



NFER Education Briefings

Key insights from PISA 2015 (Scotland)

What is PISA?

The Programme for International Student Assessment (PISA) is a worldwide research project involving schools and students in over 70 countries¹. It is run by the OECD² and takes place every three years.

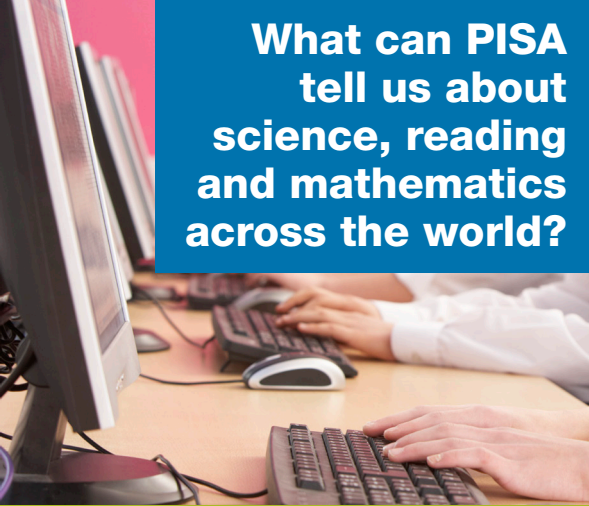
PISA is designed to examine how 15-year-olds can apply what they have learned in school to real life situations. Students are asked to use their skills of reasoning, interpretation and problem solving rather than simply remembering facts. The 2015 survey was the first to be wholly computer based in Scotland.

Each cycle of PISA has a different focus. The main focus in PISA 2015 was science, but it also included questions on maths, reading and collaborative problem solving.

PISA also gathers extensive background information about students' home and learning environments and the quantity, quality and content of teaching. This information can provide powerful insights into how well education systems are functioning, and how to improve teaching and learning for students around the world.

¹The 2018 survey will involve 82 countries.

²Organisation for Economic Co-operation and Development



What can PISA tell us about science, reading and mathematics across the world?

Has achievement in science, reading and mathematics changed over time?

Simply looking at whether the score for science, maths or reading is higher or lower than in a previous PISA cycle does not tell us accurately whether achievement has improved, is stable or is in decline. It is crucial to consider whether a score is *statistically significantly* different – in other words, that differences have not arisen solely by chance. In 2015, Scotland's score for maths was 491 and in 2012 it was 498. Although the score had decreased, the international analysis found that Scotland had actually maintained an equivalent level of performance.

How does achievement compare between countries?

It is tempting to focus on 'rankings' when comparing achievement between countries. However, 'rankings' can be misleading because small differences in scores may not be statistically significant. For example, for reading, although 11 countries have scores that lie between those of Scotland and Denmark, their scores are not actually significantly different.

Another reason not to rely on 'rankings' when comparing performance across countries is that

'rankings' can be volatile, varying according to the mix of countries participating in any given cycle. One country's position relative to other countries is not just based on its own performance. It's also influenced by which countries participate and whether their performance has changed since the last round of PISA. For example, despite Scotland's maths score in 2015 not varying significantly from 2012, it was outperformed by four additional countries.



How does achievement vary within countries?

A country's average PISA science, reading or maths score doesn't tell us everything we might need to know. In addition to knowing how well students in Scotland performed overall, it is also important, for the purposes of teaching and learning, to examine the spread in performance between the highest and lowest achievers.

PISA provides data on the spread of achievement in two ways: the proportion of students achieving certain 'proficiency levels'; and the difference between a country's highest and lowest scores. For example, a high achieving country may have a very wide spread of achievement, whereas a country with average attainment may nevertheless have fewer students below the lowest proficiency levels.

What characteristics are associated with achievement?

PISA also provides in-depth contextual information about education systems, schools, teachers and students and their homes, and explores the relationships between these characteristics and achievement. This information can help countries make evidence-based decisions on aspects of their own education policy that they might review and adapt.

However, it is important to recognise that the data from PISA alone does not provide a magic formula for policy changes that will improve achievement. For example, it cannot tell us whether the high performance of countries such as Singapore or Japan is a direct result of the specific teaching practices they adopt or whether it is due to other aspects of the learning (or wider) environment. It is therefore important to consider PISA alongside other sources of evidence.



Who takes part?

PISA 2015 involved 74 participating countries/jurisdictions. PISA 2015 participants are varied, ranging from high income countries or regions through to low and middle income ones. Their education systems also vary, differing for example in the age at which children start school.



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

PISA 2015 in the UK

All four countries of the United Kingdom contribute to the overall UK performance scores.

Scotland has participated in PISA since it began in 2000, as have England and Northern Ireland. Wales then joined in 2006. Comparisons can therefore be made between cycles and between countries.

Each country also produces separate national reports that focus on performance in their own country, as well as within the UK and international contexts.

NFER has a long history of involvement in international large scale assessments dating back over fifty years. We have delivered PISA to UK schools since 2006, including the administration of the 2015 survey in Scotland. Outcomes from the 2015 cycle, internationally and for Scotland, are available through the NFER website: www.nfer.ac.uk/pisa

Over the coming months, NFER will be undertaking detailed analysis of the PISA data and will publish further focused briefings of the findings to support teaching and learning throughout the UK and beyond.

Some key findings from PISA 2015 in Scotland³

Achievement

- Scotland's performance in science and reading in 2015 was significantly lower than in 2012, but remained stable in maths.
- Scotland was placed near the middle of the OECD countries for its performance in science, reading and mathematics, and was in line with OECD averages. Among all countries participating in PISA, Scotland significantly outperformed over half, and was outperformed by around a quarter of countries.
- In maths and reading, fewer students were among the highest⁴ and lowest⁵ performers compared to the OECD average. This indicates a more consistent level of performance among Scottish students. In science, these proportions were similar to the OECD average.
- The relationship between performance and social background was similar to 2012, maintaining the reduced impact of deprivation seen in 2009.

School learning environment

- Scottish students were more likely to be in schools where headteachers reported acting on disruptive behaviour; working with teachers to solve problems together and offering praise, than in other OECD countries.
- Scottish students were more likely to be grouped by ability into different classes and within classes.
- Scottish students were more likely to attend schools where headteachers reported that parents were involved in school decision making and provided information and ideas for families on how to help students with homework and other curriculum-related activities.

- Scottish students were more likely to report that teachers would give them feedback on their strengths and advised them on how to reach their learning goals.

Students' views

- **studying science and careers:** Scottish students were more likely than the OECD average to agree that working hard in science would improve their career prospects. Over one fifth of students reported that they expected to work in science-related occupations at age 30.
- **behaviour in science lessons:** Scottish students reported less classroom disruption than was the case across the OECD, and reported fewer instances of *noise and disorder* in science lessons.
- **relations with teachers:** Scottish students were more likely to report high levels of support from their teachers, than across the OECD. They were more likely to report that their teacher *shows an interest in every student's learning; gives extra help when we need it and that the teacher continues teaching until the students understand*.

Parents

- Scottish parents were less likely to report involvement in parent councils or school management committees, volunteering in physical or extra curricular activities or exchanging ideas on parenting, family support, or the child's development with their child's teachers than on average across the OECD.
- However, they were more likely to report that they attended a scheduled meeting or conferences for parents and talked about how to support learning at home and homework with their child's teachers.

³Findings reported here as 'more likely' or 'less likely' mean that the differences between Scotland and the OECD averages were statistically significant.

⁴Level 5 and above'

⁵'below Level 2'

How can PISA inform national policy?

The release of the PISA 2015 data will enable a range of policy questions to be explored:

- What can we learn from the highest achieving countries, and those which have improved most between PISA cycles?
- Are there any reforms to curriculum or resourcing that other countries have undertaken that appear successful and might be considered for the Scottish context?
- Are current policies having the intended impact?
- Which countries were able to increase the proportion of students performing at the highest levels in PISA? Are there countries that reduced the proportion of low-achieving students?
- In which countries and economies do disadvantaged students have the best chances of performing at the level of the top students across all countries?
- How many students in Scotland expect to work in science-related careers in their future? (Are these expectations related to students' performance in science, or to their enjoyment of it?)
- Which teaching practices are associated with better results in science?