

Australia's performance in PISA 2006

Selected information from 'Executive Summary'

Overall, Australia's students acquitted themselves very well in PISA 2006. The following are some highlights. Differences are only mentioned if tests of statistical significance showed that the differences were highly likely to indicate real differences.

In terms of country averages:

Australia's results were above the OECD average in each of scientific, reading and mathematical literacy. Australia was significantly outperformed in scientific literacy by three countries – Finland, Hong Kong-China and Canada. Australia's performance was not significantly different from that of Japan or Korea. In 2003, three countries also achieved better results than Australia in scientific literacy – Finland, Japan and Korea. In PISA 2000, only Korea and Japan outperformed Australia.

Eight countries outperformed Australia in mathematical literacy in PISA 2006, compared with seven countries in PISA 2003 and one in PISA 2000.

In reading literacy in PISA 2006 Australia was outperformed by five countries: Korea, Finland, Hong Kong-China, Canada and New Zealand. In PISA 2003 Finland and Korea achieved significantly better results than Australia and in PISA 2000 only Finland achieved significantly better results than Australia in reading literacy. The change in Australia's position has occurred because of a combination of Australia's decline in score, improvements for Korea and Hong Kong-China, and the scores for Canada, Finland and New Zealand remaining the same.

Australian students scored significantly higher than the OECD average in both science knowledge domains, scoring 533 points for *knowledge about science* and 528 points for *knowledge of science*, compared to the OECD averages of 500.

Australia performed at a level higher than the OECD average in all three of the content areas within the PISA *knowledge of science* domain: Earth and space systems, living systems, and physical systems. Physical systems was a relative weakness nationally, with achievement in this domain a significant 12 points lower than the average overall science performance score for Australia. The score in living systems was also relatively lower than the overall average score for scientific literacy, while the score for Earth and space systems was slightly higher than the overall average score.

Australian students performed well in the *identifying scientific issues* competency, scoring second only to Finland. This was also a strength nationally, with an average score eight points higher than the overall Australian science average. As was the case in almost all participating countries, Australian females scored significantly higher than males in this competency.

Australian students demonstrated a relative weakness in the *explaining phenomena scientifically* competency. The average score was seven score points lower than the overall average for science, and Australian students were outperformed by five other countries. Gender differences internationally were almost all in favour of males, and Australian males outscored their female counterparts by a significant 14 score points.

In *using scientific evidence*, Australian students performed moderately well. The average score was four points higher than the overall science average, and Australian students were outperformed by four other countries. There were fewer gender differences in this competency than in the other two, and most were in favour of females. In Australia the gender difference was not significant.

In terms of distribution of scores:

In Australia, the ranges of scores between the 5th and 95th percentile are wider than the OECD average for scientific literacy, and narrower than the OECD average for reading literacy and mathematical literacy. A lower spread in scores means that there is a smaller gap in performance between the highest- and lowest-achieving students.

In terms of proficiency levels in scientific literacy:

Three per cent of Australia's students achieved the highest scientific literacy proficiency level (Level 6), which was above the OECD average of one per cent. The country with the highest proportion of students achieving proficiency level 6 was Finland, with four per cent of its students at Level 6.

Policy Issues

Australia is well placed to continue its tradition of producing high quality scientists. The average score in scientific literacy is significantly higher than the OECD average, and either statistically similar to, or significantly higher than, most trading partners and other countries to which we would usually compare ourselves. Fifteen per cent of our young people scored in the top two proficiency levels, comparing favourably internationally.

The 'gap' in achievement between the best and the weakest students varies by subject domain. In science, there is a relatively wide gap, narrower than that of the United States and the United Kingdom, but wider than the OECD average and that of most other countries. In reading and mathematical literacy, however, it is narrower than the OECD average and also narrower than the spread for between 60 per cent of other countries (for reading) and 70 per cent of other countries (for mathematics).

Analysis of Australia's performance in terms of equity and achievement places us in the category of above-average level of student performance and below-average impact of socioeconomic background in scientific literacy; in other words, high quality and high equity. In terms of the slope and strength of the association between socioeconomic background and achievement in science, both have decreased significantly since PISA 2003. Australia's outcomes have become more equitable, as shown by a flatter gradient, and less deterministic, as shown by the smaller proportion of variance explained by socioeconomic background. In reading literacy the slope and strength have also significantly declined, while in mathematics only the strength of the relationship has decreased. However, the increase in equity in reading literacy may be an artefact of declining achievement in the higher levels rather than because achievement at the bottom end has improved.

Australia's results in scientific, reading and mathematical literacy are laudable. However average scores do not paint the complete picture of a country's performance, and that has been the primary aim of this report. There are a number of areas in which Australia's performance is not as good as would be hoped.

Decline in reading achievement

The results from the first three cycles of PISA indicate that the performance levels of Australian students, while comparing reasonably well internationally, are generally not improving. TIMSS 2003 found that scores in science at Year 8 had improved significantly; however, this improvement in scores has not really translated to an improvement in scientific literacy in the manner in which it is presented in PISA. There had also been no evidence previously of any decline in performance, but the PISA 2006 results now point to a significant decrease in performance in reading literacy since PISA 2000. While some caution should be exercised in interpreting these results, as PISA 2006 is comparing the results from the assessment of a minor domain to the assessment of a major domain, there is evidence of a decline, and it seems to be occurring primarily at the upper end of the achievement scale without any compensatory improvement at the lower end. The decline was found for both male and female students. While there is no evidence of any decrease in the average achievement levels in mathematical or scientific literacy, there was a significant decline in the mathematics achievement of Australian females.

Indigenous students

The achievement of Australia's Indigenous students continues to be a concern. Average scores for Indigenous students place them on a par with students in a low-performing country such as Chile, and two and a half years behind the average for their non-Indigenous contemporaries. While some individual Indigenous students performed very well on the PISA assessment many more performed extremely poorly. There is no doubt that many Indigenous students will continue to need extra support.

Students attending schools in remote locations

The relatively poor performance of students attending schools in remote areas is also evident from these analyses, and requires attention. Students attending schools in remote areas were found to be achieving at a level about a year and a half lower than their counterparts in metropolitan schools in all of the assessment areas. It is recognised that schools in remote areas face problems such as attracting and retaining qualified teachers, maintaining services and providing resources, and in their capacity to send staff to participate in professional development, which may impinge on the quality of student outcomes.

Students and schools with low socioeconomic levels

This report has also examined differences in achievement by quartiles of socioeconomic background. Students in the lowest socioeconomic quartile, on average, were achieving at a level two and a half years lower than students in the highest socioeconomic quartile across all three domains. Of the students in the lowest socioeconomic quartile around one-quarter failed to achieve the baseline proficiency levels in scientific, reading or mathematical literacy. Few achieved the highest levels in any domain.

Achievement differences in Australia are much larger within schools than they are between schools. However, the discussion of the PISA findings in scientific literacy indicates that the average socioeconomic background of a school outweighs a student's own socioeconomic background, and that the impact of schooling is greatest for students from disadvantaged backgrounds or attending schools with a low average socioeconomic background.

However, students from low socioeconomic backgrounds are a diverse group encompassing the full range of learning abilities, evidenced by the relatively low strength of the relationship between socioeconomic background and performance. They can and do achieve high standards. Students who are confident in their own abilities and well motivated tend to do better at school. Positive approaches not only help to explain student performance but also are themselves important outcomes of education. Students who have become effective learners by the time they leave school, and particularly those who have learned to regulate their own learning, are often considered more likely to learn throughout life.

Australia remains committed to the principle of equity and social justice in education and to the goal of allowing and encouraging all children to fulfil their full educational potential. To a large extent, these goals are realised; evidenced by the high average achievement levels in all three assessment domains in PISA. However, there is some evidence from this cycle that Australia appears to be standing still while other countries improve their levels of performance.

This report has also shown that behind the higher than average scores, significant levels of educational disadvantage exist in Australia, and that the gap between students of the same age can be equivalent to several years of schooling. This gap places an unacceptable proportion of 15-year old students at serious risk of not achieving levels sufficient for them to participate fully in the 21st century work force and to contribute to Australia as productive citizens.

Educational inequality is not a given. Some schools, some school systems, and some countries do more to mitigate inequality than others. Using PISA to monitor national outcomes on a regular basis provides Australian educators at all levels with the opportunity to step back and see how we measure up in terms of educational outcomes.