.

Read more on these issues in *PISA 2018 Results (Volume III): What School Life Means for Students' Lives*.
<https://doi.org/10.1787/acd78851-en>

What comes next?

The three volumes of PISA 2018 results that are published in 2019 and summarised in this brochure provide the first findings from this latest assessment. Volume V, which will be published in June 2020, will highlight some of the policies and practices that predict the success of students, schools and education systems; but it will take some time until we fully understand the results from PISA 2018. Policy makers' hunger for immediate answers is always frustrated by the snail's pace at which the development of data, evidence and research advances; and the data collected by PISA alone leave many questions unanswered. The results offer a snapshot of education systems at a certain moment in time; but they do not – they cannot – show how the school systems got to that point, or the institutions and organisations that might have helped or hindered progress. In addition, the data do not really say much about cause and effect. Correlations are often deceptive: if the birds sing when the sun rises, and they do so day after day, year after year, and in many different places around the world, it doesn't mean the sun rises because the birds sing. In a nutshell, knowing what successful systems are doing does not yet tell us how to improve less-successful systems. That is where the OECD brings a range of other tools to bear to strengthen insights for policy and practice.

PISA is not only the world's most comprehensive and reliable international comparison of students' capabilities, it is also integrated with a range of methods and resources at the OECD, including country and thematic policy reviews, that countries can use to situate the results from PISA in the different contexts in which students learn, teachers teach and schools

operate, and to fine-tune their education policies. Education policy makers and practitioners can benefit from these tools in the same way that business leaders learn to steer their companies towards success: by taking inspiration from others, and then adapting lessons learned to their own situation.

Sharing insights, across borders, to improve quality, equity and efficiency in education is more urgently needed than ever before. The demands on education and education policy are high and rising. In the past it was sufficient for education to sort students because our economies and societies could rely on a few highly educated individuals. In today's world, everyone needs to have advanced knowledge and skills, not just for economic reasons but also for social participation.

In traditional bureaucratic school systems, teachers are left alone in classrooms with a lot of prescriptions about what to teach. The OECD Teaching and Learning International Survey, TALIS, shows the value of teachers and schools looking outward to collaborate with the next teacher and the next school. The past was about delivered wisdom; the future is about user-generated wisdom. The past was about divisions: education systems could allow for teachers and content to be divided by subjects and student abilities. The past was about isolation: schools were designed to keep students inside, and the rest of the world outside. The past was about hierarchies: teachers provided, students received. The future of education needs to be about integration: the integration of different subjects, the integration of diverse students and the integration of various learning contexts; it needs to be about connections: connections with real-world contexts,

and with the rich array of resources in the community; and it needs to be about co-creation: recognising both students and adults as resources for how learning is designed and how students succeed.

In the past, different students were taught in similar ways; now, schools need to embrace diversity with differentiated pedagogical practices. The goals of the past were standardisation and compliance: students of the same age were educated in batches and followed the same instruction. The future is about personalising educational experiences: building instruction out of students' passions and capabilities, helping students with individualised learning and assessment in ways that foster their engagement and talents. In the past, schools were technological islands, where technology was deployed mostly to support existing practices. The schools of tomorrow will use the potential of technologies to liberate learning from conventions and connect learners in new and powerful ways.

The future is about more innovative partnerships. Effective learning environments are constantly creating synergies and finding new ways to enhance professional, social and cultural capital with others. They do that with families and communities, with higher education, with other schools and learning environments, and with businesses. Education needs to find better ways to recognise, reward and give exposure to the successes of innovators.

All of this has profound implications for schools, teachers and teaching. The past was about prescription, the future requires a knowledge-rich profession, and the replacement of the industrial work organisation, with its administrative control, with much more professional and collaborative working norms. When teachers feel a sense of ownership over their classrooms, when students feel a sense of ownership over their learning, that is when learning for the post-truth information age can take place. The central reason why teachers' ownership of the profession is a must-have rather than an optional extra is the pace of change. Even the most efficient attempts to push a central curriculum into classroom practice will drag out over a decade, because it takes so much time to communicate the goals and methods through the different layers of the system. In this age of accelerations, such a slow process inevitably leads to a widening gap between what students need to learn and what teachers teach. When fast gets really fast, being slow to adapt makes us really slow.

While measurement is the means, the purpose of PISA is to help countries look outward and incorporate the results of that learning into policy and practice.

That outward-looking perspective also seems to be a common trait of many high-performing education systems: they are open to the world and ready to learn from and with the world's education leaders; they do not feel threatened by alternative ways of thinking.

In the end, the laws of physics apply. If we stop pedalling, not only will we not move forward, our bicycles will stop moving at all and will fall over – and we will fall with them. Against strong headwinds, we need to push ourselves even harder. In the face of challenges and opportunities as great as any that have gone before, human beings need not be passive or inert. We have agency, the ability to anticipate and the power to frame our actions with purpose. The best-performing PISA countries show that high-quality and equitable education is an attainable goal, that it is within countries' means to deliver a future for millions of learners who currently do not have one. The task is not to make the impossible possible, but to make the possible attainable.

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PISA 2018 Results

Volume I, What Students Know and Can Do, provides a detailed examination of student performance in reading, mathematics and science, and describes how performance has changed since previous PISA assessments.

<https://doi.org/10.1787/5f07c754-en>

Volume II, Where All Students Can Succeed, examines gender differences in student performance, and the links between students' socio-economic status and immigrant background, on the one hand, and student performance and well-being, on the other.

<https://doi.org/10.1787/b5fd1b8f-en>

Volume III, What School Life Means for Students' Lives, focuses on the physical and emotional health of students, the role of teachers and parents in shaping the school climate, and the social life at school. The volume also examines indicators of student well-being, and how these are related to the school climate.

<https://doi.org/10.1787/acd78851-en>

Volume IV, Are Students Smart about Money?, examines 15-year-old students' understanding about money matters in the 21 countries and economies that participated in this optional assessment; forthcoming in 2020.

Volume V, Effective Policies, Successful Schools, analyses the policies and practices used in schools and school systems, and their relationship with education outcomes more generally; forthcoming in 2020.

Volume VI, Are Students Ready to Thrive in Global Societies?, explores students' ability to examine local, global and intercultural issues, understand and appreciate different perspectives and world views, interact respectfully with others, and take responsible action towards sustainability and collective well-being; forthcoming in 2020.

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For more information, contact
Andreas Schleicher
Andreas.Schleicher@oecd.org



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