6

Policies and Practices to Help Boys and Girls Fulfil their Potential

This chapter examines gender gaps in reading and mathematics performance from wider perspectives: across countries and over time. It also discusses the policy implications of the PISA findings that boys tend to underachieve in reading and high-performing girls tend to underachieve in mathematics and some areas of science and problem solving.

An analysis of results from all waves of PISA and the 2012 Survey of Adult Skills[1] suggests that, in general, there is a positive relationship between performance in PISA and the corresponding age group's performance in the Survey of Adult Skills (OECD, 2014a).[2] Countries that had high, middling or low mean scores in a given wave of PISA also tend to have high mean, middling or low mean scores for the corresponding age group in the adult survey. For example, in 2000, 15-year-olds in Finland, Japan, Korea and Sweden performed above average; 12 years later, 26-28 year-olds in these countries also performed above average in the Survey of Adult Skills. Similarly, Austria, Germany, Italy, Poland and Spain performed below average in PISA 2000 and did again in the adult survey for the corresponding age group (OECD, 2014a).

Why does this relationship matter? The Survey of Adult Skills finds that proficiency in literacy – how well people read and understand what they read – is associated with the likelihood of being employed and well-paid. For example, about 57% of those individuals who scored at or below Level 1, the lowest proficiency level in the survey's assessment of literacy, were employed when they took the survey – compared with 79% of those who scored at Level 4 or 5, the highest proficiency levels. Proficiency in literacy is also strongly associated with wages. On average across countries that participated in the survey, the median hourly wage of workers who scored at Level 4 or 5 in literacy proficiency was 61% higher than that of workers scoring at or below Level 1 (OECD, 2013).

The survey also finds that proficiency in literacy and numeracy is strongly associated with social and emotional well-being. In all countries that participated in the survey, adults who were less proficient in literacy were more likely than highly skilled adults to report poor health, believe that they have little impact on the political process, and not participate in volunteer activities. In most countries, these adults also tended to report that they had little trust in others (OECD, 2013).

The link between reading and mathematics skills and economic and social well-being couldn't be clearer – which makes it all the more urgent that parents and schools work in concert to give boys and girls an equal chance at realising their full potential. Where there are differences in student performance that are related to gender, either boys or girls are not being given that chance.

RELATIONSHIP BETWEEN THE GENDER GAP IN READING AND THE GENDER GAP IN MATHEMATICS

Figure 6.1 illustrates the strong relationship observed across countries between the gender gap in reading and the gender gap in mathematics. Results from PISA 2012 reveal that countries where girls tend to do particularly well in reading are also those where girls tend to do as well as boys in mathematics, or where the gap in mathematics in favour of boys is small. For example, in Finland, girls score 62 points higher in reading than boys, on average, and they perform just as well as boys in mathematics. Similarly, in Iceland, girls score 51 points higher in reading, and they outperform boys in mathematics by 6 points (Tables 1.2a and 1.3a).

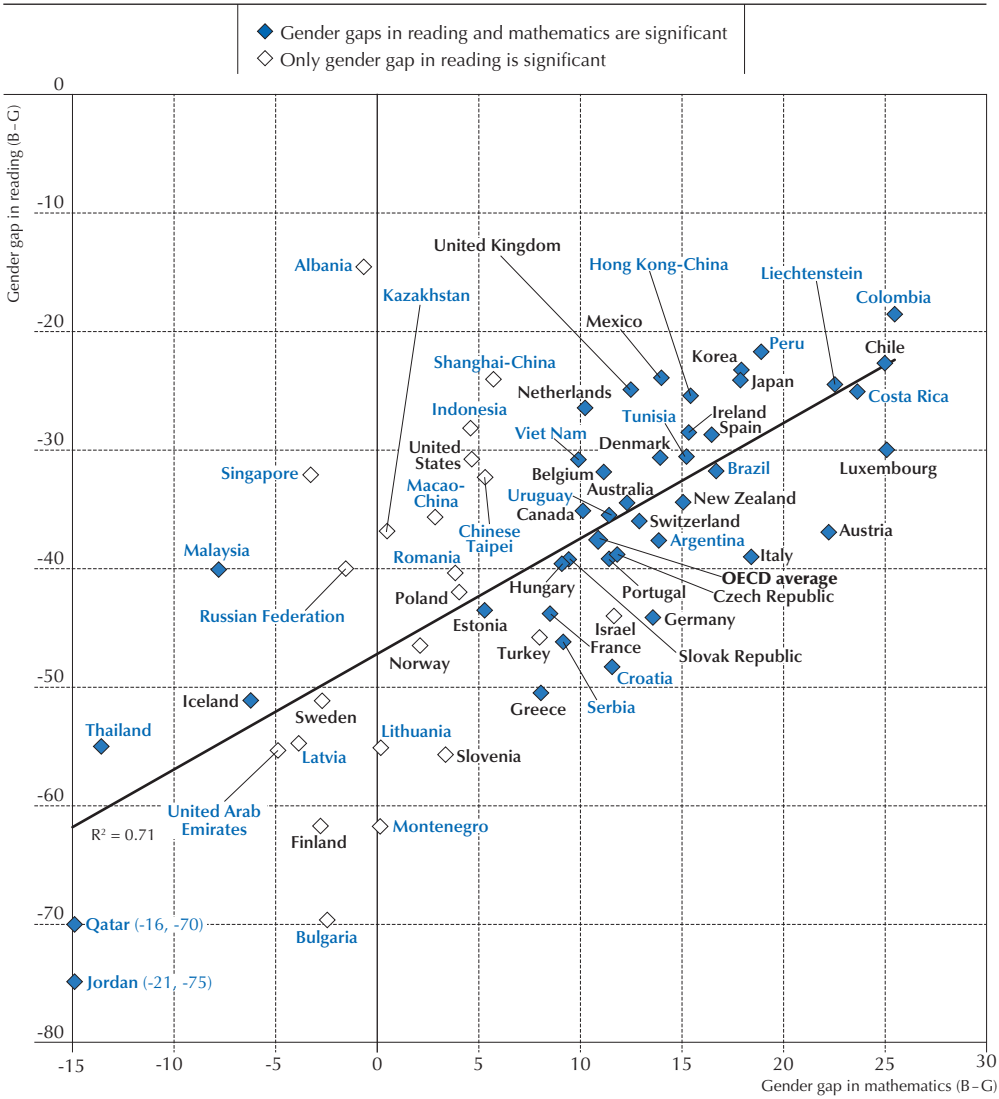
By contrast, in countries where the gender gap in reading, in favour of girls, is narrowest, the gender gap in mathematics performance, in favour of boys, is widest. For example, in Chile, girls score 23 points higher than boys in reading, on average, while boys score 25 points higher than

girls in mathematics. East Asian countries and economies, such as Shanghai-China, Singapore and Chinese Taipei, are notable exceptions to this pattern. In these countries, girls do as well as boys in mathematics (both at the average and among the highest-performing students), and the gender gap in reading, in favour of girls, is narrower than the OECD average (Tables 1.2a and 1.3a).

■ Figure 6.1 ■

Cross-country variation in gender gaps in reading and mathematics

Score-point difference between boys and girls

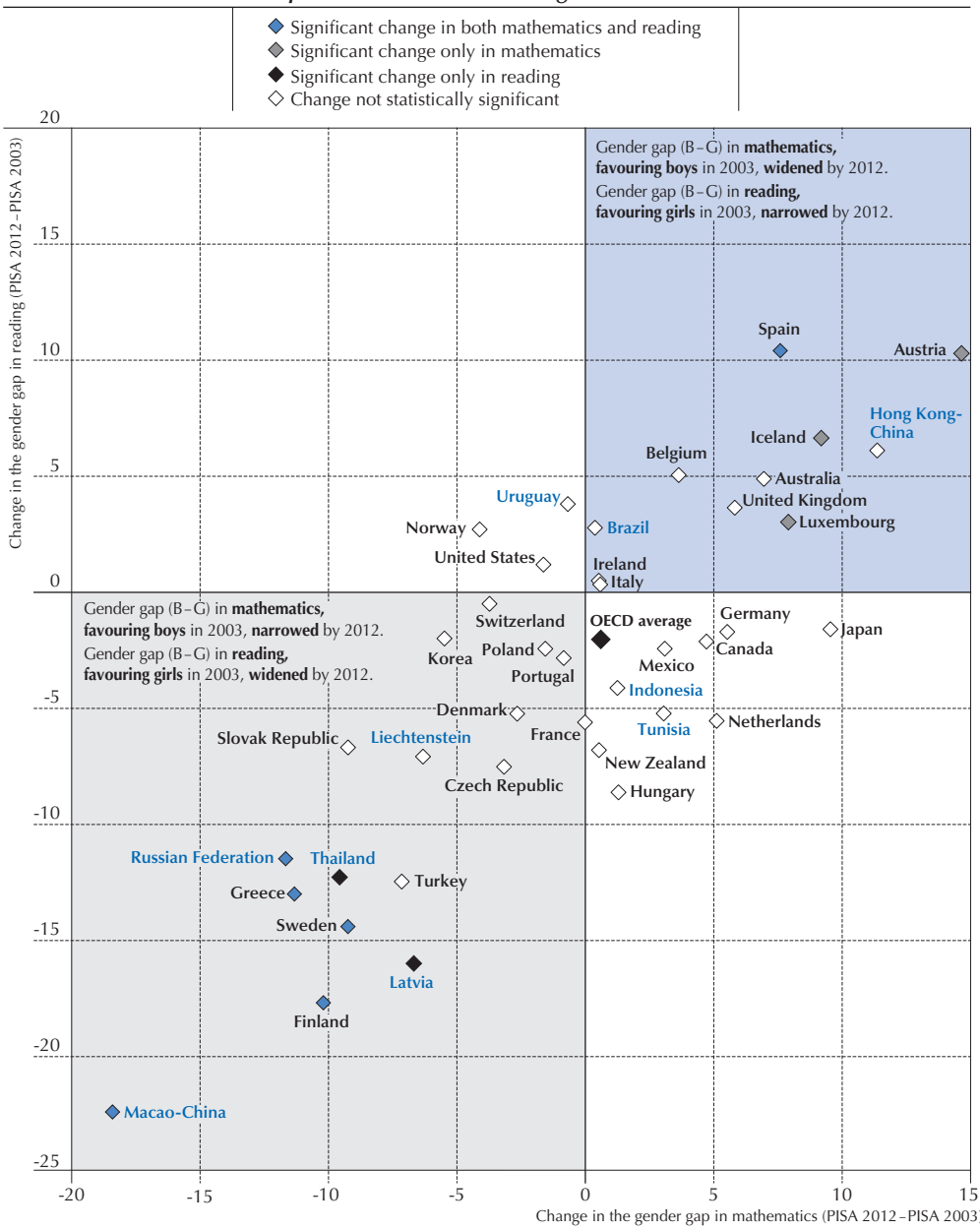


Source: OECD, PISA 2012 Database, Tables 1.2a and 1.3a.

■ Figure 6.2 ■

Trends in gender gaps in reading and mathematics between 2003 and 2012

Score-point difference in reading and mathematics



Source: OECD, PISA 2012 Database, Tables 1.2b and 1.3b.

The data in Figure 6.2 suggest that trends in the gender gap in performance in different subjects are associated. Countries where girls became better readers between 2003 and 2012 are also generally the same countries where girls improved in mathematics during the same period. For example, in Finland, the gender gap in mathematics, in favour of boys, narrowed by 10 score points between 2003 and 2012. Over the same period, the gender gap in reading, in favour of girls, widened by 18 score points. In Greece, between 2003 and 2012, the gender gap in mathematics, in favour of boys, narrowed by 11 score points while the gender gap in reading, in favour of girls, widened by 13 score points. Similarly, in Sweden during the same period, the gender gap in mathematics, in favour of boys, narrowed by 9 score points while the gender gap in reading, in favour of girls, widened by 14 score points. Among partner countries and economies, similar trends were observed in Macao-China and the Russian Federation (Tables 1.2b and 1.3b).

These results, and the evidence developed in the context of Chapters 2 and 3, suggest that, in general, the gender gap in mathematics tends to be narrow when girls are good students in all subjects. But the factors that help to narrow the gender gap in mathematics also tend to enlarge the gender gap in reading, in favour of girls. Are gender gaps a "zero sum game", in which education systems, schools and families have to choose whether to create an environment that promotes either boys' performance or girls' performance; or are there policies and practices that manage to narrow – or eliminate – all gender gaps in performance simultaneously?

POLICY IMPLICATIONS

Results from Chapter 1 suggest that differences in performance among boys or among girls are much wider than differences across the genders. In fact, when it comes to mathematics performance, girls in top-performing countries and economies, such as Hong Kong-China, Shanghai-China, Singapore and Chinese Taipei, perform on a par with their male classmates and attain higher scores than all boys in most other countries and economies around the world. Similarly, while boys underperform in reading, by a large margin, compared to girls in all countries and economies, boys in top-performing education systems score much higher in reading than girls elsewhere. This evidence strongly suggests that gender gaps in academic performance are not determined by innate differences in ability.

Give students a greater choice in what they read

The report identifies clear behavioural differences between boys and girls, and how such differences are associated with performance in different academic subjects. In particular, PISA shows that boys tend to be far less engaged in reading than girls. They are less likely to read for enjoyment every day, they tend to enjoy reading less, are less likely to read fiction, and are less likely to read a range of materials. PISA finds that enjoying reading, reading widely, and reading fiction, in particular, are the factors most closely associated with high performance in reading.

The strong link between reading fiction and high reading performance indicates that some material may be far too complex for weak readers to grasp. Obliging poor readers, who are overwhelmingly boys, to read texts that they may find too challenging – and perhaps uninteresting to them as well – may alienate them from reading altogether.

PISA does not measure students' responses to the *content* of the material they read. However, it is also possible, for example, that if boys were assigned to read fiction they found interesting (the *Harry Potter* series, for example, is popular among both boys and girls) or books about sports stars they admire, they might be more easily persuaded to spend time reading both fiction and long non-fiction, material that they might otherwise reject. What this implies is that, even though reading simpler material may not lead to high proficiency in reading, any reading is better than no reading. To some extent, PISA results support this notion. After accounting for other background characteristics, students who read comic books, magazines and newspapers are better at reading than those who do not read any material.

Efforts to promote reading should thus take into account differences in students' reading preferences as well as differences in students' current reading abilities. Parents and teachers can use comic books, magazines and newspapers to help boys develop the habit of reading for enjoyment. A structured approach that entices disengaged readers with easy and appealing texts, then gradually introduces more complex tasks and texts, could spark boys' interest in reading and ultimately improve their performance.

Boys – and girls too – spend less time reading for enjoyment than they used to. This could threaten efforts to improve reading skills and could exacerbate disparities in reading performance. To break, or at least slow, this downward trend, schools could consider organising book clubs, letting students use school facilities after school hours to access material online, under the supervision of responsible adults, and/or incorporating into school curricula those reading materials that are favourites among students who read for enjoyment, according to PISA results, namely magazines and newspapers.

Allow some video gaming, but homework comes first

The report also reveals that doing homework has an impact on student performance. Students who spend more time doing homework tend to have better results in reading, mathematics and science. Homework helps students practice what they have learned in class and crystallises acquired knowledge into long-term memory. The very process of devising and organising a homework plan can help students develop self-regulation and perseverance, learn how to set goals and sub-goals for themselves, and follow through. It also teaches students about the perils of procrastination when facing binding deadlines.

Boys spend less time than girls doing homework or other independent study set by their teachers. At the same time, boys spend considerably more time than girls playing video games, both one-player games and online collaborative games. PISA shows that moderate video gaming is not associated with poorer performance in school, and may even help students acquire useful skills, such as spatial judgement and the ability to navigate through web-based material. Parents and teachers often chastise boys for the amount of time they devote to gaming and the amount of time they do not devote to doing their homework. Instead, they could forge a "learning contract" with both boys and girls: parents and teachers could allow children to play video games, in moderation, recognising that those games can help children acquire important skills, but children would have to complete their homework too.[3] Excessive video gaming late in the evening can disrupt sleep patterns (King et al., 2013), so it should be avoided.

PISA finds that boys are more likely than girls to arrive late for school. Arriving late disrupts not only the individual student's learning, but that of his or her classmates, too. Parents can help to ensure that their children arrive for school on time – for example, by prohibiting video games late at night – and schools could try to encourage more students to arrive for school on time by, for example, scheduling the most fun activities at the beginning of the day. No matter what subject is taught first in a school day, teachers can use innovative teaching techniques to engage students so that they will be reluctant to arrive late for school and miss the lesson.

Train teachers to be aware of their own gender biases

The report also shows that teachers generally award girls higher marks than boys, given what would be expected after considering their performance in PISA. This practice is particularly apparent in language-of-instruction courses. Girls' better marks may reflect the fact that they tend to be "better students" than boys: they tend to do what is required and expected of them, thanks to better self-regulation skills, and they are more driven to excel in school. In addition, girls appear to be stronger in displaying the knowledge they have acquired (i.e. solving an algebraic equation) than in problem solving, the latter of which is a central component of the PISA test. But this report reveals that the gender gap observed in both school marks and PISA scores is not the same in both language-of-instruction classes and mathematics. The fact that it is much wider in the language-of-instruction courses suggests that teachers may harbour conscious or unconscious stereotyped notions about girls' and boys' strengths and weaknesses in school subjects, and, through the marks they give, reinforce those notions among their students and their students' families. For example, PISA also reveals that parents are more likely to expect their teenage sons rather than their daughters to work in science, technology, engineering and mathematics (STEM) occupations – even when their daughters perform just as well as their male classmates in mathematics, science and reading.

Training teachers to recognise and address any biases they may hold about different groups of students – boys and girls, socio-economically advantaged or disadvantaged students, students from different ethnic or cultural traditions – will help them to become more effective teachers and ensure that all students make the most of their potential. Private-sector companies provide similar training for human resource managers, and research into the results of these programmes suggests that simple training programmes can lead to changes in practices (Diverseo, 2012; Kahneman, 2011).

Disruptive behaviour and lack of engagement with school among boys affects not only the boys themselves, but often the entire class. Teachers may need further training in class management and discipline to ensure that the work of the entire class does not suffer because of the bad behaviour of a few.

Build girls' self-confidence

Crucially, the report finds that girls are under-represented among top-performers in mathematics, science and problem solving, and that girls' lack of self-confidence in and anxiety towards mathematics may be largely responsible for this situation. A wealth of research has examined how self-beliefs are formed and the key role played by both interpersonal and intrapersonal

comparisons (Moeller and Marsh, 2013). Students' beliefs about their own competence in mathematics are related to how well they perform compared to their classmates, and also to how well they perform in mathematics compared to their performance in other subjects. Because girls tend to perform so well in reading, they may, unconsciously, believe that they are underperforming in other subjects. As a result, they have less confidence in other subjects, like mathematics, which, in turn, could undermine their performance.

Teachers and parents can stop the corrosive effects of these comparisons and help girls to build their confidence by evaluating girls' actual abilities – noting the tasks they can accomplish relatively easily and those with which they struggle. They can provide positive reinforcement for the work girls do well and offer girls opportunities to "think like scientists" in low-stakes situations, where making mistakes does not have consequences for their marks.

The report also highlights that, in many countries, teachers' use of cognitive-activation strategies in mathematics classes is associated with better performance in the PISA mathematics test, and that the use of such strategies may be particularly beneficial for girls. There is evidence on the role of metacognitive pedagogies in acquiring strong problem-based mathematics skills (Mevarech and Kramarski, 2014). This report suggests that certain methods of teaching mathematics can help narrow the gender gap in performance. For example, PISA reveals that girls in Croatia, Germany, Ireland, Italy, Korea, Poland and the Slovak Republic benefit the most when teachers ask students questions that make them reflect on a given problem; give them problems that require the students to think for an extended time; ask students to decide, on their own, on which procedures to use to solve complex problems; present problems in different contexts so that students know whether they have understood the concepts; help them learn from the mistakes they have made; ask them to explain how they solved a problem; present problems that require students to apply what they have learned in new contexts; and assign problems that can be solved in different ways.

Help students look ahead

As the report notes, schools in many education systems appear ill-equipped to help students make a smooth transition from compulsory education to further education and training or the labour market. On average, boys are more likely than girls to have acquired a set of skills that could help them to navigate the job-search process, to apply for a particular job, and to succeed in job interviews. But a sizeable proportion of both boys and girls appears to be unprepared to take the next steps towards either further education or the labour force. In the large majority of countries, students reported that they had acquired these types of skills outside of school.

Education systems could strengthen their career advice and orientation services by forming consortia across different schools and creating partnerships with local business groups and trade associations, and by inviting parents to offer job-shadowing opportunities and "bring your child to work" programmes. They could also encourage parents to speak to classes, explaining their work and the skills most valued and developed in their jobs. By creating consortia of interested schools, particularly schools serving diverse student populations, local authorities and school principals can ensure that all students, regardless of the socio-economic profile of the school

or the individual student, are exposed to the breadth of opportunities that are available in the local labour market. Partner trade associations, civil society groups and the business community can ensure that students also develop a broader perspective about work, as they will likely be competing in a highly integrated global economy when they ultimately enter the labour market.

PISA reveals that girls generally hold more ambitious career and education expectations than boys. They are more likely to expect to attend and complete university and to work as managers or professionals. However, 15-year-old girls are considerably less likely than 15-year-old boys to expect to work as engineers, mathematicians or computer scientists, even when they score just as well as boys in the PISA mathematics and science tests. This represents a significant loss not only to these careers, but to countries' economies, in general.

Science, technology, engineering and mathematics are the backbone of modern economies. They are integral to health care, infrastructure, energy and the environment. These STEM fields are also the source of innovation, which has been shown to increase productivity in an economy, which, in turn, helps to improve competitiveness, increase exports in high value-added products, and raise standards of living. While science and technology-based innovation cannot be achieved without a STEM-educated workforce (OECD, 2010), research also suggests that an exclusive focus on STEM disciplines in education is too narrow. In fact, businesses rely on a mix of skills to thrive, including workers who are specialised in the arts and humanities. Indeed, innovation, even in STEM sectors, also involves marketing, sales, support services, human-resource management, logistics and procurement – a broad array of knowledge and skills that graduates in the humanities, social sciences and the arts can offer (Hughes et al. 2011).[4]

While advancing STEM education appears to be a common objective in many countries, it remains unclear what approach is best suited to promote STEM skills for economic growth. Generally, proposals for reform of STEM education maintain that because STEM is so important, every student should be given the best-quality STEM education (Atkinson and Mayo, 2010). Greater exposure to these subjects, it is assumed, will prompt more young people to choose STEM careers. But as this report makes clear, unless major efforts are devoted to helping students, particularly girls, overcome their anxiety towards mathematics and their lack of confidence in their own abilities in science and mathematics, then providing even the highest-quality STEM education will do nothing to narrow the gender gap in STEM studies and careers. At the same time, an "all STEM for some" approach, as argued by Atkinson and Mayo, that aims to provide STEM education only to those students who are most interested in and capable of doing well in STEM, runs the risk of reinforcing current gender inequalities and not tapping the vast skills potential among high-achieving girls.

Learn from experience

Analyses of data from the 2012 Survey of Adult Skills reveals that even though 15-year-old boys underachieve in reading compared to girls, by a substantial margin, the gender gap in literacy among 16-29 year-olds is small or non-existent. This partly reflects the fact that the adult survey was delivered on computer, and males, even at age 15, tend to be more proficient using computers than females.[5]

But this advantage cannot explain the striking difference between the reading performance of 15-year-old boys and girls and literacy proficiency among 16-29 year-olds. While 15-year-old boys are considerably less likely to read than girls the same age, there are no gender differences in how much reading or writing young adults do at work or at home. These data suggest that while teenage boys may be less likely than teenage girls to engage in activities that allow them to practice and develop their literacy skills, as they mature they are required to read and write in their work as much as, if not more than, women are. They are also able to choose for themselves the material they want to read, without being told by their parents and teachers what is good and what is not good for them. Thus young men are often able to catch up with, if not surpass, women in literacy skills. These results underscore the importance for families and teachers to understand boys' reading preferences and to suggest reading materials that, while catering to their interests, also gradually build their reading skills.

Notes

1. The Survey of Adult Skills is a product of the OECD Programme for the International Assessment of Adult Competencies (PIAAC).

2. But PISA performance isn't destiny; performance can change over subsequent years. As noted in Chapter 4, for example, as boys and girls leave compulsory schooling and enter either further education and training or work, the gap in literacy proficiency narrows considerably.

3. Results from PISA show that homework can perpetuate differences in performance related to socio-economic status. In every country and economy that participated in PISA 2012, socio-economically advantaged students spent more time doing homework or other study required by their teachers than disadvantaged students (OECD [2014b]. Schools and teachers should look for ways to encourage struggling and disadvantaged students to complete their homework. They could, for example, offer to help parents motivate their children to do their homework and provide facilities so that disadvantaged students have a quiet place to complete assigned homework if none is available in their homes.

4. This report does not examine all the factors that may shape gender differences in expectations to enter STEM fields of study and careers. Certainly girls – and boys – choose careers based on various considerations, such as the ability to balance work and family life, as well as relative job standing and wages. PISA does not contain relevant data on students' knowledge about different careers.

5. Maybe because males find computers more enjoyable and therefore put more effort in completing the assessment; maybe because digital reading requires proficiency in a different set of skills.

Note regarding Israel

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

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