OECD PISA

PISA in Brief From Australia's perspective

Highlights from the full Australian Report: Exploring scientific literacy: How Australia measures up

The PISA 2006 assessment of students' scientific, reading and mathematical literacy skills

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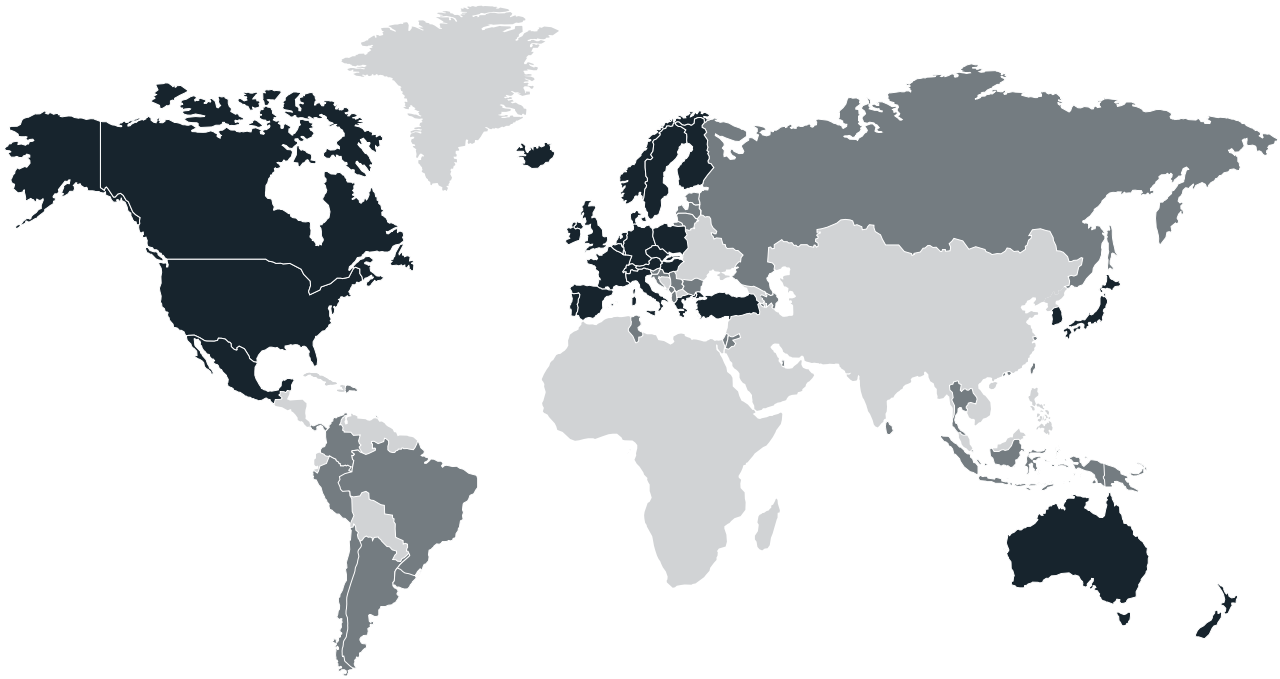
PISA Participants

In 2006, 57 countries participated in PISA. This included all OECD countries and 27 partner (non-OECD) countries, as shown on this map.



OECD Countries

Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Korea, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Spain, Sweden, Switzerland, Turkey, United Kingdom, United States

Partner Countries

Argentina, Azerbaijan, Brazil, Bulgaria, Chile, Chinese Taipei, Colombia, Croatia, Estonia, Hong Kong-China, Indonesia, Israel, Jordan, Kyrgyzstan, Latvia, Liechtenstein, Lithuania, Macao-China, Montenegro, Qatar, Romania, Russian Federation, Serbia, Slovenia, Thailand, Tunisia, Uruguay

Who took part in Australia?

Just over 14,000 students from 356 schools around Australia took part in PISA 2006. The schools and students were randomly selected. The table below shows the number of schools and students who participated across Australia by state and territory and school sector.

Sector	State/Territory									
	Number	ACT	NSW	VIC	QLD	SA	WA	TAS	NT	Total
Government	Schools	15	50	34	36	26	23	25	13	222
	Students	534	2087	1335	1523	882	873	945	461	8640
Catholic	Schools	8	19	12	11	8	7	5	3	73
	Students	323	861	544	470	346	281	238	133	3196
Independent	Schools	3	11	10	10	9	8	4	6	61
	Students	129	425	393	409	365	330	106	177	2334
Total	Schools	26	80	56	57	43	38	34	22	356
	Students	986	3373	2272	2402	1593	1484	1289	771	14170

What is PISA (Programme for International Student Assessment)?

PISA is a survey of the knowledge and skills of 15-year-olds, mainly in industrialised countries.

- The survey, first carried out in 2000 is repeated every three years, so that changes over time can be measured.
- Almost 400,000 students from 57 countries took part in PISA 2006.
- Students answered a pen-and-paper assessment booklet containing questions from one or more of the scientific, reading and mathematical literacy domains. They also answered a 30-minute questionnaire, about their background, their attitudes to school and the learning strategies they use.
- Principals answered a 30-minute questionnaire about the level of resources in the school, the school environment, qualifications of staff and teacher morale.

PISA assesses young people's ability to apply their knowledge and skills to real-life problems and situations rather than how well they had learned a specific curriculum.

- As in previous PISA assessments, PISA assessed students' capabilities in scientific, reading and mathematical literacy. The word 'literacy' reflects the focus of broader skills and is used to mean much more than the common meaning of being able to read and write.
- To answer the PISA 2006 tasks correctly, students had to understand key concepts, use a range of processes in the correct way and apply their knowledge and skills in different situations.
- Some of the assessment tasks were multiple choice questions, but many required students to construct and write in their own answers.

PISA looks for answers to several important questions related to education, such as:

- How well prepared are young adults to meet the challenges of the future?
- What skills do young adults have that will help them adapt to change in their lives? Are they able to analyse, reason and communicate their arguments and ideas to others?
- Are some ways of organising schools and school learning more effective than others?
- What influence does the quality of school resources have on student outcomes?
- What educational structures and practices maximise the opportunities of students from disadvantaged backgrounds?
- To what extent is student performance dependent on their background? How equitable is education provision for students from all backgrounds?

What PISA tells us

PISA in Brief summarises results from PISA 2006. It tells us about how students performed and describes wider findings about what lies behind their results.

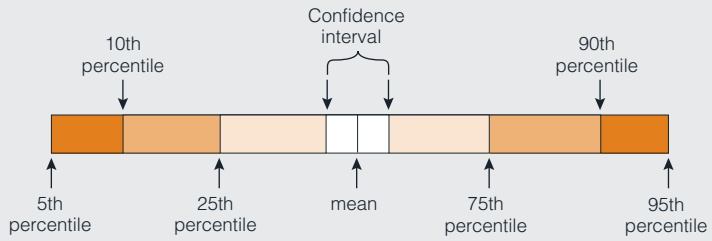
The full Australian report is called *Exploring scientific literacy: How Australia measures up. The PISA 2006 survey of students' scientific, reading and mathematical literacy skills*. The OECD report is called *PISA 2006: Science Competencies for Tomorrow's World*. The national report is available from www.ozpisa.acer.edu.au.

PISA 2006 assessed students' capacities to apply knowledge and skills in science, reading and mathematical literacy. More assessment time was given to scientific literacy. In 2000, more time was given to reading literacy, in 2003, more time was given to mathematical literacy, and in 2009 more time will once again be allocated to reading literacy.

PISA provides regular information on educational outcomes within and across countries by providing insight about the range of skills and competencies in different assessment domains, that are considered to be essential to an individual's ability to participate and contribute to society.

Similar to other international studies, PISA results are reported as mean scores that indicate average performance and various statistics that reflect the distribution of performance. School and student variables further enhance the understanding of student performance. PISA also attaches meaning to the performance scale by providing a profile of what students have achieved in terms of skills and knowledge. The performance scale is divided into levels of difficulty, referred to as 'described proficiency levels'. Students at a particular level not only typically demonstrate the knowledge and skills associated with that level but also the proficiencies required at lower levels.

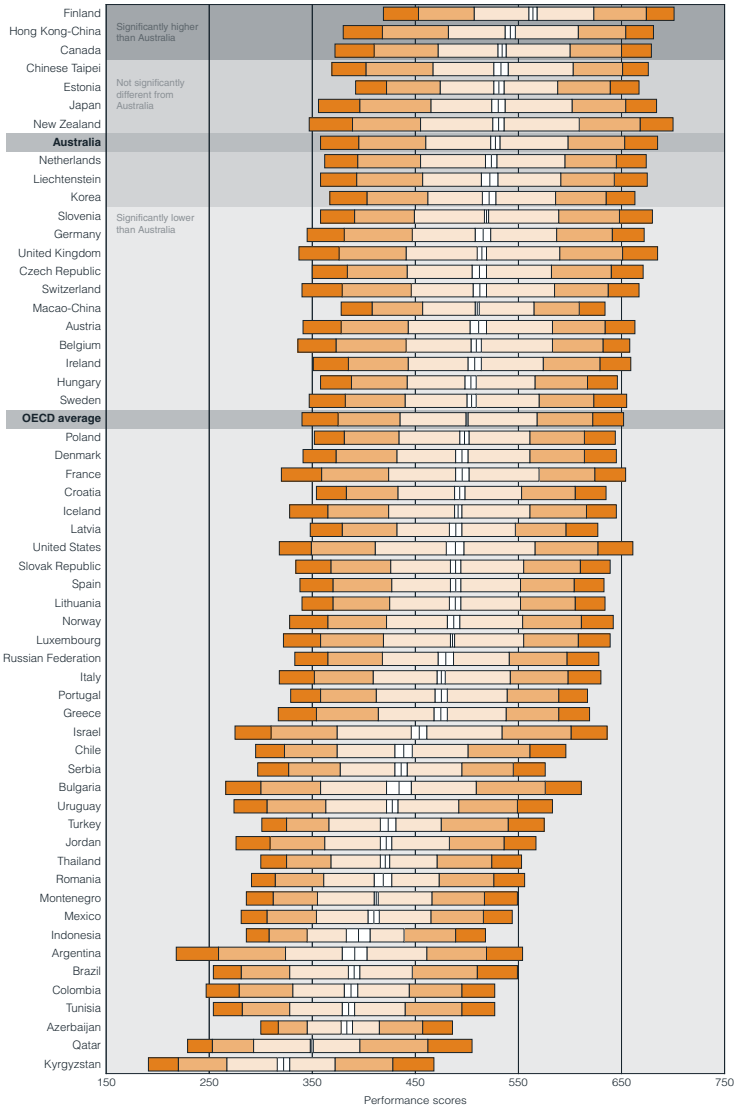
Scientific, reading and mathematical literacy achievement by country



READING THE GRAPHS

Each country's results are represented by horizontal bars with various colours. On the left end of the bar is the 5th percentile – this is the score below which 5 per cent of the students have scored. The next two lines indicate the 10th percentile and the 25th percentile. The next line at the left of the white band is the lower limit of the confidence interval for the mean – i.e. there is 95 per cent confidence that the mean will lie in this white band. The line in the centre of the white band is the mean. The lines to the right of the white band indicate the 75th, 90th and 95th percentiles. Results for states are presented vertically, however, the interpretation is the same.

The graphs show good to excellent results for Australia. Australia's results were above the OECD average in each of scientific, reading and mathematical literacy, and in each of the scientific literacy subscales. The following are some highlights.



Scientific 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 seven countries including Japan or Korea and Australia outperformed the remaining 46 countries.

In 2003, four countries achieved better results than Australia in scientific literacy – Finland, Japan, Korea and Hong Kong-China.

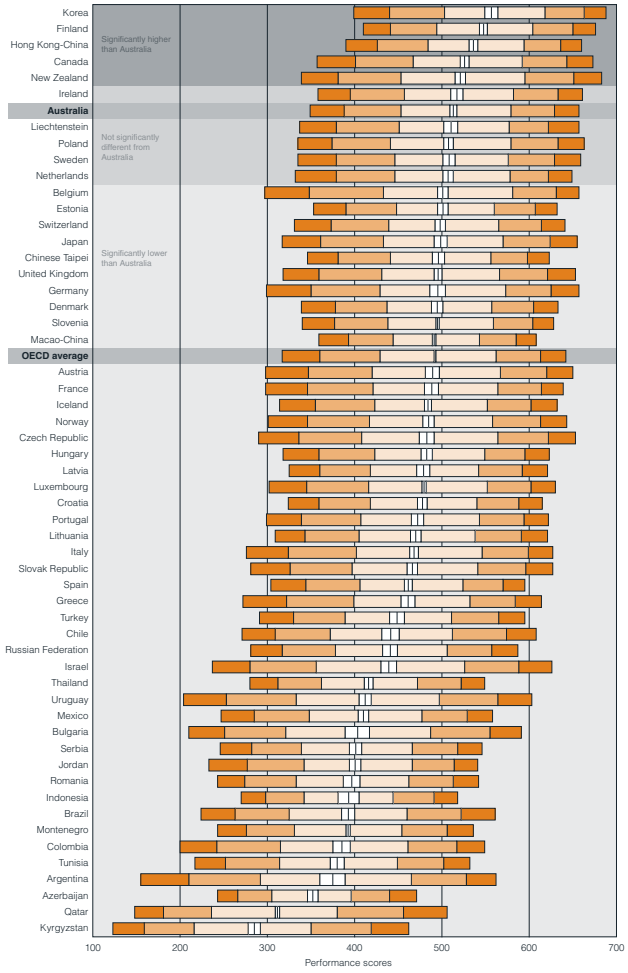
In PISA 2000, only Korea and Japan outperformed Australia.*

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

The differences between countries referred to in this summary are statistically significant.

*In PISA 2000 a more conservative approach was taken to identifying significant differences between countries.

Reading literacy



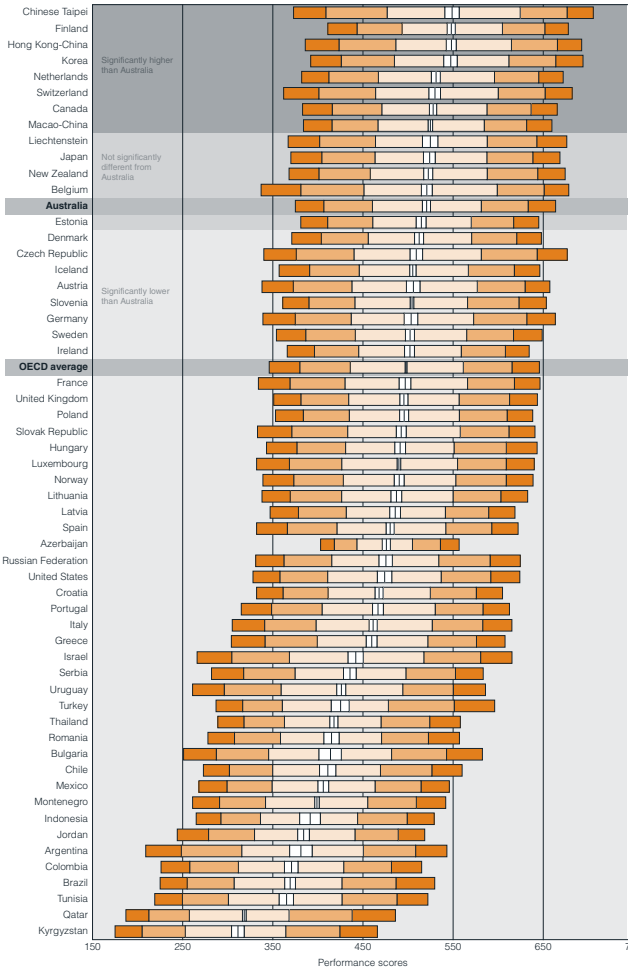
In reading literacy in PISA 2006 Australia was outperformed by five countries: Korea, Finland, Hong Kong-China, Canada and New Zealand.

In PISA 2003 Finland and Korea achieved significantly better results than Australia.

In PISA 2000 only Finland achieved significantly better results than Australia in reading literacy.

The ranges of reading literacy scores between the 5th and 95th percentile for Australia are narrower than the OECD average.

Mathematical literacy



Eight countries outperformed Australia in mathematical literacy in PISA 2006, including Chinese Taipei, participating in PISA for the first time.

In PISA 2003, seven countries (Hong Kong-China; Finland; Korea; the Netherlands; Liechtenstein; Japan and Canada) achieved significantly better results than Australia.

In PISA 2000, only one country, Japan outperformed Australia.

In Australia, the ranges of scores between the 5th and 95th percentile are narrower than the OECD average for mathematical literacy.

Monitoring changes over time

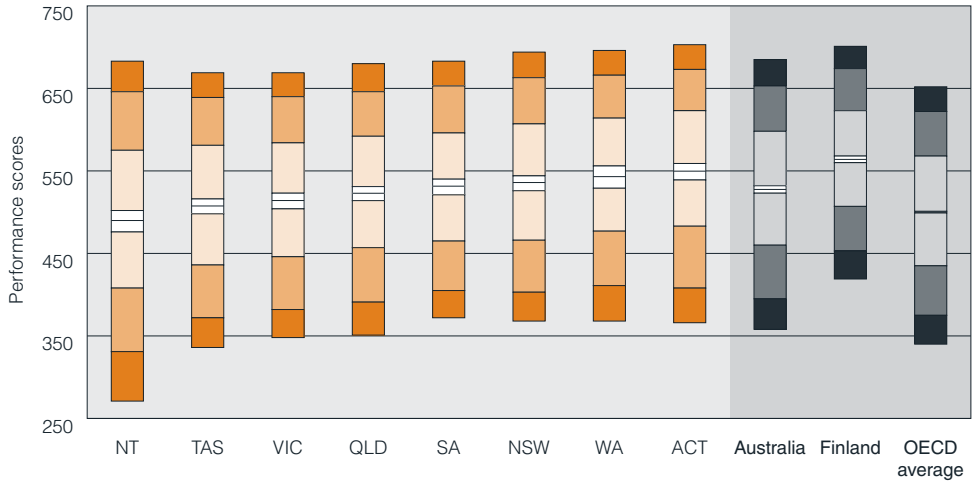
Australia's performance significantly declined in reading literacy from PISA 2000 to PISA 2006. The change in Australia's position has occurred because of a combination of Australia's decline in score, improvements for Korea and Hong Kong-China, and the scores for Canada, Finland and New Zealand remaining the same.

Australia's performance from PISA 2003 to PISA 2006 remained statistically the same in mathematical literacy.

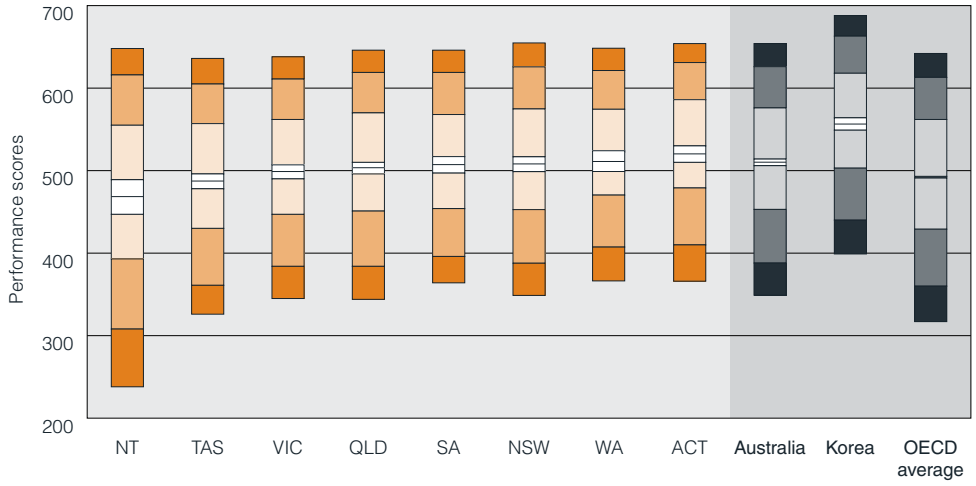
As the first major assessment of science, the PISA 2006 assessment establishes the basis for analysis of trends in scientific literacy performance in the future and it is therefore not possible to compare science learning outcomes from PISA 2006 with those of earlier PISA assessments as is done for reading and mathematics.

Scientific, reading and mathematical literacy results for the Australian states and territories

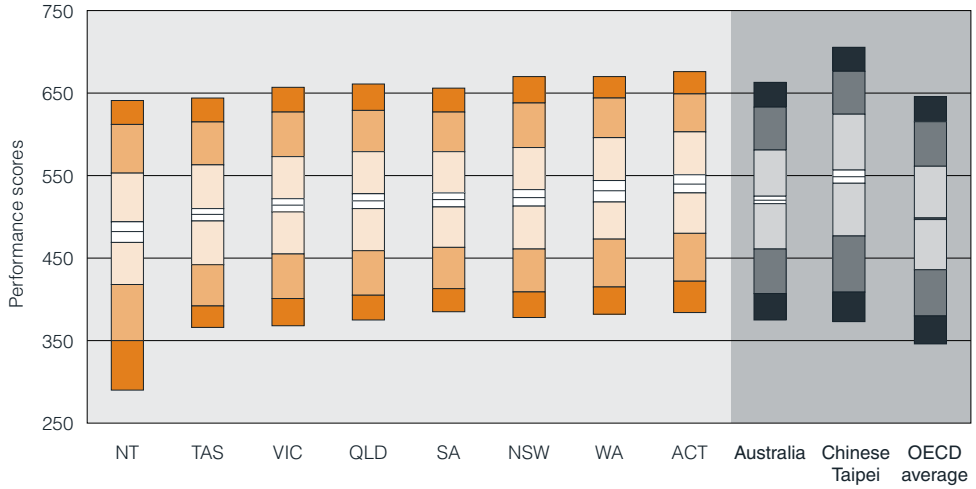
Scientific literacy



Reading literacy



Mathematical literacy



The differences between states and territories referred to in this summary are statistically significant.

Scientific literacy

The Australian Capital Territory, Western Australia, New South Wales, South Australia, Queensland and Victoria all performed above the OECD average. Tasmania and the Northern Territory performed at the OECD average.

The average performance of students in the Australian Capital Territory was significantly higher than that of all states other than Western Australia.

The scores of students in Western Australia were statistically similar to those of students in New South Wales and South Australia but higher than those of the other states.

New South Wales achieved significantly higher than Queensland, Victoria, Tasmania and the Northern Territory while South Australia outperformed Victoria, Tasmania and the Northern Territory, and Victoria achieved better results than the Northern Territory.

The average score in the Northern Territory was significantly lower than the score for any other state.

Reading literacy

The Australian Capital Territory, Western Australia, New South Wales, South Australia, Queensland and Victoria all performed above the OECD average. Tasmania performed at the OECD average and the Northern Territory performed below the OECD average.

The Australian Capital Territory and Western Australia achieved the highest means (which were not statistically different from one another). The Australian Capital Territory outperformed all other states.

Western Australia also performed on a par with New South Wales and South Australia and outperformed those of the other states and the Northern Territory.

New South Wales achieved significantly higher than Victoria, Tasmania and the Northern Territory, while South Australia and Queensland outperformed Tasmania and the Northern Territory.

Victoria and Tasmania achieved on a similar level to each other and significantly higher than the Northern Territory.

Mathematical literacy

The Australian Capital Territory, Western Australia, New South Wales, South Australia, Queensland and Victoria all performed above the OECD average. Tasmania performed at the OECD average and the Northern Territory performed below the OECD average.

The Australian Capital Territory and Western Australia achieved the highest means (which were not statistically different from one another). The Australian Capital Territory outperformed all other states.

Western Australia achieved significantly higher than Victoria, Tasmania and the Northern Territory and similar results to New South Wales, South Australia and Queensland.

New South Wales, South Australia, Queensland and Victoria achieved statistically similar results and outperformed Tasmania and the Northern Territory.

Monitoring changes over time

While the mean scores in mathematical literacy for Australia as a whole and for most of the states declined between PISA 2003 and PISA 2006, the decreases were not significant for Australia overall and were significant for only two states – Western Australia and South Australia. However, there was a significant decline in the mean score of female students between 2003 and 2006 for Australia as a whole.

Data on reading literacy achievement by state and gender over the period from 2000 to 2006 show that there was a statistically significant decline in the reading literacy performance of females in the Northern Territory and Western Australia between PISA 2003 and PISA 2006 and for Tasmania between PISA 2000 and PISA 2006. There were also significant declines for males between 2003 and 2006 in South Australia and in the Northern Territory, New South Wales and South Australia between 2000 and 2006. Overall for Australia, mean reading scores for females declined significantly between 2003 and 2006 and between 2000 and 2006, and for males, there was a significant decline between 2000 and 2006.

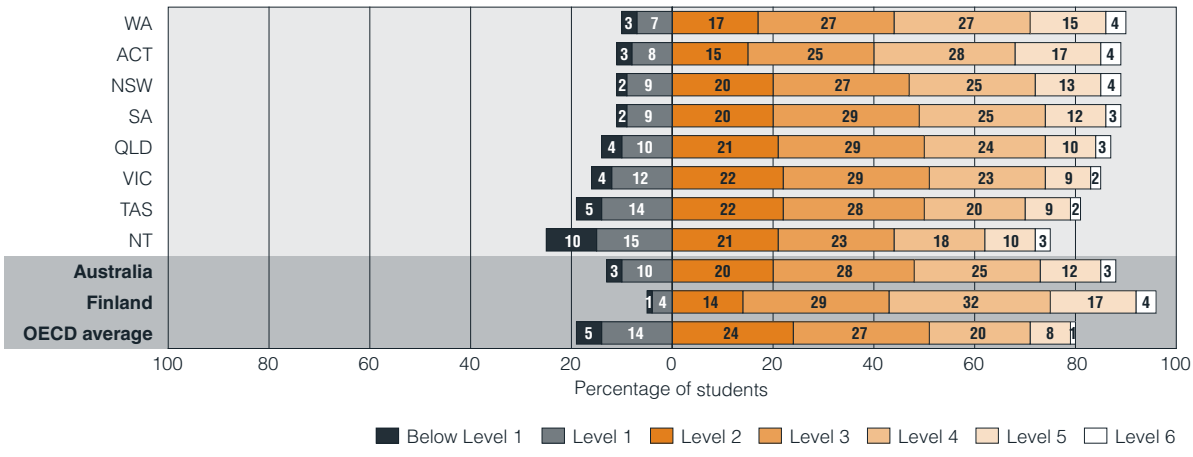
Providing further meaning to the PISA results

As well as reporting average scores for each country, PISA is able to provide a profile of students' science, reading and mathematics performance using proficiency levels.

What students can do in scientific literacy

	Students at this level can ...
Level 6	◗ consistently identify, explain and apply scientific knowledge and knowledge about science in a variety of complex life situations. ◗ link different information sources and explanations and use evidence from those sources to justify decisions. ◗ clearly and consistently demonstrate advanced scientific thinking and reasoning, and they are willing to use their scientific understanding in support of solutions to unfamiliar scientific and technological situations. ◗ use scientific knowledge and develop arguments in support of recommendations and decisions that centre on personal, social or global situations.
Level 5	◗ identify the scientific components of many complex life situations, apply both scientific concepts and knowledge about science to these situations, and can compare, select and evaluate appropriate scientific evidence for responding to life situations. ◗ use well-developed inquiry abilities, link knowledge appropriately and bring critical insights to situations. ◗ construct explanations based on evidence and arguments based on their critical analysis.
Level 4	◗ work effectively with situations and issues that may involve explicit phenomena requiring them to make inferences about the role of science or technology. ◗ select and integrate explanations from different disciplines of science or technology and link those explanations directly to aspects of life situations. ◗ reflect on their actions and they can communicate decisions using scientific knowledge and evidence.
Level 3	◗ identify clearly described scientific issues in a range of contexts. ◗ select facts and knowledge to explain phenomena and apply simple models or inquiry strategies. ◗ interpret and use scientific concepts from different disciplines and can apply them directly. ◗ develop short statements using facts and make decisions based on scientific knowledge.
Level 2	◗ use adequate scientific knowledge to provide possible explanations in familiar contexts or draw conclusions based on simple investigations. ◗ use direct reasoning and making literal interpretations of the results of scientific inquiry or technological problem solving.
Level 1	◗ present scientific explanations that are obvious and follow explicitly from given evidence. However, students have such a limited scientific knowledge that it can only be applied to a few, familiar situations.
Below Level 1	◗ not demonstrate even the most basic types of scientific literacy that PISA measures. These students are likely to be seriously disadvantaged in their lives beyond school.

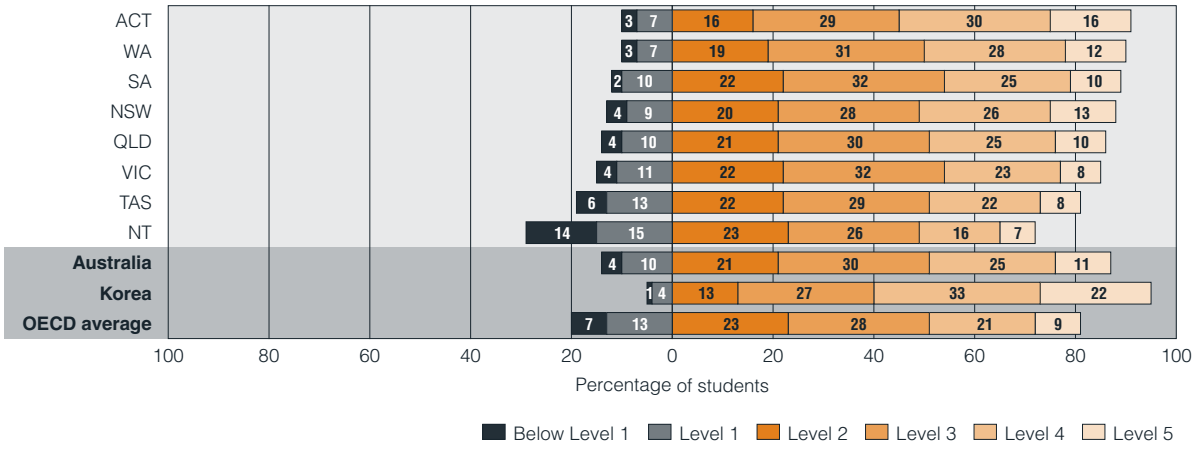
Results for Australia and each of the states and territories are shown on the figure below and are ordered from the lowest to highest percentage of students who achieved below Level 2.



What students can do in reading literacy

	Students at this level can ...
Level 5	◗ deal with difficult texts and complete sophisticated reading tasks. ◗ deal with information that is difficult to find in unfamiliar texts, especially in the presence of closely competing information, show detailed understanding of these texts and sort out which information is relevant to the task. ◗ evaluate texts critically, draw on specialised knowledge to build hypotheses, and cope with concepts that may be contrary to expectations.
Level 4	◗ cope with difficult tasks such as locating embedded information, construing meaning of part of a text through considering the text as a whole, and dealing with ambiguities and negatively worded ideas. ◗ show accurate understanding of complex texts. ◗ evaluate texts critically.
Level 3	◗ deal with moderately complex reading tasks, such as finding several pieces of relevant information and sorting out detailed competing information requiring consideration of many criteria to compare, contrast or categorise. ◗ make links between different parts of a text. ◗ understand text in a detailed way in relation to everyday knowledge.
Level 2	◗ cope with basic reading tasks such as locating straightforward information. ◗ make low-level inferences, using some outside knowledge to help understand a well-defined part of a text. ◗ apply their own experience and attitudes to help explain a feature of a text.
Level 1	◗ deal with only the least complex reading tasks such as finding explicitly stated pieces of information and recognising the main theme or author's purpose in a text on a familiar topic when the required information is readily accessible in the text. ◗ make a connection between common, everyday knowledge and information in the text.
Below Level 1	◗ not demonstrate even the most basic types of reading literacy that PISA measures. These students are likely to be seriously disadvantaged in their lives beyond school.

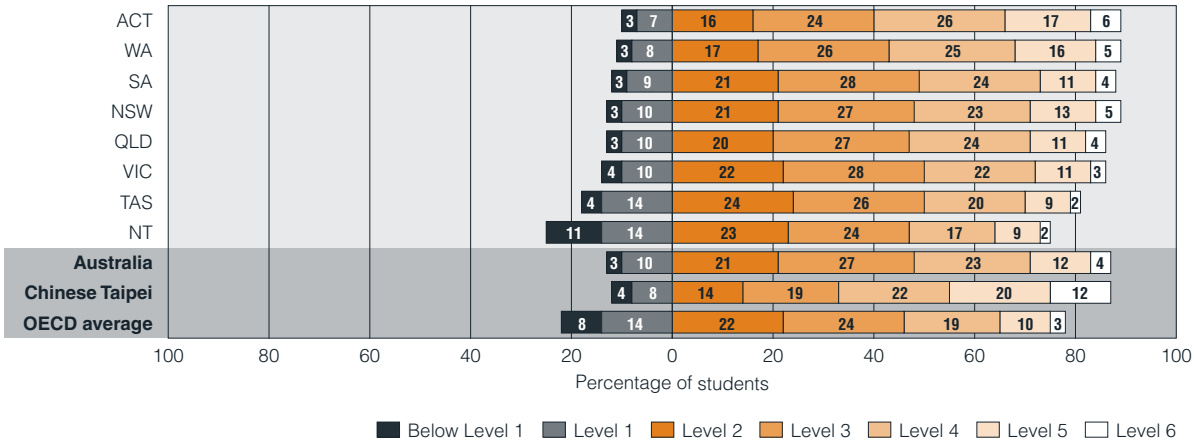
Results for Australia and each of the states and territories are shown on the figure below and are ordered from the lowest to highest percentage of students who achieved below Level 2.



What students can do in mathematical literacy

	Students at this level can ...
Level 6	◗ conceptualise, generalise, and utilise information based on their investigations and modelling of complex problem situations. ◗ link different information sources and representations and flexibly translate among them. ◗ apply this insight and understandings along with a mastery of symbolic and formal mathematical operations and relationships to develop new approaches and strategies for attacking novel situations. ◗ formulate and precisely communicate their actions and reflections regarding their findings, interpretations, arguments, and the appropriateness of these to the original situations.
Level 5	◗ develop and work with models for complex situations, identifying constraints and specifying assumptions. ◗ select, compare and evaluate appropriate problem solving strategies for dealing with complex problems related to these models. ◗ work strategically using broad, well-developed thinking and reasoning skills, appropriate linked representations, symbolic and formal characterisations, and insights pertaining to these situations. ◗ reflect on their actions and formulate and communicate their interpretations and reasoning.
Level 4	◗ work effectively with explicit models for complex concrete situations that may involve constraints or call for making assumptions. ◗ select and integrate different representations, including symbolic, linking them directly to aspects of real-world situations. ◗ utilise well-developed skills and reason flexibly, with some insight, in these contexts. ◗ construct and communicate explanations and arguments based on their interpretations, arguments and actions.
Level 3	◗ execute clearly described procedures, including those that require sequential decisions. ◗ select and apply simple problem solving strategies. ◗ interpret and use representations based on different information sources and reason directly from them. ◗ develop short communications reporting their interpretations, results and reasoning.
Level 2	◗ interpret and recognise situations in contexts that require no more than direct inference. ◗ extract relevant information from a single source and make use of a single representational mode. ◗ employ basic algorithms, formulae, procedures or conventions. ◗ use direct reasoning and make literal interpretations of the results.
Level 1	◗ answer questions involving familiar contexts where all relevant information is present and the questions are clearly defined. ◗ identify information and to carry out routine procedures according to direct instructions in explicit situations. ◗ can perform actions that are obvious and follow immediately from the given stimuli.
Below Level 1	◗ not demonstrate even the most basic types of mathematical literacy that PISA measures. These students are likely to be seriously disadvantaged in their lives beyond school.

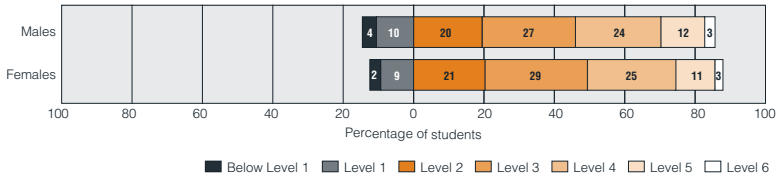
Results for Australia and each of the states and territories are shown on the figure below and are ordered from the lowest to highest percentage of students who achieved below Level 2.



Gender differences within Australia

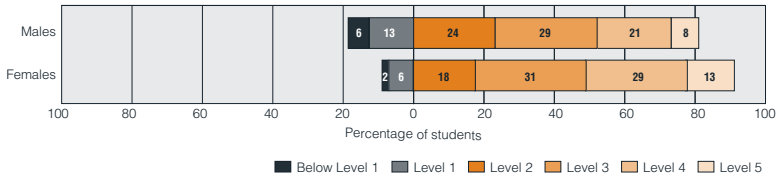
- There was not a significant gender difference in Australia on the overall scientific literacy scale. In terms of proficiency levels, there was a tendency for males to be at the extremes – 15% achieving at least Level 5 compared to 14% of females, and 14% not achieving Level 2 compared to 11% of females.

Scientific literacy



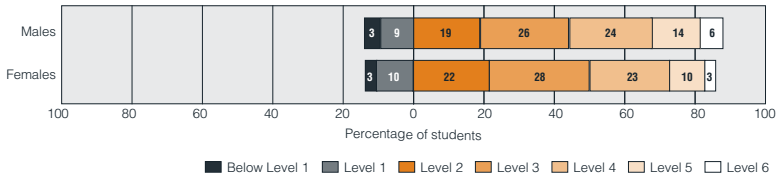
- As the main focus of PISA 2006 was on scientific literacy, subscales were able to be developed to examine performance in science in more depth.
- Gender differences were subsequently described in several areas. Male students significantly outperformed female students in both *Earth and space systems* and *physical systems* and at a similar level in *living systems*. In *physical systems* the average score for females was not significantly different to the OECD average. Australian males also significantly outscored females in *explaining phenomena scientifically*, while females performed significantly better in *identifying scientific issues*.

Reading literacy



- As in PISA 2000 and PISA 2003, the gender difference in reading literacy was in favour of females. In PISA 2006, the gender difference in reading literacy was 37 score points, equivalent with the OECD average gender difference.
- In terms of proficiency levels, 42% of females achieved at least Level 4, compared with just 29% of males, and 19% of males failed to achieve Level 2, compared to 8% of females.

Mathematical literacy



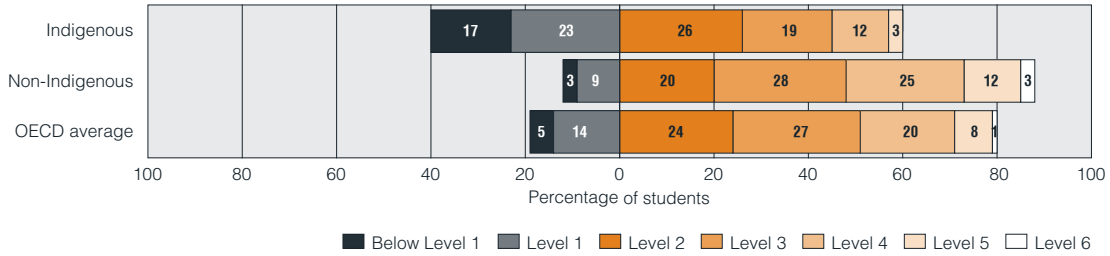
- In contrast to the finding of no gender difference in mathematical literacy in PISA 2003, Australian males significantly outscored females in mathematical literacy in PISA 2006, by 14 score points.
- More males achieved the highest proficiency levels in mathematical literacy, with 20% achieving at least Level 5 compared to 13% of females. At the lower proficiency levels there was little difference, with 12% of males and 13% of females failing to achieve Level 2.

Results for Indigenous students

Altogether, 1,080 Indigenous students were assessed in the Australian PISA 2006 sample.

In scientific literacy the performance of Indigenous Australians was 88 score points lower than that of non-Indigenous students, a difference equivalent to more than one proficiency level. The performance of Indigenous students is significantly and substantially below the OECD average.

Indigenous students were over-represented in the lowest levels of science proficiency and under-represented in the highest levels. Only three per cent of Indigenous students demonstrated skills at proficiency level 5 or higher, and 40 per cent failed to achieve proficiency level 2.



The wide gap in performance between Indigenous and non-Indigenous students is also evident for reading and mathematical literacy, and similar in size to the performance gap in scientific literacy.

In reading literacy, 12 per cent of Indigenous students achieved in the highest two proficiency levels along with 36 per cent of non-Indigenous students. In mathematical literacy, two per cent of Indigenous students and 16 per cent of non-Indigenous students were found in the higher levels. In reading, 38 per cent of Indigenous and 12 per cent of non-Indigenous students did not achieve Level 2, and in mathematical literacy 39 per cent of Indigenous and 12 per cent of non-Indigenous students did not achieve Level 2.

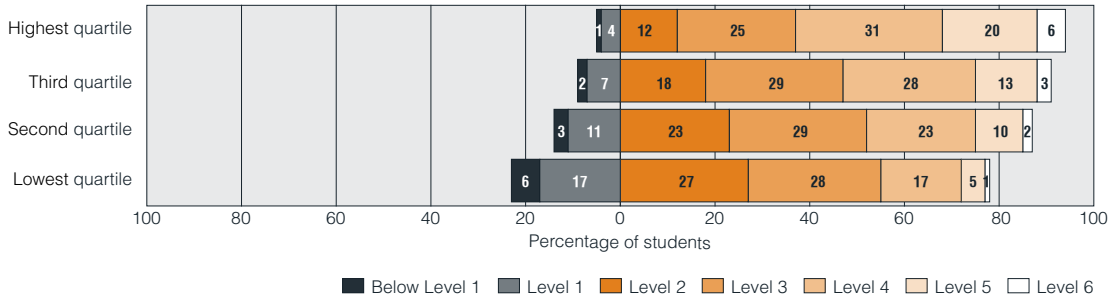
The performance of Indigenous students over the period from 2000 to 2006 for reading literacy and from 2003 to 2006 for mathematical literacy has remained essentially the same with any changes not found to be statistically significant.

Results for other student groups

Socioeconomic background

In scientific literacy, students in the lowest socioeconomic quartile scored a significant 87 points or more than one proficiency level lower than students in the highest socioeconomic quartile.

Twenty-three per cent of students in the lowest socioeconomic quartile were not achieving at Level 2, compared with five per cent of the cohort in the highest socioeconomic quartile. Only six per cent of students in the lowest socioeconomic quartile achieved Level 5 or higher, compared with 26 per cent of students in the highest socioeconomic quartile.



In reading literacy the difference in average scores between students in the highest and lowest socioeconomic quartiles was 84 score points.

Five per cent of students in the highest socioeconomic quartile were not achieving at Level 2, compared with 23 per cent of the cohort in the lowest socioeconomic quartile. Only four per cent of students in the lowest socioeconomic quartile achieved Level 5, compared with 21 per cent of students in the highest socioeconomic quartile.

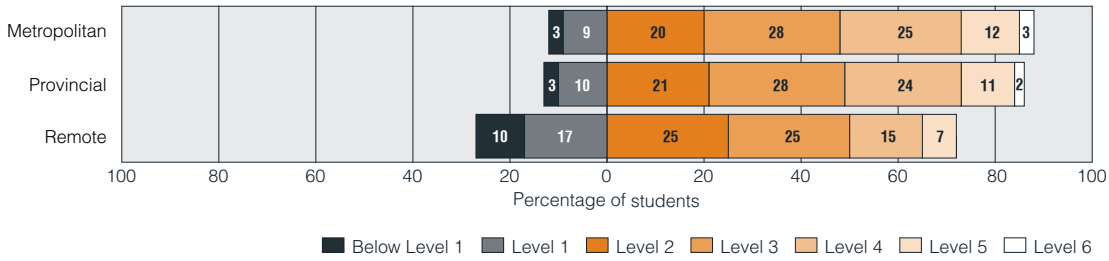
In mathematical literacy, students in the lowest socioeconomic quartile scored on average 78 score points lower than those of students in the highest socioeconomic quartile.

Twenty-two per cent of students in the lowest socioeconomic quartile were not achieving at Level 2, compared with five per cent of the cohort in the highest socioeconomic quartile. Only six per cent of students in the lowest socioeconomic quartile achieved Level 5 or higher, compared with 29 per cent of students in the highest socioeconomic quartile.

Geographic location

In scientific literacy, the average score of students attending schools in remote areas was significantly lower than that of students attending schools in either provincial areas (by 47 score points) or metropolitan areas (by 57 score points).

Twenty-seven per cent of students in remote schools did not achieve Level 2, compared with around 12 per cent in metropolitan or provincial areas. At the higher end of the achievement scale, only seven per cent of students in remote areas achieved Level 5 or higher, compared with 13 and 15 per cent of students in provincial and metropolitan schools respectively.



In reading literacy, the average score of students attending remote schools was about 30 score points lower than that of students attending schools in provincial areas, and about 50 score points lower than those of students attending schools in metropolitan areas.

Twenty-four per cent of the students in remote areas did not achieve Level 2, compared to 17 per cent of students in provincial areas and 12 per cent in metropolitan areas. Around 12 per cent of students attending metropolitan schools were achieving at Level 5, compared to eight per cent of those in provincial schools and seven per cent of those in remote schools.

In mathematical literacy, the average score of students attending schools in remote areas was 40 score points lower than that of students attending schools in provincial areas, and 58 score points lower than students attending schools in metropolitan areas.

Twenty-eight per cent of students in remote areas did not achieve proficiency level 2, compared to 20 per cent of students in provincial areas and 12 per cent in metropolitan areas. Around 18 per cent of students attending metropolitan schools were achieving at Level 5 or higher, compared to 12 per cent of those in provincial schools and seven per cent of those in remote schools.

Immigrant status

In scientific literacy there were no significant differences between the scores of Australian-born students (students and both parents born in Australia); first-generation students (students born in Australia with at least one parent born overseas); and foreign-born students (students and both parents born overseas).

Students with a language background other than English scored significantly lower than those who spoke English.

Slightly more foreign-born students than Australian-born students and substantially more students with a language background other than English (20% compared to 11% of English-speaking students) were not achieving proficiency level 2.

In reading literacy, first-generation students achieved significantly higher scores than Australian-born students. There was a similar distribution in the proficiency levels, across all immigrant status categories.

English-speaking students scored at a significantly higher level than those students with a language background other than English, and 20 per cent of students with a language background other than English failed to achieve Level 2, compared with 12 per cent of English-speaking students.

In mathematical literacy, both first-generation and foreign-born students significantly outperformed Australian-born students.

There was no significant difference in the average scores of English-speaking students and those with a language background other than English.

Similar proportions of students in each of the immigrant and language categories achieved at the lower proficiency levels. However, a higher proportion of foreign-born (23%) than first-generation (18%) and Australian-born (15%) students and a higher proportion of students with a language background other than English (22%) than English-speaking (16%) students were achieving at Level 5 or higher.

Quality and equity in the performance of students and schools

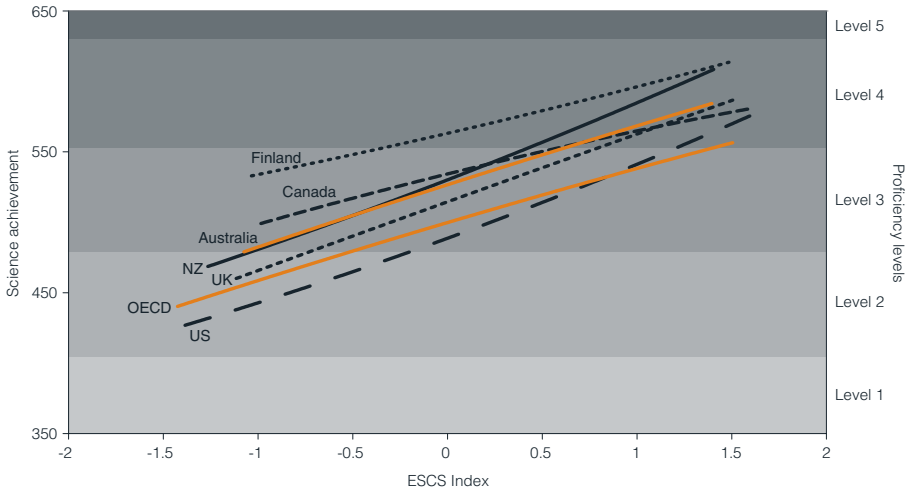
PISA not only looks at the quality of outcomes achieved by different countries, it also looks at the equity of outcomes achieved for students from different social backgrounds. In all countries, students from more advantaged backgrounds tend to perform better than students from less advantaged backgrounds, although the influence of socioeconomic background on performance varies between countries.

To measure socioeconomic status, PISA uses a composite index (ESCS), which is based on the occupations of the parents or guardians, the highest level of education of the parents converted into years of education, an index of the home educational resources, an index of cultural possessions in the home, and an index of family wealth.

To examine equity the OECD uses the extent to which social background (represented by ESCS) relates to student and school performance. Socioeconomic gradients describe graphically the relationship between ESCS and student performance in terms of the strength of the relationship, the slope of the gradient line (indicating the extent of inequality), the average level of the line (indicating how well the overall population has achieved), and the length of the line (indicating the range of ESCS).

The strength of the relationship between socioeconomic background and scientific literacy was found to be significantly weaker for Australia than for the OECD on average, but as can be seen on the figure below, the slope of the gradient is significantly higher than for the OECD. The slope shows that the impact of socioeconomic levels on scores in scientific literacy is greater for Australia, so that each additional unit of socioeconomic background translates into 43 score points compared to 40 for the OECD. However, the strength of the relationship is weaker than for the OECD, only explaining around 11 per cent of the variance in performance compared to 14.5 per cent over the OECD.

The line for Finland is higher than the line for Australia and is less steep. This indicates that not only is there higher overall achievement in Finland, but there is less difference in the scores obtained between lower and higher socioeconomic background students in Finland than in Australia. In other words, the figure shows that there is a higher degree of equity in Finland.



Canada appears to cater well for its lower socioeconomic background students: their achievement levels are higher than in Australia for low socioeconomic background students and closer to the Australian achievement scores for their high achieving students. For higher socioeconomic background students, Australia's achievement level is higher than that of Canada.

Another feature illustrated by this figure is that there is less difference, generally, between countries at high levels of ESCS than there is at low levels - the slopes appear to converge slightly at higher levels of ESCS. This is also observed when the social gradients of all countries are plotted, implying that students with high levels of socioeconomic background tend to vary less in their scientific literacy performance, from country to country, than students with relatively low levels of socioeconomic background. That is, the impact of different schooling structures and systems on student performance may be greatest for students from lower socioeconomic backgrounds.

The socioeconomic gradient for each country can be broken down into a within-school gradient and a between-school gradient. The within-school gradient describes how a student's socioeconomic background is related to their performance within a common school environment. The between-school gradient describes how schools' average level of performance is related to the average socioeconomic background of their student intake.

For almost all countries, including Australia, there is a clear advantage in students attending a school in which the average socioeconomic background is high. The effect of the average ESCS of students in a school outweighs the effect of the student's own socioeconomic background.

Main Policy Messages from PISA 2006 for Australia

Australia's results in scientific, reading and mathematical literacy are very good, and compare well internationally. PISA has found again that 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.

Many of Australia's students have high levels of motivation, self-confidence and interest in science, and have achieved world-class outcomes.

However there are a number of areas in which Australia's performance is not as good as would be hoped.

Some indications of a decline in achievement

The results from the first three cycles of PISA indicate that the performance levels of Australian students are generally not improving. Up until now there has been no evidence of any decline in performance, but the PISA 2006 results point to a significant decrease in performance in reading literacy since PISA 2000, and also in mathematical literacy levels of females from PISA 2003 - PISA 2006. While some caution should be exercised in interpreting these results, there is evidence of a decline, and it seems to be occurring mainly at the upper end of the reading literacy achievement scale without any compensatory improvement at the lower end. The decline in the reading scores was found for both male and female students.

Gender

There was no difference overall in scientific literacy; however, males performed significantly better than females in both Earth and space systems and physical systems, and the performance of females in the latter was at the OECD average. In reading literacy, the gender gap continued to favour females, and it is of a similar size to the gap found in PISA 2000. In PISA 2006 mathematical literacy, there is evidence of a decline in the scores of 15-year-old females and no associated decline in the score for males, resulting in a significant gender difference and one that is higher than the OECD average gender difference. The decline in scores for females appears to have come from the higher end of achievement.

Indigenous students

The achievement of Australia's Indigenous students continues to be a concern. Average scores for Indigenous students place them around 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.

Students attending schools in remote locations

The relatively poor performance of students attending schools in remote areas is also evident. 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.

Students and schools with low socioeconomic levels

Students in the lowest socioeconomic quartile scored, on average, 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 students 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.

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 is now falling behind other countries that previously performed at a comparable level with Australia. 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 where we stand in terms of educational outcomes.