

CO3.4: Literacy scores by gender at age 15

Definitions and methodology

This indicator presents information on educational performance by gender at age 15. Data for the indicator come from the OECD's Programme for International Student Assessment (PISA), an international survey which provides cross-nationally comparable data on student performance in reading, mathematics and science. The survey started in 2000 and is conducted every three years, with one of the three education domains covered in depth in each round on a rotational basis. The latest published results are for 2018.

As a part of the survey process OECD PISA collects a range of contextual information that allow for student performance to be disaggregated by various demographic and socio-economic factors. These factors include family status, the educational level of parents, their labour market status and the presence or absence of household items important for material and educational well-being, such as books and other educational resources. In addition to cross-country mean average scores and gender differences in mean scores, this indicator discusses differences in mean PISA reading scores the highest level of education of the student's parents (and specifically, differences between students with parents with a highest level of education at ISCED 1997 level 2 [lower secondary] and ISCED 1997 level 5a or 6 [theoretically oriented tertiary and post-graduate]), and by PISA's index of economic, social and cultural status (ESCS) (a PISA-specific composite index based on information about the students' home and background). Detailed definitions are provided below each relevant chart.

Importantly, as the OECD PISA surveys are based on probability samples, any differences in results between groups must be interpreted alongside measures of uncertainty in the difference. In OECD PISA, all estimates are accompanied by an associated standard error and all differences between groups by a test of statistical significance, that is, by a test of whether a given difference of a given size would be observed less than a certain number of times – here, less than 5% of the time – if there were no true difference between the groups in the overall population. When looking at differences in student performance between groups, the following highlights where differences in mean scores are statistically significant and where they are not. Any differences between groups that are not statistically significant should be interpreted with caution.

Key findings

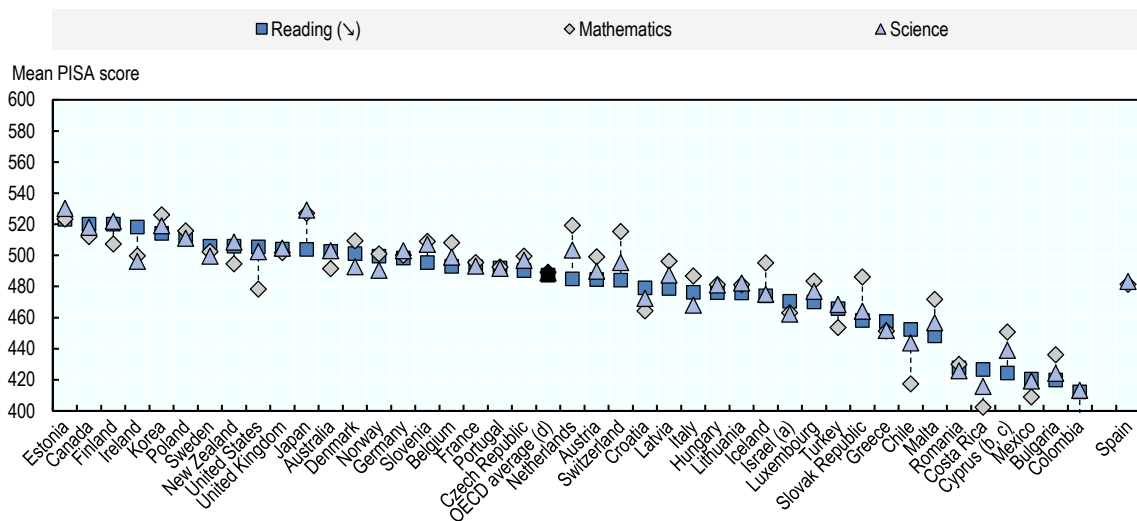
Literacy scores in all three domains varied widely across OECD countries in 2018 (Chart CO3.4.A). In reading, Canada, Estonia and Finland have the highest mean scores at well above 520, while Colombia and Mexico have the lowest at 420 or less. Mean scores in mathematics range from as high as just over 525 in Japan and Korea to as low as 391 in Colombia, while those in science vary from a mean of 530 in Estonia to 413 in Colombia.

The ranking of countries is fairly similar across the three domains (Chart CO3.4.A). The two East Asian OECD countries (Japan and Korea) perform well across all three, with Canada, Estonia and Finland also consistently near the top of the rankings. At the lower end, Colombia, Costa Rica and Mexico have the lowest score in the OECD in all three domains. Generally, countries with a high mean score in one domain also tend to have a high mean score in the other domains, and vice versa for those with low mean scores.

Other relevant indicators: CO3.1: Educational attainment by gender and average years spent in formal education; CO3.2: Gender differences in university graduates by field of study; CO3.3: Literacy scores by gender at age 10; CO3.5: Youths not in education or employment; and, PF1.2: Public spending on education.

Chart CO3.4.A. Student performance in reading, mathematics and science, 2018

Country mean average PISA scores



a. The 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.

b. Footnote by Turkey: The information in this document with reference to « Cyprus » relates to the southern part of the Island. There is no single authority representing both Turkish and Greek Cypriot people on the Island. Turkey recognizes the Turkish Republic of Northern Cyprus (TRNC). Until a lasting and equitable solution is found within the context of United Nations, Turkey shall preserve its position concerning the "Cyprus issue";

c. Footnote by all the European Union Member States of the OECD and the European Commission: The Republic of Cyprus is recognized by all members of the United Nations with the exception of Turkey. The information in this document relates to the area under the effective control of the Government of the Republic of Cyprus.

d. For reading, the OECD average excludes Austria and Spain. For Mathematics and Science, it excludes Austria.

Source: OECD Programme for International Student Assessment (PISA) 2018, <https://www.oecd.org/pisa/>

Chart CO3.4.B shows how country mean PISA scores in reading, mathematics and science differ by gender across countries. Gender differences are calculated as the female score in the given domain less the male score, so that a positive score indicates a gender difference in favour of girls and a negative score a gender difference in favour of boys. Markers that are shaded represent statistically significant gender differences, while those that are white are not statistically significant.

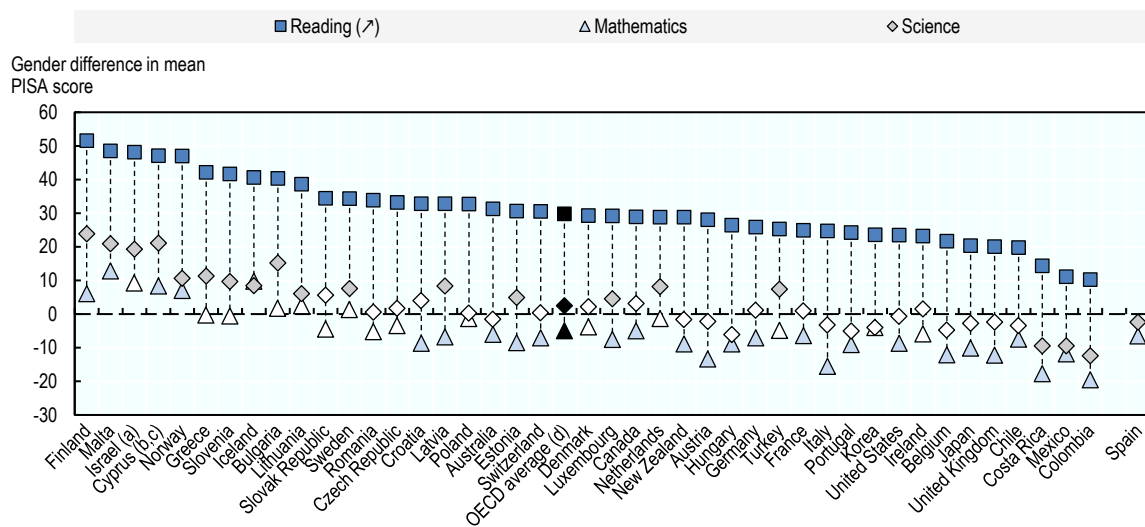
Across all OECD countries, girls performed significantly better than boys in reading in 2018 (Chart CO3.4.B). The size of the gender difference varies between countries – in Finland, Iceland, Israel, Korea, Norway and Slovenia, for example, the female mean score in reading was over 40 points higher than the male mean score, while in Colombia and Mexico the difference was less than 15 points. The OECD average gender difference in reading was 30 points.

In mathematics, by contrast, boys often perform significantly better than girls (Chart CO3.4.B). In some OECD countries, there were large and significant gender differences in mathematics in favour of boys (e.g. Austria, Belgium, Colombia, Japan, Mexico, the United Kingdom); in some others (Finland, Iceland, Norway), however, there were significant differences in favour of girls. On average across OECD countries, boys perform about 5 points better than girls at mathematics.

Gender differences in science performance are mixed (Chart CO3.4.B). In some OECD countries (e.g. Finland, Greece, Israel, Norway, Slovenia), girls perform significantly better than boys; in a few others (Colombia, Mexico), there is a gender gap in favour of boys. In most OECD countries, however, any gender differences are not statistically significant.

Chart CO3.4.B. Gender differences in student performance in reading, mathematics and science, 2018

Gender difference (girls minus boys) in country mean average PISA scores



Note: Shaded markers represent statistically significant gender differences.

a. See note a. to Chart CO3.4.A

b. See note b. to Chart CO3.4.A

c. See note c. to Chart CO3.4.A

d. See note d. to Chart CO3.4.A

Source: OECD Programme for International Student Assessment (PISA) 2018, <https://www.oecd.org/pisa/>

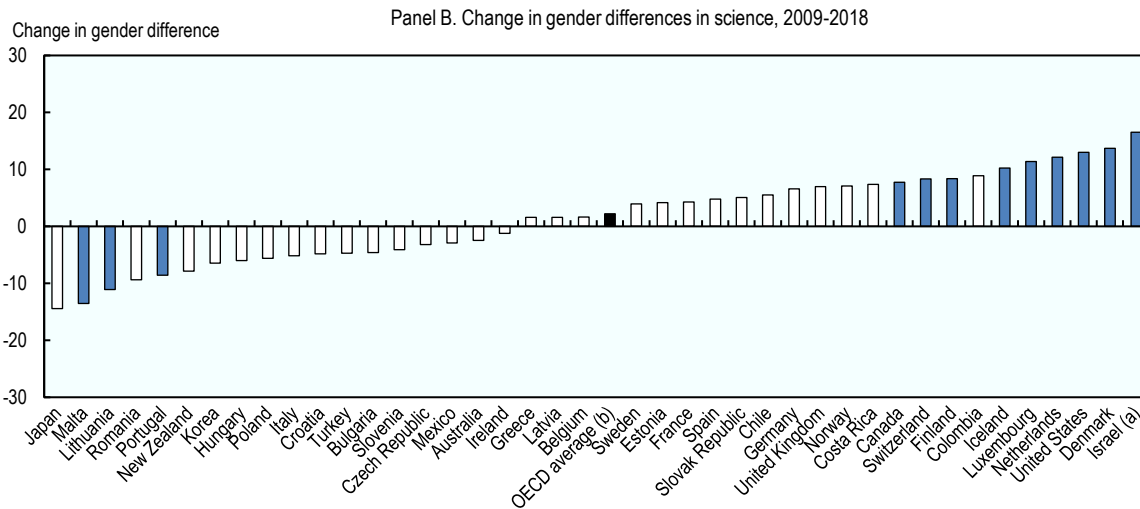
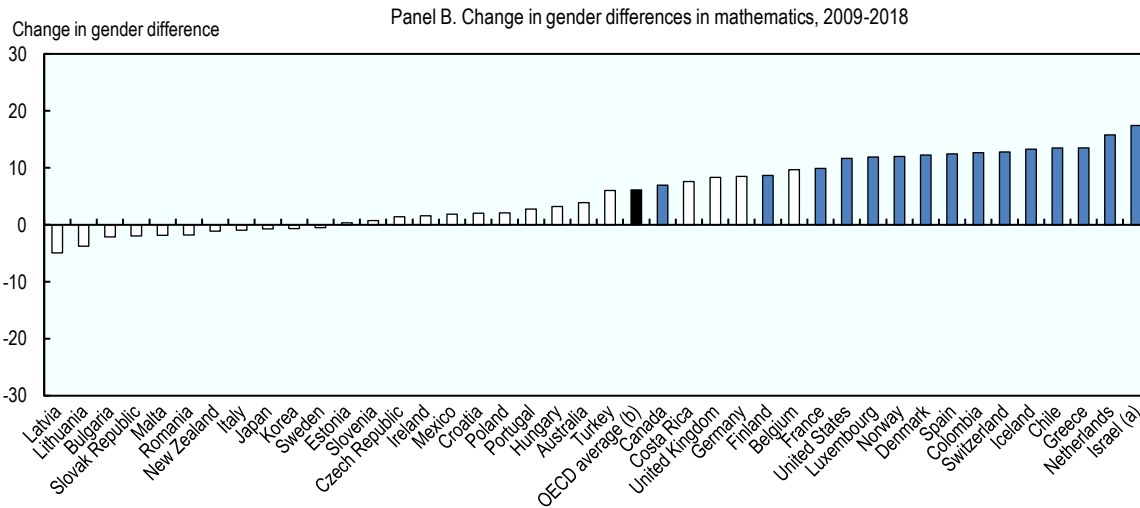
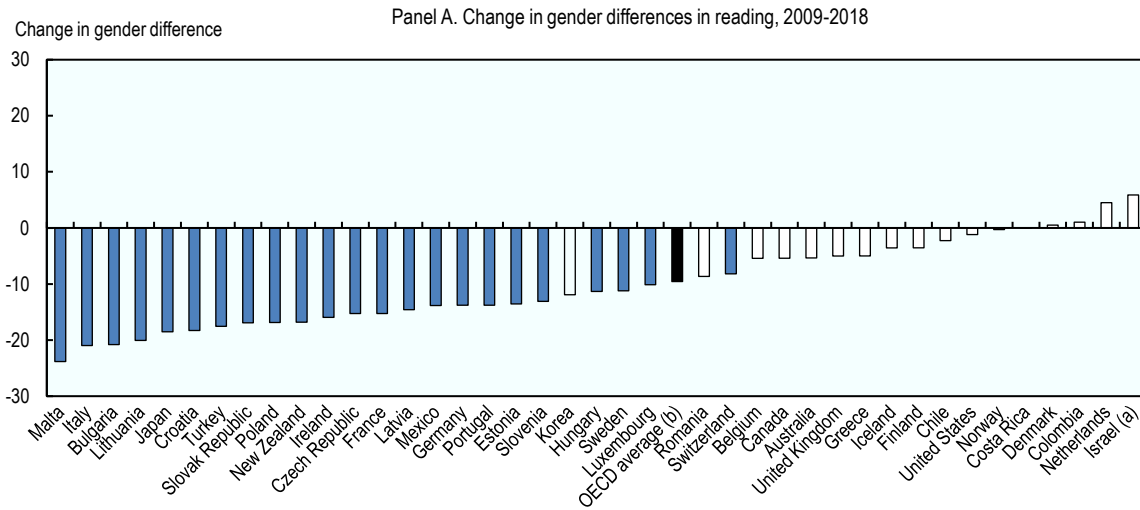
Gender differences in PISA scores have changed substantially in the past decade or so. Chart CO3.4.C shows changes between 2009 and 2018 in gender difference in student performance in reading (Panel A), mathematics (Panel B), and science (Panel C). The largest changes have come in reading (Panel A) where, in many OECD countries, the gender difference in favour of girls has fallen significantly since 2009. On average, the gender gap in favour of girls has fallen by 10 points, with the largest changes in Lithuania (down 20 points) and Italy (down 21 points). No OECD country has seen a statistically significant shift on reading in favour of girls.

In mathematics (Panel B), by contrast, sixteen OECD countries (Canada, Chile, Colombia, Denmark, France, Finland, Greece, Iceland, Israel, Luxembourg, Netherlands, Norway, Spain, Switzerland, United Kingdom and United States) have seen the gender difference shift in favour of girls since 2009. The largest shifts have come in the Netherlands and Israel, where girls have gained 16-17 points on boys since 2009. The OECD average change is a 6 point shift in favour of girls. No OECD country has seen a significant shift in mathematics performance in favour of boys.

Changes in gender differences in science (Panel C) are smaller than those for reading and mathematics. Two OECD countries (Lithuania and Portugal) have seen a statistically significant shift in favour of boys; nine others (Canada, Denmark, Finland, Iceland, Israel, Luxembourg, the Netherlands, Switzerland, and the United States) have seen a significant shift in favour of girls. The OECD average gender difference has shifted very slightly in favour of girls.

Chart CO3.4.C. Changes in gender differences in student performance in reading, mathematics and science

Change in gender differences (girls minus boys) in country mean average PISA scores, 2009-2018



Note: Shaded bars represent statistically significant changes in gender differences and white bars non-statistically significant changes in gender differences

a. See note a. to Chart CO3.4.A

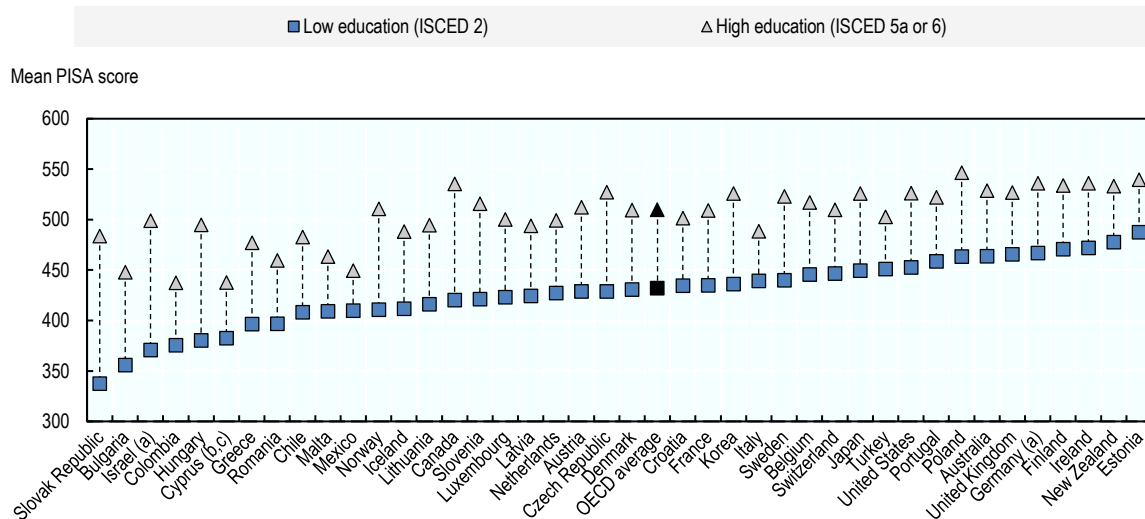
b. See note d. to Chart CO3.4.A

Source: OECD Programme for International Student Assessment (PISA) 2018, <https://www.oecd.org/pisa/>

Across OECD countries, students perform significantly better in reading when at least one of their parents is highly educated (Chart CO3.4.D). On average across OECD countries, the mean average PISA reading score for students with at least one parent with a highest qualification equal to ISCED level 5a or 6 (theoretically oriented tertiary and post-graduate) is, at 510 points, about 78 points higher than mean average for students with parents educated at most to ISCED level 2 (lower secondary) (432 points). The gap is significant in all OECD countries, and is largest Canada (115 points), Hungary (115 points), Israel (128 points) and especially the Slovak Republic (146 points).

Chart CO3.4.D. Differences in student reading performance by highest level of education of parents, 2018

Mean average PISA scores for students with parents with a highest level of education at ISCED 1997 level 2 (lower secondary) and ISCED 1997 level 5a or 6 (theoretically oriented tertiary and post-graduate)



Note: Shaded markers represent statistically significant differences between groups at $p < 0.005$, and white markers non-statistically significant differences between groups at $p < 0.005$.

a. For Germany, for children with parents with a highest level of education at all levels, the item response rate is below 85 percent. Missing data have not been explicitly accounted for.

b. See note a. to Chart CO3.4.A

c. See note b. to Chart CO3.4.A

d. See note c. to Chart CO3.4.A

Source: OECD Programme for International Student Assessment (PISA) 2018, <https://www.oecd.org/pisa/>

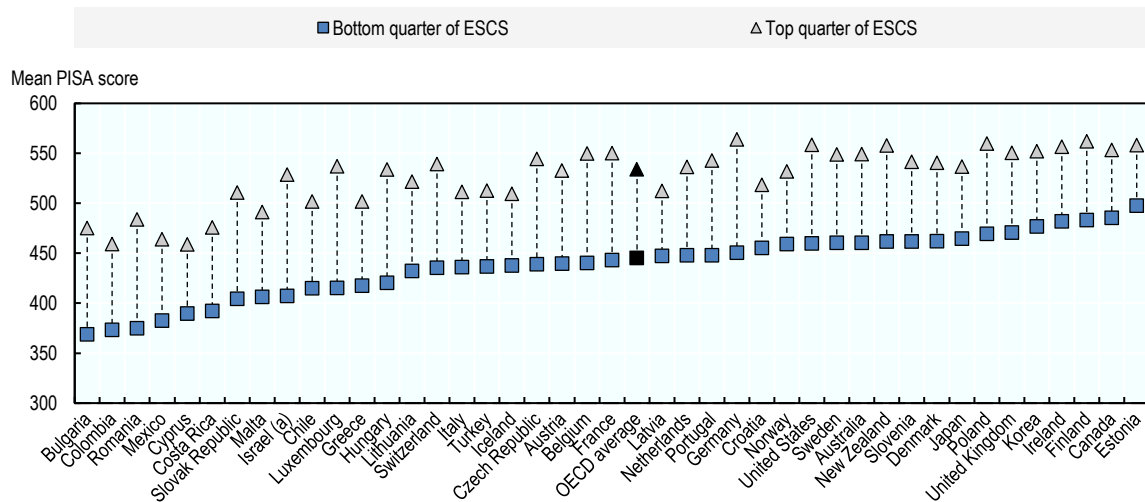
The PISA assessment provides a composite index of student's economic, social and cultural status (ESCS) by combining information on (i) the ISCED level of parents, (ii) the occupational status of parents, (iii) household possessions. The index is designed in such a manner that students with highly educated parents, many household possessions and high-earning parents score high in the index, while students whose parents have limited educational attainment with few material possessions and low earnings score low in the index.

Chart CO3.4.E shows mean PISA reading scores for students in the bottom and top quarters of the ESCS index. Across all OECD countries, students with high scores on the ESCS index perform significantly better

than students with low scores, with the OECD average gap in PISA reading scores standing at 89 points. Differences are particularly large in Israel and Luxembourg, where the gap in mean reading scores between students in the top and bottom quarters of ESCS exceeds 120 points. Some countries are able to combine higher average performance in reading with smaller socio-economic gaps in performance. In ten OECD countries, including Canada, Denmark, Estonia, Finland, Ireland, Japan, Korea, Norway, Slovenia and the United Kingdom, average performance in reading was higher than the OECD average while the performance difference between advantaged and disadvantaged was smaller than the OECD average.

Chart CO3.4.E. Differences in student reading performance by socio-economic status, 2018

Mean average PISA reading scores for students in the top and bottom quarters of the PISA index of economic, social and cultural status (ESCS).



Note: shaded markers represent statistically significant differences between groups at $p < 0.005$, and white markers non-statistically significant differences between groups at $p < 0.005$. The PISA index of economic, social and cultural status (ESCS) is a PISA-specific composite index based on information about the students' home and background. It is derived from several variables: parents' education, parents' occupations, a number of home possessions that can be taken as proxies for material wealth, and the number of books and other educational resources available in the home. For more information see OECD (2019) PISA 2018 Results (Volume I): What Students Know and Can Do (<https://doi.org/10.1787/5f07c754-en>).

a. See note a. to Chart CO3.4.A

Source: OECD Programme for International Student Assessment (PISA) 2018, <https://www.oecd.org/pisa/>

Comparability and data issues

The OECD PISA assessment process devotes substantial efforts and resources to achieving cultural and linguistic balance in the assessment materials, to provide students with equal chances of successful performance. Stringent quality assurance mechanisms are applied in translation and data collection, and sample sizes are large – more than 600,000 students across 79 countries were assessed for the 2018 wave. If countries fail to meet sampling size requirements they are omitted from the published international comparisons (e.g., the Netherlands in 2000, the United Kingdom in 2003 and Austria in 2006).

Because the structure and stages of education differ across countries, OECD PISA targets students of a specific age – between 15 years and 3 months and 16 years and 2 months at the time of assessment – rather than students at a specific grade or point in the education system. This allows for a better comparison of student performance internationally and ensures that across countries students are at a relatively similar stage of cognitive development. Similarly, to ensure that cross-national differences in education systems do not influence results, OECD PISA samples students from all and any types of

institution (including public or private schools and foreign schools) and students on various types of course (academic or vocational, full-time or part-time). For a more detailed discussion of the methodology used, see OECD (2014) and the OECD PISA website (<https://www.oecd.org/pisa/>).

Sources and further reading:

The PISA website (<https://www.oecd.org/pisa/>) provides information relating to the programme, including an interactive database, copies of the questionnaires and all associated publications and reports.

For information on The International Standard Classification of Education (ISCED), see OECD Education at a Glance 2019 (<https://doi.org/10.1787/19991487>);

OECD (2019) PISA 2018 Results: Volume I: What Students Know and Can Do and Volume II: Where All Students Can Succeed (<https://www.oecd.org/pisa/publications>).