

PROGRAMME FOR INTERNATIONAL STUDENT ASSESSMENT (PISA) RESULTS FROM PISA 2015

UNITED KINGDOM

In the United Kingdom education policy is devolved across four jurisdictions: England, Northern Ireland, Scotland and Wales.

Key findings

- By age 15, students in the United Kingdom perform above the OECD average in science (509 score points) and reading (498 points) and around the OECD average in mathematics (492 points). As is the case across OECD countries, the average science, mathematics and reading performance of 15-year-olds in the United Kingdom has remained stable since 2006.
- A greater proportion of students in the United Kingdom achieved the highest levels in the PISA science assessment – the major domain in 2015 – compared to the average across OECD countries (Table I.2.2a). In 2015, 29% of students in the United Kingdom expect to work in a science-related occupation by age 30, and the country saw the second largest increase on this measure since 2006 across all countries (Figure 1.3.4).
- As in many other countries, socio-economically disadvantaged students in the United Kingdom are less likely to succeed at school than their more advantaged peers. However, equity in education outcomes in the United Kingdom is better than the OECD average, as 11% of the variation in student performance in science is attributed to differences in students' socio-economic status (the OECD average is 13%) (Table I.6.3a).
- Students with an immigrant background (first or second generation) in the United Kingdom, as in many other OECD countries, do not perform as well in science as students without an immigrant background. However, once socio-economic status is accounted for, there is no difference in science performance between non-immigrant and immigrant students in the United Kingdom (Table I.7.4a).
- In the United Kingdom, boys and girls are equally likely to score at Level 5 or 6, the highest levels of proficiency, in science (12% of boys and 10% of girls) (Table I.2.6a), and they are equally likely to expect to work in a science-related occupation at age 30 (29% of boys and 30% of girls hold such expectations) (Table I.3.10b).

Student performance in science

- Students in the United Kingdom score 509 points in science, on average (Table I.2.3), above the OECD average (493 points) and comparable with students in Australia, Beijing-Shanghai-Jiangsu-Guangdong (China) (hereafter “B-S-J-G [China]”), Germany, Ireland,

Korea, the Netherlands, New Zealand, Slovenia and Switzerland (Table I.2.3 and Figure I.2.13).

- Within the United Kingdom, students in England score 512 points, on average, and students in Northern Ireland score 500 points, on average – both above the OECD average. Students in Scotland score 497 points, around the OECD average, while students in Wales score 485 points, which is below the OECD average (Table B2.I.2).
- The United Kingdom’s mean performance has remained stable since 2006, decreasing from 515 to 509 score points, which is not a significant change (Table I.2.4a).
- Mean performance in science has not changed since 2006 for students in England (516 points in 2006) and Northern Ireland (508 points in 2006), while it has declined in Scotland (515 points in 2006) and Wales (505 points in 2006) (Table B2.I.2, and Table S2c in the PISA 2006 Initial Report).
- On average across OECD countries, 21% of students do not reach the baseline level of proficiency in science, Level 2, meaning they cannot draw on their knowledge of basic science content and procedures to identify an appropriate explanation, interpret data, and identify the question being addressed in a simple experiment. Some 17% of students in the United Kingdom are low performers, a proportion that has remained unchanged since 2006 (Table I.2.2a).
- Some 17% of students in England and 18% of students in Northern Ireland do not reach the baseline level of proficiency in science, while 20% of students in Scotland and 22% of students in Wales are low performers (Table B2.I.1).
- On average across OECD countries, 8% of students are top performers in science, meaning that they are proficient at Level 5 or 6. At these levels, students can creatively and autonomously apply their scientific knowledge and skills to a wide variety of situations, including unfamiliar ones. Some 11% of students in the United Kingdom are top performers, but this share shrank a significant 3 percentage points since 2006 (Table I.2.2a).
- In England, 12% of students are top performers, as are 8% of students in Scotland (8%), 7% of students in Northern Ireland and 5% of students in Wales (Table B2.I.1).

Gender differences in science performance

- Across the United Kingdom as a whole, and in England, Northern Ireland, Scotland and Wales individually, there is no significant gender gap in science performance (boys score 510 points and girls score 509 points, on average; across OECD countries, the average gender gap is 4 points, in favour of boys) (Tables I.2.8a, I.2.8d and B2.I.4).
- Even though gender differences in science performance tend to be small on average, in 33 countries and economies, the share of top performers in science is larger among boys than among girls. In the United Kingdom, as a whole, there is no significant difference in the share of top performers among boys and girls (Table I.2.6a), and this is also true in England, Northern Ireland, Scotland and Wales (Table B2.I.3).

Student performance in reading

- Students in the United Kingdom score 498 points in reading, on average, above the OECD average (493 score points) and comparable with students in Australia, B-S-J-G (China), Belgium, Denmark, France, the Netherlands, Portugal, the Russian Federation (hereafter

“Russia”), Spain, Sweden, Switzerland, Chinese Taipei and the United States (Table I.4.3a and Figure I.4.1).

- Students in England score 500 points in reading, on average, above the OECD average, while students in Northern Ireland score 497 points and students in Scotland score 493 points, both of which are comparable to the OECD average. Students in Wales score 477 points, which is below the OECD average (Table B2.I.6).
- The United Kingdom’s mean performance in reading has remained largely unchanged since 2006, rising only slightly from 495 to 498 score points, with an average increase of 1.2 score points every three years, a statistically insignificant change (Table I.4.4a).
- Since 2009, when reading was the major domain, student performance in reading has not changed significantly in England, Northern Ireland, Scotland and Wales (Table B2.I.6, and Table S.I.c in the PISA 2009 Initial Report).
- About 20% of students in OECD countries, on average, do not attain the baseline level of proficiency in reading, considered the level of proficiency at which students begin to demonstrate the reading skills that will enable them to participate effectively and productively in life. In the United Kingdom, as a whole, 18% of students perform below Level 2 in reading (Table I.4.2a). Some 15% of students in Northern Ireland, 18% of students in England and Scotland, and 21% of students in Wales do not attain the baseline level of proficiency in reading (Table B2.I.5).
- Across OECD countries, 8% of students are top performers in reading, meaning that they are proficient at Level 5 or 6. At these levels, students can find information in texts that are unfamiliar in form or content, demonstrate detailed understanding, and infer which information is relevant to the task. They are also able to critically evaluate such texts and build hypotheses about them, drawing on specialised knowledge and accommodating concepts that may be contrary to expectations. Around 9% of students in the United Kingdom are top performers (Table I.4.2a). In England, 10% of students are top performers, while 6% of students in Scotland and Northern Ireland and 4% of students in Wales score at this level (Table B2.I.5).

Gender differences in reading performance

- Girls outperform boys in reading by an average of 22 points in the United Kingdom. The gender gap in the United Kingdom is not significantly different from that observed across OECD countries (27 points) and it has not changed significantly since 2009 (Table I.4.8a and Table I.4.8d).

The gender gap in favour of girls is 11 points in Wales, 14 points in Northern Ireland, 21 points in Scotland and 23 points in England (Table B2.I.8).

- Boys in the United Kingdom are six percentage points more likely to be low performers and four percentage points less likely to be top performers in reading than girls. Similar or slightly larger gender gaps are observed across OECD countries (Table I.4.6a).

Student performance in mathematics

- Students in the United Kingdom score 492 points in mathematics, on average, around the OECD average of 490 points and comparable to students in Australia, Austria, the Czech Republic, France, Iceland, Italy, New Zealand, Portugal, Russia, Sweden and Viet Nam (Table I.5.3 and Figure I.5.1).

- Students in England and Northern Ireland score 493 points in mathematics, on average, and students in Scotland score 491 points – all comparable to the OECD average. Students in Wales score 478 points, below the OECD average (Table B2.I.10).
- The United Kingdom's mean performance has remained stable since 2006, with small (non-significant) changes from 495 points in 2006 and 494 in 2012 to 492 score points in 2015 (Table I.5.4a).
- Since 2012 when mathematics was the major domain, student performance in mathematics has not changed significantly in England, Northern Ireland, Scotland or Wales (Table B2.I.6, and Table B2.I.3 from the PISA 2012 Initial Report).
- On average across OECD countries, 23% of students do not reach the baseline level of proficiency in mathematics, Level 2. These low achievers can solve problems involving clear directions and requiring a single source of information, but cannot engage in more complex reasoning to solve the kinds of problems that are routinely faced by adults in their daily lives. In the United Kingdom, 22% of students are low achievers (Table I.5.2a).

Some 19% of students in Northern Ireland are low achievers, as are 20% of students in Scotland, 22% of students in England and 23% of students in Wales (Table B2.I.9). There has not been a significant change in the share of low achievers in the United Kingdom between 2006 (20%) and 2015 (22%) (Table I.5.2a).

- Around 11% of students in OECD countries – and in the United Kingdom – are top performers in mathematics; however, in Singapore, the top-performing country/economy in the PISA 2015 assessment, 35% of students are top performers in the subject (Table I.5.2a).

Some 11% of students in England are top performers, as are 9% of students in Scotland, 7% of students in Northern Ireland and 5% of students in Wales (Table B2.I.9). There has been no change in the share of top performers in the United Kingdom since 2006 (Table I.5.2a).

Gender differences in mathematics performance

- Boys in the United Kingdom outperform girls in mathematics by an average of 12 score points, similar to the OECD average gender gap of 8 score points. The gender gap in the United Kingdom has remained unchanged since 2012 (Tables I.5.8a and I.5.8e). In England, boys score 12 points higher than girls in mathematics, on average; in Wales, the gender gap is 10 points. In both Northern Ireland and Scotland, boys score seven points higher than girls in mathematics, an insignificant difference (Table B2.I.12).
- Boys in the United Kingdom are four percentage points more likely to be top performers than girls, similar to the average difference across OECD countries (Table I.5.6a).

Students' engagement with science

Attitudes towards science

- Students in the United Kingdom are more positive about their experiences of learning science than is the case across OECD countries, on average, and a larger proportion of them in 2015 than in 2006 reported that they enjoy learning science. Only in three other countries – Ireland, Poland and the United States – was the increase in enjoyment greater than in the United Kingdom (Tables I.3.1a and I.3.1f).

- PISA 2015 asked students about their beliefs about the nature of science knowledge and the validity of scientific methods of enquiry (collectively known as epistemic beliefs). Students across the United Kingdom, and in England, Northern Ireland, Scotland and Wales individually, reported strong epistemic beliefs. Around 92% of students agreed that ideas in science sometimes change, compared to the OECD average of 81%, and 93% of students in the United Kingdom agreed that it is good to try experiments more than once to make sure of one's findings, compared to the OECD average of 85% (Table I.2.12a).

Students' expectations of a career in science

- PISA 2015 asked students what occupation they expect to be working in when they are 30 years old. Even though many 15-year-olds are undecided about their future, 29% of students in the United Kingdom reported that they expect to work in an occupation that requires further science training beyond compulsory education, compared with 24% of students across the OECD. This is 11 percentage points higher than in 2006, reflecting a six percentage-point increase in the share of students intending to become science and engineering professionals, and a four percentage-point increase in the share of students intending to become health professionals (Tables I.3.10a and I.3.10b).
- Students in Northern Ireland are particularly likely to expect to work in science (33%), followed by students in England (30%) and Wales (28%). By contrast, only 23% of students in Scotland expect to work in a science-related occupation at the age of 30 (Table B2.I.64).
- In almost all countries and economies, the expectation of pursuing a career in science is strongly related to proficiency in science. On average across OECD countries, only 13% of students who score below PISA proficiency Level 2 in science hold such expectations, but that percentage more than triples, to 41%, among top performers in science (those who score at or above Level 5). In the United Kingdom, 18% of low achievers expect to pursue a career in science, compared to 44% of top performers (Table I.3.10b).
- The increase in the likelihood of expecting to pursue a science-related career with better performance in science is even more pronounced in Wales (17% of low achievers compared to 51% of top performers who hold such expectations) and Northern Ireland (16% of low achievers compared to 59% of top performers), but similar to the United Kingdom, as a whole, in England (19% of low performers compared to 43% of top performers) and Scotland (10% of low performers compared to 42% of top performers) (Table B2.I.64).

Gender-related differences in students' engagement with science

- Even when equal shares of boys and girls expect a science-related career, boys and girls tend to think of working in different fields of science. In almost all countries and economies that participated in PISA 2015, girls envisage themselves as health professionals more than boys do; and in almost all countries, boys see themselves as becoming ICT professionals, scientists or engineers more than girls do. Boys are more than twice as likely as girls to expect to work as engineers, scientists or architects (science and engineering professionals), on average across OECD countries; only 0.4% of girls, but 4.8% of boys, expect to work as ICT professionals. Girls are almost three times as likely as boys to expect to work as doctors, veterinarians or nurses (health professionals).
- In the United Kingdom, there is no significant gender difference in the share of boys and girls who reported that they expect to pursue a career in science: 29% of boys and 30% of girls so reported. However, as across OECD countries, boys in the United Kingdom are more than twice as likely as girls to envisage themselves as science and engineering professionals (17% of boys compared with 8% of girls; the OECD averages are 12% of boys

and 5% of girls), while girls are three times as likely as boys to envisage themselves as health professionals (20% of girls compared with 7% of boys; the OECD averages are 17% of girls and 6% of boys) (Tables I.3.10b, I.3.11a and I.3.11b).

- When a student is confident in his or her ability to accomplish particular goals in the context of science, he or she is said to have a greater sense of **self-efficacy** in science. In 41 countries and economies, boys show significantly greater self-efficacy than girls. Gender differences in science self-efficacy are larger in the United Kingdom than on average across OECD countries (Table I.3.4c).
- Student self-efficacy in science is greatest in England, followed by Wales – both above the OECD average. Students in Northern Ireland reported around OECD average levels of self-efficacy while students in Scotland reported slightly below-average self-efficacy (Table B2.I.66).
- PISA distinguishes between two forms of motivation to learn science: students may learn science because they enjoy it (**intrinsic motivation**) and/or because they perceive learning science to be useful for their future plans (**instrumental motivation**). A majority of students who participated in PISA 2015 reported that they enjoy and are interested in learning science, but boys tended to report so more than girls. In the United Kingdom, boys were six percentage points more likely than girls to agree with the statements “I enjoy acquiring new knowledge in science” and “I am interested in learning about science”. This is larger than the average gender gap of four percentage points across OECD countries. Moreover, in the United Kingdom, boys were seven percentage points more likely than girls to report that “studying [one’s] school science subject(s) is worthwhile [for one] because what [one learns] will improve [one’s] career prospects” (Tables I.3.1c and I.3.3c).

Student experience of science teaching

- On average across OECD countries, students reported spending 3.5 hours in science lessons at school. In England, Northern Ireland, Scotland and Wales, students reported spending more time learning science in school than either English or mathematics. The average student across the United Kingdom spends 4.7 hours per week in science lessons, more than the OECD average and more than observed in several high-performing countries. In Singapore, however, students spend 5.5 hours per week, on average, in science lessons (Tables II.6.32 and B2.II.45).
- A relatively large share of science teachers in the United Kingdom (93%) hold a university degree with a major in science compared to the OECD average (74%) (Table II.2.8).
- A relatively large share of principals in the United Kingdom reported that their school’s capacity to provide instruction is hindered by a shortage of teaching staff, at least to some extent (43% of principals in the United Kingdom so reported, compared to 30% on average across OECD countries) (Table II.6.14). A lack of teaching staff seems to be a particularly pressing concern amongst principals in England, compared to the rest of the United Kingdom. Almost half of the principals in England and Scotland (45%) reported this to be a problem, significantly more than in Northern Ireland (27%) and Wales (20%) (Table B2.II.41).

Student truancy

- On average across OECD countries, 20% of students reported that they had skipped a day of school or more in the two weeks prior to the PISA test, while in the United Kingdom, 25% of students so reported (Table II.3.1). Truancy rates are particularly high in Northern Ireland

(36%) and Wales (35%), at a par with the United Kingdom average in England (25%), and at a par with the OECD average in Scotland (19%) (Table B2.II.11).

- In PISA-participating countries and economies, skipping a whole day of school is more common in disadvantaged schools than in advantaged schools. In 44 out of the 56 PISA-participating countries and economies for which data are available, students in disadvantaged schools were more likely to skip a whole day of school than students in advantaged schools. This was also the case in the United Kingdom, where students in disadvantaged schools are 10 percentage points more likely to have skipped a day of school (Table II.3.4).
- On average across OECD countries, students who had skipped a whole day of school at least once in the two weeks prior to the PISA assessment score 45 points lower in the science assessment than students who had not skipped a day of school (33 points lower after accounting for the socio-economic profile of students and schools – the equivalent of almost one full year of schooling). In the United Kingdom, students who reported that they had skipped a day of school during that period score 35 points lower in science (25 points after accounting for socio-economic profile) (Table II.3.4).
- Between 2012 and 2015, the percentage of students in the United Kingdom who had skipped a day of school in the two weeks prior to the PISA test increased by eight percentage points (the OECD average is an increase of five percentage points), signalling that students' engagement with school has deteriorated during the period (Table II.3.3).

Context for student achievement

- The per capita GDP of the United Kingdom (USD 40 233, after converting for purchasing power parity) is similar to the average per capita GDP across OECD countries (USD 39 333). However, the United Kingdom spends (from both public and private sources) USD 114 920 per student from the age of 6 to 15 – 27% more than the average cumulative expenditure across OECD countries (USD 90 294) (Table I.2.11).
- The adult population in the United Kingdom is more educated than that in other OECD countries, with 46% of 35-44 year-olds tertiary educated, compared with 37% across OECD countries. Fewer students in the United Kingdom are disadvantaged (on an international scale of socio-economic status) compared to the OECD average. However, 9% of students in the United Kingdom are first-generation immigrants compared to 5% of students across OECD countries (Table I.2.11).

The impact of socio-economic status on performance

- Canada, Estonia, Finland and Japan achieve high levels of performance and equity in education outcomes as assessed in PISA 2015, with 10% or less of the variation in student performance attributed to differences in students' socio-economic status, compared with 13% across OECD countries (Table I.6.3a).
- In the United Kingdom, equity in education outcomes is greater than the OECD average, as 11% of the variation in student performance in science is attributed to differences in students' socio-economic status (Table I.6.3a).
- In Wales, only 6% of the variation in performance can be attributed to socio-economic status; in England, Northern Ireland and Scotland, 11% of the variation is so explained (Table B2.I.66).

- Across OECD countries, a more socio-economically advantaged student scores 38 points higher in science – the equivalent of more than one year of schooling – than a less-advantaged student. In the United Kingdom, an advantaged student scores 37 points higher in science – a difference that is statistically equivalent to the OECD average (Table I.6.3a).
- While the score-point difference between advantaged and disadvantaged students in England, Northern Ireland and Scotland is similar to that observed in the United Kingdom, as a whole, and across OECD countries, on average, advantaged students in Wales score only 25 points higher in science than disadvantaged students (Table B2.I.66).
- Across OECD countries, 29% of disadvantaged students are “resilient” in science, meaning that they beat the odds against them and score among the top 25% of students worldwide. In Hong Kong (China), Macao (China) and Viet Nam, more than one in two disadvantaged students are resilient (Table I.6.7).
- In the United Kingdom, 35% of disadvantaged students are resilient – five percentage points more than in 2006 (Table I.6.7).

Students with an immigrant background

- The share of immigrant students in OECD countries increased from 9% in 2006 to 12% in 2015 while the difference in science performance between immigrant and non-immigrant students shrank by 9 score points during the same period (6 score points after accounting for socio-economic status and the language spoken at home) (Tables I.7.1 and I.7.15a).
- In the United Kingdom, the proportion of students with an immigrant background increased from 9% in 2006 to 17% in 2015 (Table I.7.1).
- Immigrant students in the United Kingdom score 23 points below non-immigrant students in the science assessment, but the gap shrinks to 15 score points after accounting for socio-economic status and the language spoken at home (Table I.7.15a).

Education policies and practices

Opportunity to learn science at school

Inequalities in opportunities to learn are mainly reflected in the time education systems, schools and teachers allocate to learning. If time is a necessary condition for learning, students who do not attend science lessons are probably those who enjoy the fewest opportunities to acquire competencies in science.

- On average across OECD countries, 94% of students reported that they attend at least one science course per week. However, that means that at least one million 15-year-old students are not required to attend any science lessons. In the United Kingdom, only 2% of students are not required to attend any science lessons (Table II.2.3).
- Across OECD countries, students who are not required to attend science lessons score 25 points lower in science than students who are required to attend at least one science lesson per week, after accounting for the socio-economic profile of students and schools. In the United Kingdom, students who are not required to attend science classes score 66 points lower in science (Table II.2.3).

Science resources at school

- PISA asked school principals to provide information about the resources available to their school's science department. Students in the United Kingdom were more likely than the OECD average to attend a school whose principal agreed that the science department is well-equipped and well-staffed (Table II.2.5).
- Laboratories, in particular, seem to be well-equipped. Some 91% of students in the United Kingdom, (92% of students in England and in Northern Ireland, 88% of students in Scotland and 84% of students in Wales) attend schools whose principal reported that there is “enough laboratory material that all courses can regularly use it” (66% of students across OECD countries attend such schools). And 91% of students in the United Kingdom (91% of students in England, 90% of students in Wales, 88% of students in Northern Ireland, and 83% of students in Scotland) attend schools whose principal reported that there are “extra laboratory staff that [help] support science teaching” (34% of students across OECD countries attend such schools) (Tables II.2.5 and B2.II.4).
- On average across OECD countries, a 19-score point increase in science performance is observed in schools whose principal reported that there is enough laboratory material, while a 21-score point increase is observed in schools whose principal reported that extra laboratory staff are available. However, in the United Kingdom, there is no significant difference in science performance between students in schools whose principal reported better science-specific resources (Table II.2.7).

Extracurricular science activities

- On average across OECD countries, students in schools that offer science competitions score 36 points higher in science and are 55% more likely to expect to work in a science-related occupation than students in schools that do not offer such activities (Table II.2.13); those in schools offering a science club score 21 score points higher and are 30% more likely to expect to pursue a career in science (Table II.2.12).
- Extracurricular activities such as science clubs and competitions help students understand scientific concepts, raise interest in science and even nurture future scientists. Across OECD countries, 39% of students are enrolled in schools that offer a science club and 66% attend schools that offer science competitions (Table II.2.11). Science clubs are most commonly offered in East Asian countries and economies: more than 90% of students in B-S-J-G (China), Hong Kong (China) and Korea attend schools that offer science clubs. Science competitions, by contrast, are most frequently offered in several Eastern European countries, including Estonia, Hungary, Lithuania, Moldova, Poland and Russia, where more than 90% of students attend schools that offer these science activities.
- In the United Kingdom, 79% of students attend schools that offer science clubs, a larger proportion than the OECD average (Table II.2.11). Some 80% of students in England and Wales, 74% in Northern Ireland and 71% in Scotland attend such schools (Table B2.II.6).
- Some 72% of students in the United Kingdom, as a whole, attend schools that offer science competitions (similar to the OECD average), as do 84% of students in Scotland, 78% of students in Northern Ireland, 71% of students in England and 65% of students in Wales (Tables II.2.11 and B2.II.6).
- In the United Kingdom, advantaged schools offer science competitions more often than disadvantaged schools do, although they are equally likely to offer science clubs (Table II.2.12 and Table II.2.13). For example, while 68% of students enrolled in disadvantaged

schools are offered science competitions, 88% of students in advantaged schools are offered this activity, a gap comparable to the OECD average. However, the relationship between science competitions and performance is weak in the United Kingdom. Students in schools that offer science competitions score 18 points higher in science (and a non-significant 2 points higher after accounting for students' and schools' socio-economic profile), compared to 36 points higher on average across OECD countries (12 points higher after accounting for socio-economic status) (Table II.2.13). There are no significant performance differences in the United Kingdom associated with the availability of a science club (Table II.2.12).

Teaching strategies

How teachers teach science is more strongly associated with science performance and students' expectations of working in a science-related career than the material and human resources of science departments, including the qualifications of teachers or the kinds of extracurricular science activities offered to students.

- Almost everywhere, students who reported that their teachers explain scientific ideas more frequently score higher in science, even after accounting for socio-economic status. In the United Kingdom, 65% of students reported that their teachers explain scientific ideas in many or all lessons, and these students score 56 points higher in science than students who reported that their teachers explain scientific ideas only in some lessons or never (48 points higher after accounting for socio-economic status). This is higher than the 55% of students who score 37 points higher on average across OECD countries (28 points higher after accounting for socio-economic status) (Tables II.2.16 and II.2.18).
- Only 57% of students in Wales reported that their teacher explains scientific ideas in many or all lessons, compared to 60% of students in Northern Ireland, 61% of students in Scotland, and 66% of students in England who so reported (Table B2.II.7).
- In almost all school systems, students who reported that their teachers adapt the lesson to the class's needs and knowledge more frequently score higher in science, even after accounting for socio-economic status. In the United Kingdom, 48% of students reported that their teachers adapt most or every lesson to the class's needs and knowledge, and these students score 29 points higher in science (27 points higher after accounting for socio-economic status) than students who reported that their teachers never or only sometimes adapt lessons to the class's needs and knowledge (Tables II.2.22 and II.2.24).
- Students in Wales (40%) are less likely to say that their teachers adapt the lesson to the class's needs and knowledge than their peers across the rest of the United Kingdom (Table B2.II.9).

Resource allocation

- Equitable resource allocation means that the schools attended by socio-economically disadvantaged students are at least as well-equipped as the schools attended by advantaged students, to compensate for inequalities in the home environment. Based on school principals' reports, in 30 countries and economies, advantaged schools are better equipped than disadvantaged schools. Disadvantaged schools are only better equipped than advantaged schools in three countries and economies (Table II.6.2).
- With the exception of Ciudad Autónoma de Buenos Aires (Argentina) and Macao (China), all school systems where schools principals in disadvantaged schools are considerably more concerned about the material resources at their school than principals in advantaged schools score below 450 score points in science (Figure II.6.4). In the United Kingdom, principals of disadvantaged schools are less concerned about material resources than principals of

advantaged schools, although the difference is insignificant. How concerned principals are about the material resources at the school explains 0.3% of the variation in science performance, before accounting for socio-economic status (Table II.6.2).

- Students across the United Kingdom are similarly likely to attend schools whose principals believe that instruction is hindered by a lack of educational material: 26% of students in Northern Ireland, 29% of students in England, and 31% of students in Scotland and Wales attend such schools (Table B2.II.38).

Selecting and sorting students




- On average across OECD countries, school systems begin selecting students for different programmes at the age of 14. Some OECD countries, including Austria and Germany, start selecting students as early as age 10. In the United Kingdom, schools start selecting students at age 16,¹ later than the OECD average (Table II.5.27). The later students are selected into different academic programmes/schools and the lower the percentage of students who have repeated a grade, the greater the equity in science performance, even after accounting for the school's mean score in science and the variation in student performance (Figure II.5.13).
- Moreover, in countries and economies with large enrolments in pre-vocational or vocational programmes, these enrolments vary markedly according to schools' socio-economic profiles. On average across OECD countries, the proportion of 15-year-old students enrolled in a vocational track is 21 percentage points smaller among students in advantaged schools than among students in disadvantaged schools. However, as students in the United Kingdom are not sorted until age 16, only 0.8% of students are enrolled in a vocational programme at age 15, with no difference in enrolment in these programmes between students in advantaged and disadvantaged schools (Table II.5.17).

Grade repetition

- Grade repetition is more prevalent in school systems where students score lower on the PISA science assessment and where students' socio-economic status is most strongly associated with science performance. Students might have been kept back to repeat course content that they did not fully master; or they might have been invited to skip a grade when their teachers felt they were capable of taking on more challenging schoolwork. In 13 countries and economies, at least 30% of students had repeated a grade at least once in primary or secondary education. However, only 3% of students in the United Kingdom had repeated a grade in primary or secondary by the age of 15, and there has been no significant change in this percentage since 2009 (Tables II.5.9 and II.5.11).
- Many people would agree that performance, behaviour and motivation are legitimate reasons for deciding which students repeat a grade; and the data clearly show these associations. What is more troubling is that, even after accounting for students' academic performance, behaviour and motivation, in many education systems, a student with certain characteristics is more likely to have repeated a grade than other students. For instance, across OECD countries, boys are more likely than girls, socio-economically disadvantaged students are more likely than advantaged students, and students with an immigrant background are more likely than students with no immigrant background to have repeated a grade. In the United Kingdom, however, only immigrant students are more likely (2.6 times more likely) to have repeated a grade than non-immigrant students (Table II.5.13).

¹ While the selection of students at age 16 is common across the United Kingdom, specific jurisdictions select students at earlier ages. In Northern Ireland, some schools select students at age 11.

Snapshot of performance in science, reading and mathematics


-  Countries/economies with a mean performance/share of top performers **above** the OECD average
 Countries/economies with a share of low achievers **below** the OECD average
 Countries/economies with a mean performance/share of top performers/
 share of low achievers not significantly different from the OECD average
 Countries/economies with a mean performance/share of top performers **below** the OECD average
 Countries/economies with a share of low achievers **above** the OECD average

	Science		Reading		Mathematics		Science, reading and mathematics	
	Mean score in PISA 2015	Average three-year trend	Mean score in PISA 2015	Average three-year trend	Mean score in PISA 2015	Average three-year trend	Share of top performers in at least one subject (Level 5 or 6)	Share of low achievers in all three subjects (below Level 2)
	Mean	Score dif.	Mean	Score dif.	Mean	Score dif.	%	%
OECD average	493	-1	493	-1	490	-1	15.3	13.0
Singapore	556	7	535	5	564	1	39.1	4.8
Japan	538	3	516	-2	532	1	25.8	5.6
Estonia	534	2	519	9	520	2	20.4	4.7
Chinese Taipei	532	0	497	1	542	0	29.9	8.3
Finland	531	-11	526	-5	511	-10	21.4	6.3
Macao (China)	529	6	509	11	544	5	23.9	3.5
Canada	528	-2	527	1	516	-4	22.7	5.9
Viet Nam	525	-4	487	-21	495	-17	12.0	4.5
Hong Kong (China)	523	-5	527	-3	548	1	29.3	4.5
B-S-J-G (China)	518	m	494	m	531	m	27.7	10.9
Korea	516	-2	517	-11	524	-3	25.6	7.7
New Zealand	513	-7	509	-6	495	-8	20.5	10.6
Slovenia	513	-2	505	11	510	2	18.1	8.2
Australia	510	-6	503	-6	494	-8	18.4	11.1
United Kingdom	509	-1	498	2	492	-1	16.9	10.1
Germany	509	-2	509	6	506	2	19.2	9.8
Netherlands	509	-5	503	-3	512	-6	20.0	10.9
Switzerland	506	-2	492	-4	521	-1	22.2	10.1
Ireland	503	0	521	13	504	0	15.5	6.8
Belgium	502	-3	499	-4	507	-5	19.7	12.7
Denmark	502	2	500	3	511	-2	14.9	7.5
Poland	501	3	506	3	504	5	15.8	8.3
Portugal	501	8	498	4	492	7	15.6	10.7
Norway	498	3	513	5	502	1	17.6	8.9
United States	496	2	497	-1	470	-2	13.3	13.6
Austria	495	-5	485	-5	497	-2	16.2	13.5
France	495	0	499	2	493	-4	18.4	14.8
Sweden	493	-4	500	1	494	-5	16.7	11.4
Czech Republic	493	-5	487	5	492	-6	14.0	13.7
Spain	493	2	496	7	486	1	10.9	10.3
Latvia	490	1	488	2	482	0	8.3	10.5
Russia	487	3	495	17	494	6	13.0	7.7
Luxembourg	483	0	481	5	486	-2	14.1	17.0
Italy	481	2	485	0	490	7	13.5	12.2
Hungary	477	-9	470	-12	477	-4	10.3	18.5
Lithuania	475	-3	472	2	478	-2	9.5	15.3
Croatia	475	-5	487	5	464	0	9.3	14.5
CABA (Argentina)	475	51	475	46	456	38	7.5	14.5
Iceland	473	-7	482	-9	488	-7	13.2	13.2
Israel	467	5	479	2	470	10	13.9	20.2
Malta	465	2	447	3	479	9	15.3	21.9
Slovak Republic	461	-10	453	-12	475	-6	9.7	20.1
Greece	455	-6	467	-8	454	1	6.8	20.7
Chile	447	2	459	5	423	4	3.3	23.3
Bulgaria	446	4	432	1	441	9	6.9	29.6
United Arab Emirates	437	-12	434	-8	427	-7	5.8	31.3
Uruguay	435	1	437	5	418	-3	3.6	30.8
Romania	435	6	434	4	444	10	4.3	24.3
Cyprus ¹	433	-5	443	-6	437	-3	5.6	26.1
Moldova	428	9	416	17	420	13	2.8	30.1
Albania	427	18	405	10	413	18	2.0	31.1
Turkey	425	2	428	-18	420	2	1.6	31.2
Trinidad and Tobago	425	7	427	5	417	2	4.2	32.9
Thailand	421	2	409	-6	415	1	1.7	35.8
Costa Rica	420	-7	427	-9	400	-6	0.9	33.0
Qatar	418	21	402	15	402	26	3.4	42.0
Colombia	416	8	425	6	390	5	1.2	38.2
Mexico	416	2	423	-1	408	5	0.6	33.8
Montenegro	411	1	427	10	418	6	2.5	33.0
Georgia	411	23	401	16	404	15	2.6	36.3
Jordan	409	-5	408	2	380	-1	0.6	35.7
Indonesia	403	3	397	-2	386	4	0.8	42.3
Brazil	401	3	407	-2	377	6	2.2	44.1
Peru	397	14	398	14	387	10	0.6	46.7
Lebanon	386	m	347	m	396	m	2.5	50.7
Tunisia	386	0	361	-21	367	4	0.6	57.3
FYROM	384	m	352	m	371	m	1.0	52.2
Kosovo	378	m	347	m	362	m	0.0	60.4
Algeria	376	m	350	m	360	m	0.1	61.1
Dominican Republic	332	m	358	m	328	m	0.1	70.7

1. Note 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 recognises the Turkish Republic of Northern Cyprus (TRNC). Until a lasting and equitable solution is found within the context of the United Nations, Turkey shall preserve its position concerning the "Cyprus issue".

Note by all the European Union Member States of the OECD and the European Union: The Republic of Cyprus is recognised 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.

Notes: Values that are statistically significant are marked in bold (see Annex A3).
 The average trend is reported for the longest available period since PISA 2006 for science, PISA 2009 for reading, and PISA 2003 for mathematics.
 Countries and economies are ranked in descending order of the mean science score in PISA 2015.

Source: OECD, PISA 2015 Database, Tables I.2.4a, I.2.6, I.2.7, I.4.4a and I.5.4a.
 StatLink  <http://dx.doi.org/10.1787/888933431961>

Snapshot of students' science beliefs, engagement and motivation


	Mean science score	Beliefs about the nature and origin of scientific knowledge		Share of students with science-related career expectations			Motivation for learning science			
		Index of epistemic beliefs (support for scientific methods of enquiry)	Score-point difference per unit on the index of epistemic beliefs	All students	Boys	Girls	Increased likelihood of boys expecting a career in science	Index of enjoyment of learning science	Score-point difference per unit on the index of enjoyment of learning science	Gender gap in enjoyment of learning science (Boys - Girls)
OECD average	493	0.00	33	24.5	25.0	23.9	1.1	0.02	25	0.13
Singapore	556	0.22	34	28.0	31.8	23.9	1.3	-0.59	35	0.17
Japan	538	-0.06	34	18.0	18.5	17.5	1.1	-0.33	27	0.52
Estonia	534	0.01	36	24.7	28.9	20.3	1.4	-0.16	24	0.05
Chinese Taipei	532	0.31	38	20.9	25.6	16.0	1.6	-0.06	28	0.39
Finland	531	-0.07	38	17.0	15.4	18.7	0.8	-0.07	30	0.04
Macao (China)	529	-0.06	26	20.8	22.0	19.6	1.1	0.20	21	0.16
Canada	528	0.30	29	33.9	31.2	36.5	0.9	0.40	26	0.15
Viet Nam	525	-0.15	31	19.6	21.2	18.1	1.2	0.65	14	0.06
Hong Kong (China)	523	0.04	23	23.6	22.9	24.2	0.9	0.28	20	0.26
B-S-J-G (China)	518	-0.08	37	16.8	17.1	16.5	1.0	-0.37	28	0.14
Korea	516	0.02	38	19.3	21.7	16.7	1.3	-0.14	31	0.32
New Zealand	513	0.22	40	24.8	21.7	27.9	0.8	0.20	32	0.03
Slovenia	513	0.07	33	30.8	34.6	26.8	1.3	-0.36	22	-0.03
Australia	510	0.26	39	29.2	30.3	28.2	1.1	0.12	33	0.16
United Kingdom	509	0.22	37	29.1	28.7	29.6	1.0	0.15	30	0.18
Germany	509	-0.16	34	15.3	17.4	13.2	1.3	-0.18	29	0.43
Netherlands	509	-0.19	46	16.3	16.9	15.7	1.1	-0.52	30	0.25
Switzerland	506	-0.07	34	19.5	19.8	19.1	1.0	-0.02	30	0.17
Ireland	503	0.21	36	27.3	28.0	26.6	1.1	0.20	32	0.09
Belgium	502	0.00	34	24.5	25.3	23.6	1.1	-0.03	28	0.20
Denmark	502	0.17	32	14.8	11.8	17.7	0.7	0.12	26	0.09
Poland	501	-0.08	27	21.0	15.4	26.8	0.6	0.02	18	-0.10
Portugal	501	0.28	33	27.5	26.7	28.3	0.9	0.32	23	0.08
Norway	498	-0.01	35	28.6	28.9	28.4	1.0	0.12	29	0.27
United States	496	0.25	32	38.0	33.0	43.0	0.8	0.23	26	0.21
Austria	495	-0.14	36	22.3	26.6	18.0	1.5	-0.32	25	0.23
France	495	0.01	30	21.2	23.6	18.7	1.3	-0.03	30	0.31
Sweden	493	0.14	38	20.2	21.8	18.5	1.2	0.08	27	0.22
Czech Republic	493	-0.23	41	16.9	18.6	15.0	1.2	-0.34	27	-0.06
Spain	493	0.11	30	28.6	29.5	27.8	1.1	0.03	28	0.11
Latvia	490	-0.26	27	21.3	21.1	21.5	1.0	0.09	18	0.03
Russia	487	-0.26	27	23.5	23.2	23.8	1.0	0.00	16	0.07
Luxembourg	483	-0.15	35	21.1	24.3	18.0	1.4	0.10	26	0.14
Italy	481	-0.10	34	22.6	24.7	20.6	1.2	0.00	22	0.24
Hungary	477	-0.36	35	18.3	23.9	12.8	1.9	-0.23	20	-0.02
Lithuania	475	0.11	22	23.9	22.5	25.4	0.9	0.36	20	-0.14
Croatia	475	0.03	32	24.2	26.8	21.8	1.2	-0.11	22	0.05
CABA (Argentina)	475	0.09	28	27.8	26.2	29.3	0.9	-0.20	15	-0.14
Iceland	473	0.29	28	23.8	20.1	27.3	0.7	0.15	24	0.26
Israel	467	0.18	38	27.8	26.1	29.5	0.9	0.09	20	0.06
Malta	465	0.09	54	25.4	30.2	20.4	1.5	0.18	48	0.11
Slovak Republic	461	-0.35	36	18.8	18.5	19.0	1.0	-0.24	25	-0.02
Greece	455	-0.19	36	25.3	25.7	24.9	1.0	0.13	27	0.12
Chile	447	-0.15	23	37.9	36.9	39.0	0.9	0.08	15	-0.09
Bulgaria	446	-0.18	34	27.5	28.8	25.9	1.1	0.28	17	-0.16
United Arab Emirates	437	0.04	33	41.3	39.9	42.6	0.9	0.47	22	-0.02
Uruguay	435	-0.13	27	28.1	23.8	31.9	0.7	-0.10	16	-0.07
Romania	435	-0.38	27	23.1	23.3	23.0	1.0	-0.03	17	-0.05
Cyprus*	433	-0.15	33	29.9	29.3	30.5	1.0	0.15	29	0.06
Moldova	428	-0.14	37	22.0	22.5	21.3	1.1	0.33	22	-0.17
Albania	427	-0.03	m	24.8	m	m	m	0.72	m	m
Turkey	425	-0.17	18	29.7	34.5	24.9	1.4	0.15	12	0.01
Trinidad and Tobago	425	-0.02	28	27.8	24.6	31.0	0.8	0.19	24	-0.01
Thailand	421	-0.07	35	19.7	12.4	25.2	0.5	0.42	18	-0.05
Costa Rica	420	-0.15	16	44.0	43.8	44.2	1.0	0.35	4	-0.03
Qatar	418	-0.10	33	38.0	36.3	39.9	0.9	0.36	25	0.00
Colombia	416	-0.19	21	39.7	37.1	42.0	0.9	0.32	7	-0.02
Mexico	416	-0.17	17	40.7	45.4	35.8	1.3	0.42	12	0.01
Montenegro	411	-0.32	23	21.2	20.1	22.4	0.9	0.09	14	-0.07
Georgia	411	0.05	42	17.0	16.4	17.7	0.9	0.34	23	-0.13
Jordan	409	-0.13	28	43.7	44.6	42.8	1.0	0.53	23	-0.25
Indonesia	403	-0.30	16	15.3	8.6	22.1	0.4	0.65	6	-0.06
Brazil	401	-0.07	27	38.8	34.4	42.8	0.8	0.23	19	-0.04
Peru	397	-0.16	23	38.7	42.7	34.6	1.2	0.40	9	0.01
Lebanon	386	-0.24	35	39.7	41.0	38.5	1.1	0.38	32	-0.04
Tunisia	386	-0.31	18	34.4	28.5	39.5	0.7	0.52	15	-0.12
FYROM	384	-0.18	30	24.2	20.0	28.8	0.7	0.48	17	-0.29
Kosovo	378	0.03	22	26.4	24.7	28.1	0.9	0.92	14	-0.16
Algeria	376	-0.31	16	26.0	23.1	29.2	0.8	0.46	14	-0.12
Dominican Republic	332	-0.10	13	45.7	44.7	46.8	1.0	0.54	6	-0.05

* See note 1 under Figure I.1.1.

Note: Values that are statistically significant are indicated in bold (see Annex A3).

Countries and economies are ranked in descending order of the mean science score in PISA 2015.

Source: OECD, PISA 2015 Database, Tables I.2, I.2a-b, I.3.1a-c and I.3.10a-b.

StatLink  <http://dx.doi.org/10.1787/888933431979>

What is PISA?

The Programme for International Student Assessment (PISA) is an ongoing triennial survey that assesses the extent to which 15-year-olds students near the end of compulsory education have acquired key knowledge and skills that are essential for full participation in modern societies. The assessment does not just ascertain whether students can reproduce knowledge; it also examines how well students can extrapolate from what they have learned and apply that knowledge in unfamiliar settings, both in and outside of school. This approach reflects the fact that modern economies reward individuals not for what they know, but for what they can do with what they know.

PISA offers insights for education policy and practice, and helps monitor trends in students' acquisition of knowledge and skills across countries and in different demographic subgroups within each country. The findings allow policy makers around the world to gauge the knowledge and skills of students in their own countries in comparison with those in other countries, set policy targets against measurable goals achieved by other education systems, and learn from policies and practices applied elsewhere.

Key features of PISA 2015

- The PISA 2015 survey focused on science, with reading, mathematics and collaborative problem-solving as minor areas of assessment. For the first time, PISA 2015 delivered the assessment of all subjects via computer. Paper-based assessments were provided for countries that chose not to test their students by computer, but the paper-based assessment was limited to questions that could measure trends in science, reading and mathematics performance.

The students

- Around 540 000 students completed the assessment in 2015, representing about 29 million 15-year-olds in the schools of the 72 participating countries and economies.

The assessment

- Computer-based tests were used, with assessments lasting a total of two hours for each student.
- Test items were a mixture of multiple-choice questions and questions requiring students to construct their own responses. The items were organised in groups based on a passage setting out a real-life situation. About 810 minutes of test items were covered, with different students taking different combinations of test items.
- Students also answered a background questionnaire, which took 35 minutes to complete. The questionnaire sought information about the students themselves, their homes, and their school and learning experiences. School principals completed a questionnaire that covered the school system and the learning environment. For additional information, some countries/economies decided to distribute a questionnaire to teachers. It was the first time that this optional teacher questionnaire was offered to PISA-participating countries/economies. In some countries/economies, optional questionnaires were distributed to parents, who were asked to provide information on their perceptions of and involvement in their child's school, their support for learning in the home, and their child's career expectations, particularly in science. Countries could choose two other optional questionnaires for students: one asked students about their familiarity with and use of information and communication technologies (ICT); and the second sought information about students' education to date, including any interruptions in their schooling, and whether and how they are preparing for a future career.

Map of PISA countries and economies



<p>■ OECD countries</p> <ul style="list-style-type: none"> Australia Austria Belgium Canada Chile Czech Republic Denmark Estonia Finland France Germany Greece Hungary Iceland Ireland Israel Italy Japan Korea Latvia Luxembourg Mexico The Netherlands New Zealand Norway Poland Portugal Slovak Republic Slovenia Spain Sweden Switzerland Turkey United Kingdom United States 	<p>■ Partner countries and economies in PISA 2015</p> <ul style="list-style-type: none"> Albania Algeria Argentina Brazil B-S-J-G (China)* Bulgaria Colombia Costa Rica Croatia Cyprus¹ Dominican Republic Former Yugoslav Republic of Macedonia Georgia Hong Kong (China) Indonesia Jordan Kazakhstan Kosovo Lebanon Lithuania Macao (China) Malaysia Malta Moldova Montenegro Peru Qatar Romania Russian Federation Singapore Chinese Taipei Thailand Trinidad and Tobago Tunisia United Arab Emirates Uruguay Viet Nam 	<p>■ Partner countries and economies in previous cycles</p> <ul style="list-style-type: none"> Azerbaijan Himachal Pradesh-India Kyrgyzstan Liechtenstein Mauritius Miranda-Venezuela Panama Serbia Tamil Nadu-India
---	--	--

* B-S-J-G (China) refers to the four PISA participating China provinces: Beijing, Shanghai, Jiangsu, Guangdong.

1. Note 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 recognises the Turkish Republic of Northern Cyprus (TRNC). Until a lasting and equitable solution is found within the context of the United Nations, Turkey shall preserve its position concerning the “Cyprus issue”.

Note by all the European Union Member States of the OECD and the European Union: The Republic of Cyprus is recognised 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.

This work is published under the responsibility of the Secretary-General of the OECD. The opinions expressed and arguments employed herein do not necessarily reflect the official views of OECD member countries.

This document and any map included herein are without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.

Note regarding data from Israel

The statistical data for Israel are supplied by and are 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.

This work is available under the [Creative Commons Attribution-NonCommercial-ShareAlike 3.0 IGO](https://creativecommons.org/licenses/by-nc-sa/3.0/) (CC BY-NC-SA 3.0 IGO). For specific information regarding the scope and terms of the licence as well as possible commercial use of this work or the use of PISA data please consult [Terms and Conditions](https://www.oecd.org/termsandconditions/) on www.oecd.org.

Contacts:

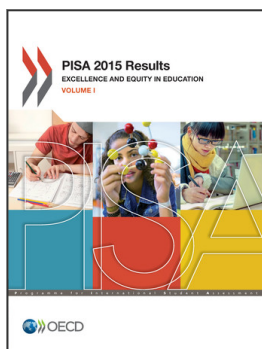
Andreas Schleicher
Director for the Directorate for Education and Skills
Email: Andreas.SCHLEICHER@oecd.org
Telephone: +33 1 45 24 93 66

Author: Jeffrey Mo
Analyst, Director for the Directorate for Education and Skills
Email: Jeffrey.MO@oecd.org

For more information on the Programme for International Student Assessment and to access the full set of PISA 2015 results visit:

www.oecd.org/edu/pisa





From:
PISA 2015 Results (Volume I)
Excellence and Equity in Education

Access the complete publication at:
<https://doi.org/10.1787/9789264266490-en>

Please cite this chapter as:

OECD (2016), "United Kingdom", in *PISA 2015 Results (Volume I): Excellence and Equity in Education*, OECD Publishing, Paris.

DOI: <https://doi.org/10.1787/9789264266490-27-en>

This work is published under the responsibility of the Secretary-General of the OECD. The opinions expressed and arguments employed herein do not necessarily reflect the official views of OECD member countries.

This document and any map included herein are without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.

You can copy, download or print OECD content for your own use, and you can include excerpts from OECD publications, databases and multimedia products in your own documents, presentations, blogs, websites and teaching materials, provided that suitable acknowledgment of OECD as source and copyright owner is given. All requests for public or commercial use and translation rights should be submitted to rights@oecd.org. Requests for permission to photocopy portions of this material for public or commercial use shall be addressed directly to the Copyright Clearance Center (CCC) at info@copyright.com or the Centre français d'exploitation du droit de copie (CFC) at contact@cfcopies.com.