OECD PISA

PISA in Brief

from Australia's perspective

Highlights from the full Australian report

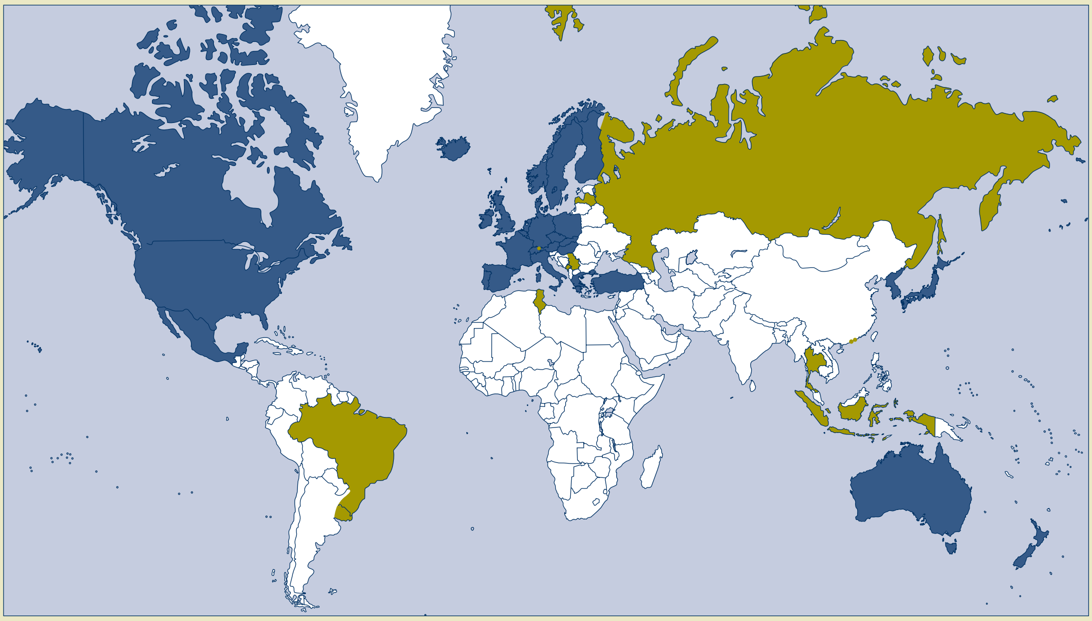
Facing the Future: >> A Focus on Mathematical Literacy Among Australian 15-year-old Students in PISA 2003

ACER OECD

Programme for International Student Assessment

PISA Participants

In 2003, 41 countries participated in PISA. This included all OECD countries and eleven partner (non-OECD) countries, as shown on this map.



Who took part in Australia?

Just over 12 500 students from 321 schools around Australia took part in PISA 2003. 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.

		State/Territory								
Sector	Number	NSW	VIC	QLD	SA	WA	TAS	NT	ACT	Total
Government	*Schools*	48	39	32	20	27	14	11	18	209
	Students	1942	1420	1273	699	1146	546	355	601	7982
Catholic	*Schools*	17	13	7	7	8	4	2	5	63
	Students	694	568	275	274	361	167	86	201	2626
Independent	*Schools*	9	10	9	7	7	2	3	2	49
	Students	346	366	386	261	260	91	142	91	1943
Total	*Schools*	74	62	48	34	42	20	16	25	321
	Students	2982	2354	1934	1234	1767	804	583	893	12551

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, was repeated in 2003 and will be repeated every three years, so that changes over time can be measured.
- Approximately 276 000 students from 41 countries took part in PISA 2003.
- Students answered a pen-and-paper assessment booklet in their schools. They also answered a 30-minute questionnaire, about their background, their attitudes to school and learning strategies they use.
- Principals answered a 30-minute questionnaire about the atmosphere and resources at school for learning and the kinds of programs students were studying.

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 2000, PISA assessed students' capabilities in mathematics, reading and scientific 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.
- In 2003 a fourth area, problem solving, was assessed.
- To answer the PISA 2003 assessment 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 people to deal with challenges they will meet in the future?
- What skills do young people 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 influences does the quality of school resources have on students' learning?
- To what extent is student performance dependent on their background? How can opportunities be improved for students from disadvantaged backgrounds?

What PISA tells us?

This pamphlet summarises results from PISA 2003. It tells us about how students performed and describes wider findings about what lies behind their results.

The pamphlet focuses on Australia's results, including how the Australian students performed in comparison with students from other countries.

The full Australian report is called *Facing the Future: A Focus on Mathematical Literacy Among Australian 15-year-old Students in PISA 2003*. The full international report is called *Learning for Tomorrow's World – First Results from PISA 2003.*

PISA 2003 assessed students' capacities to apply knowledge and skills in mathematics, reading and scientific literacy as well as problem solving. More assessment time was given to mathematics. In 2000, more time was given to reading and in 2006, more time will be given to science. There are no plans to assess problem solving in future cycles.

The broad ranges of knowledge and skills assessed are referred to as mathematical, reading and scientific literacy and problem solving. They are widely seen as essential for students to have in order to be well prepared for adult life.

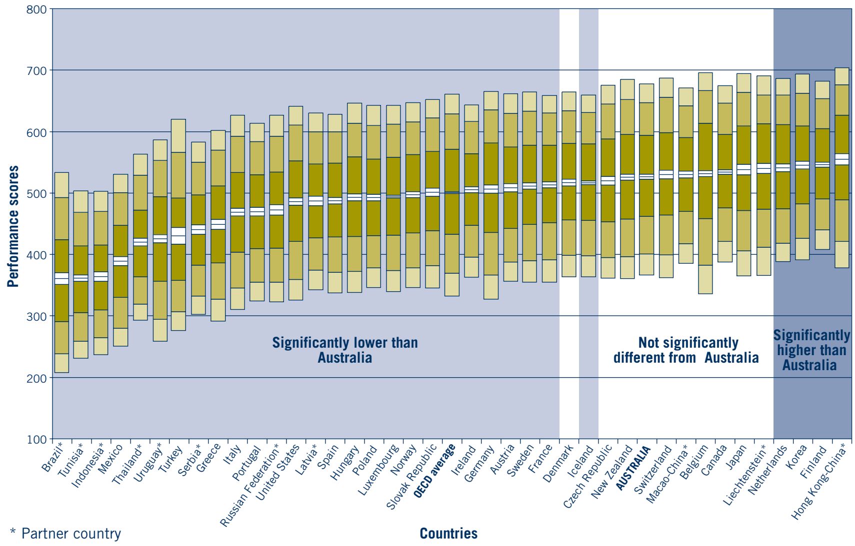
Students' scores are reported on a separate scale in each of the four domains. Each scale was devised so that the average score across OECD countries is 500 points with about two-thirds of the students scoring between 400 and 600 points.

International comparative results are shown on pages 3 and 4. Results for Australian states and territories are on pages 5 and 6. The rest of the pamphlet discusses results for specific groups and in relation to student characteristics.

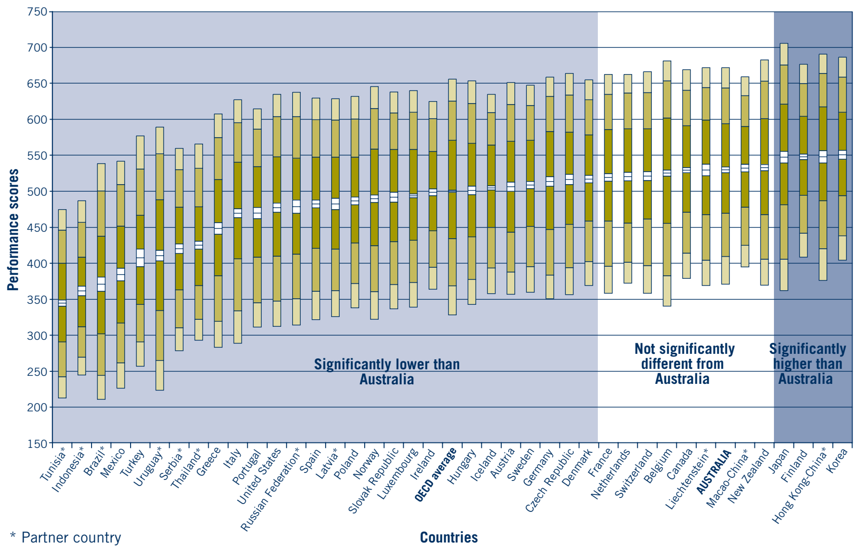
Mathematical, reading, scientific literacy and problem solving results, by country

The figures on these pages show the distributions of results on each of the three literacy and problem solving scales for countries, arranged in order of performance.

Mathematical Literacy



Problem Solving



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

(Differences between countries that are referred to in this summary are statistically significant.)

Mathematical Literacy

Four countries outperformed Australia in mathematical literacy in PISA 2003 —Hong Kong-China, Finland, Korea, and the Netherlands.

In PISA 2000 only two countries performed better than Australia —Japan and Hong Kong-China.

(Comparisons cannot be made with the Netherlands, as their data were excluded from the 2000 report because of an insufficient sample.)

Problem Solving

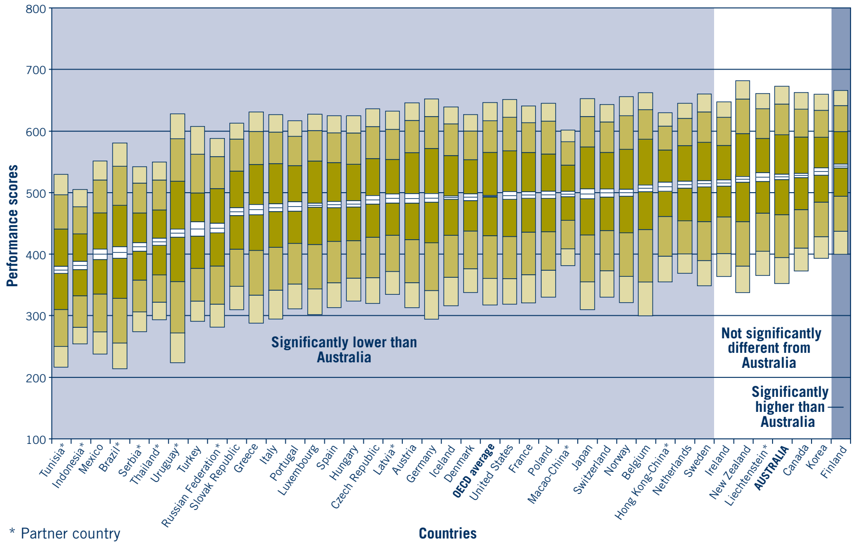
Four countries performed significantly better than Australia in problem solving —Korea, Hong Kong-China, Finland and Japan.

HOW TO READ THE CHARTS

Each white block with the black line across it shows the best estimate of the country's mean (the middle line) and the range (the white block) within which the mean would be expected, with 95% certainty, to fall if many samples were drawn in the same way from the same population.

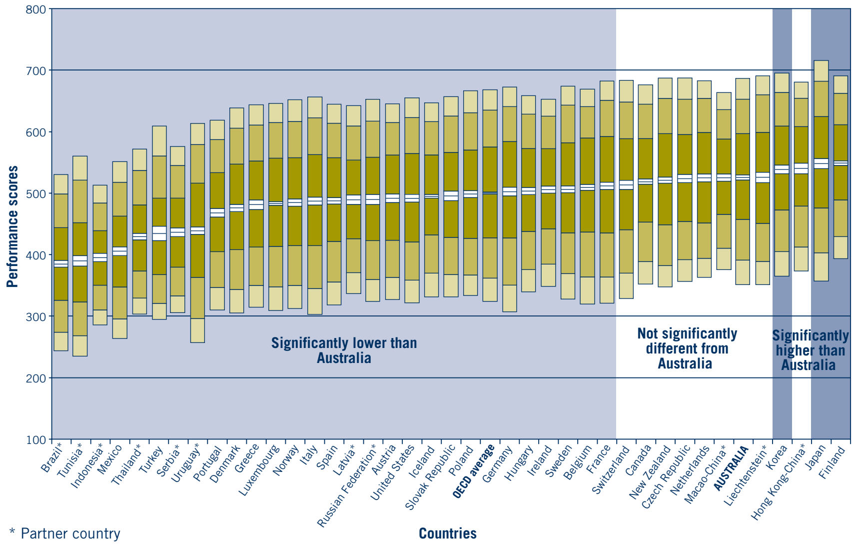
The charts also show the distributions of results:

- for the middle half, then;
- all but the highest and lowest 10 per cent; and
- all but the highest and lowest 5 per cent of students.



* Partner country

Reading Literacy



* Partner country

Scientific Literacy

Reading Literacy

As in PISA 2000, only one country achieved significantly better results than Australia in reading literacy —Finland.

Scientific Literacy

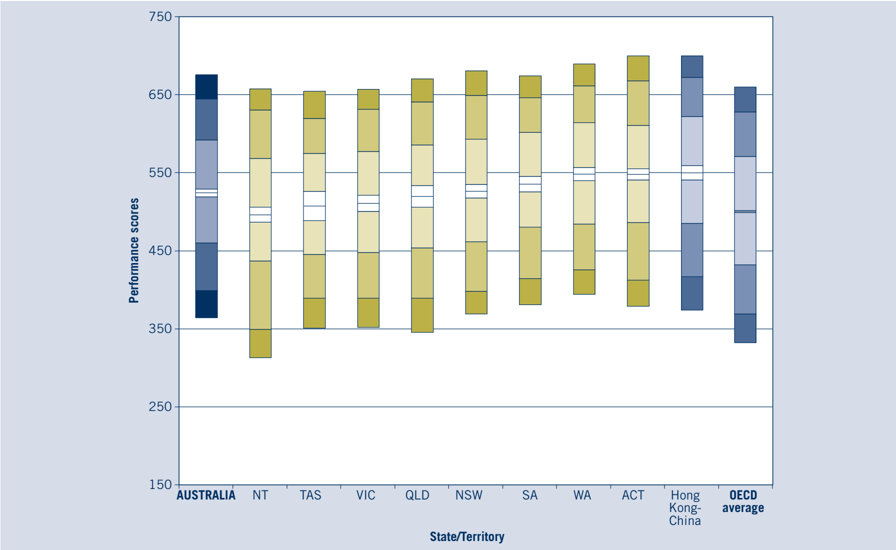
Three countries achieved better results than Australia in scientific literacy —Finland, Japan and Korea.

In PISA 2000, only Korea and Japan outperformed Australia.

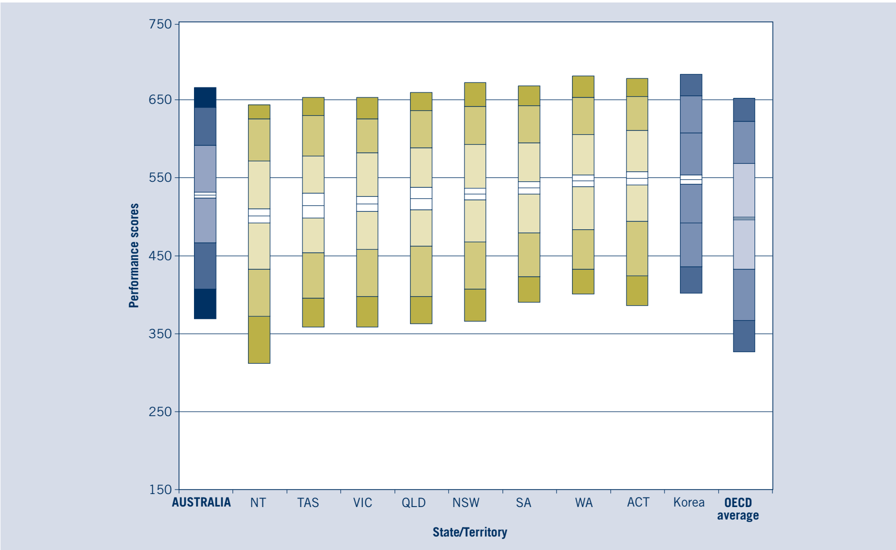
Mathematical, reading, scientific literacy and problem solving results, by Australian state and territory

The figures on these pages show the distributions of results on each of the three literacy and problem solving scales for the Australian states and territories, arranged in order of performance.

Mathematical Literacy



Problem Solving



Details of the comparisons of state and territory mean scores are contained in the full report.

There are few significant differences among the states and territories.

The Australian states and territories all performed at or better than the OECD average in all four domains.

(Differences between states and territories that are referred to in this summary are statistically significant.)

In *mathematical literacy*...

- the average performance of students in the ACT was significantly higher than the average achieved by students in NSW, Queensland, Victoria, Tasmania and the NT;
- students from the ACT, WA, SA, NSW and Queensland attained a higher average score than students in the NT; and
- the performance of students in Victoria and Tasmania was not significantly different from the performance of students in the NT.

In *problem solving*...

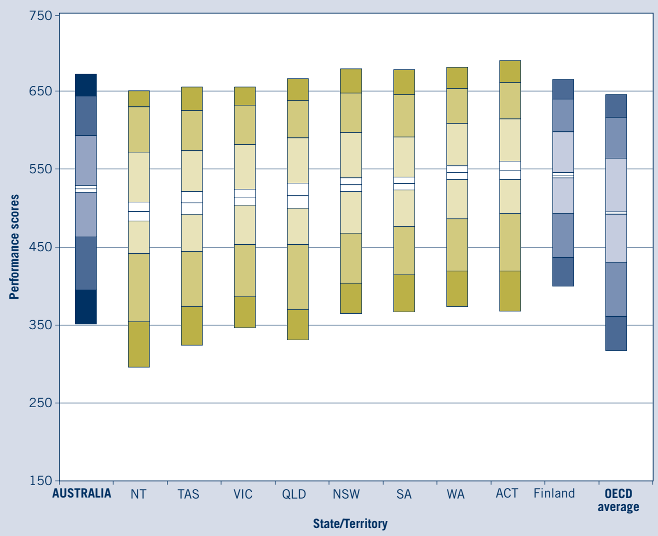
- the average performance of students in the ACT and WA was significantly higher than the average achieved by students in all other states with the exception of SA;
- students from the ACT, WA, SA and NSW attained a higher average score than students in the NT; and
- the performance of students in Victoria and Tasmania was not significantly different from the performance of students in the NT.

HOW TO READ THE CHARTS

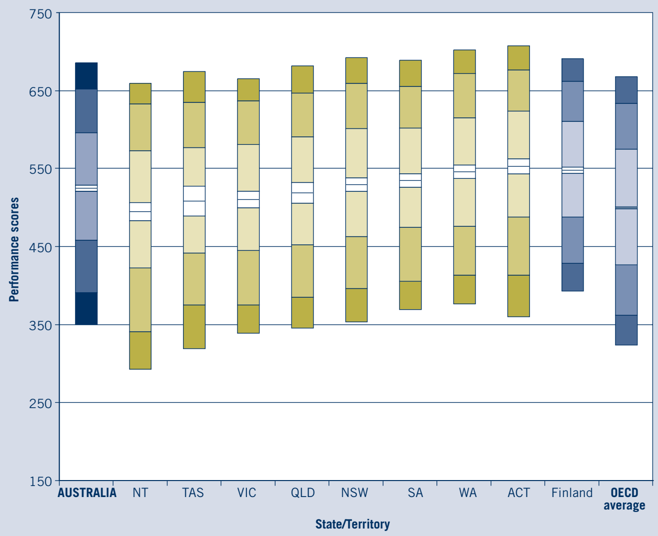
Each white block with the black line across it shows the best estimate of the country's mean (the middle line) and the range (the white block) within which the mean would be expected, with 95% certainty, to fall if many samples were drawn in the same way from the same population.

The charts also show the distributions of results:

- for the middle half, then;
- all but the highest and lowest 10 per cent; and
- all but the highest and lowest 5 per cent of students.



Reading Literacy



Scientific Literacy

In *reading literacy*...

- the ACT, WA, SA and NSW achieved means which were statistically similar;
- Queensland, Victoria, Tasmania and the NT also were statistically similar with each other in terms of their average scores;
- students in the ACT and WA performed on average significantly better than students in Queensland, Victoria, Tasmania and the NT;
- students in SA performed on average significantly better than students in Victoria, Tasmania and the NT; and
- these results are very similar to those for PISA 2000, with the only change being that the NT performed better in relation to the other states in PISA 2003. In PISA 2000, all states other than Tasmania performed significantly better than the NT.

In *scientific literacy*...

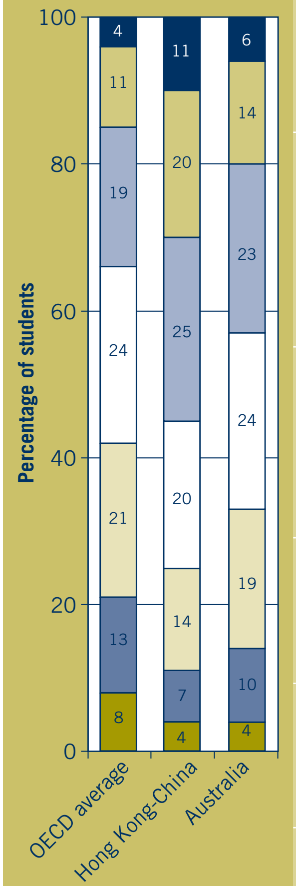
- the ACT and WA achieved means that were statistically similar;
- the ACT performed significantly better than the remaining states;
- WA performed significantly better than Queensland, Victoria, Tasmania and the NT but not significantly better than SA or NSW;
- Victoria, Tasmania and the NT also were statistically similar to each other in terms of their mean scores in scientific literacy; and
- these findings were similar to those reported for PISA 2000.

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' mathematics, reading and problem solving performance using proficiency levels.

WHAT STUDENTS CAN DO IN MATHEMATICAL LITERACY

For mathematics, six levels of literacy were defined. Level 6 is the highest level and Level 1 the lowest. In every country, some students could not do even the easiest mathematics tasks.



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.
- utilise advanced mathematical thinking and reasoning.
- 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 insight pertaining to these situations.
- reflect on their actions and formulate and communicate their interpretations and reasoning.

Level 4
- can 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.

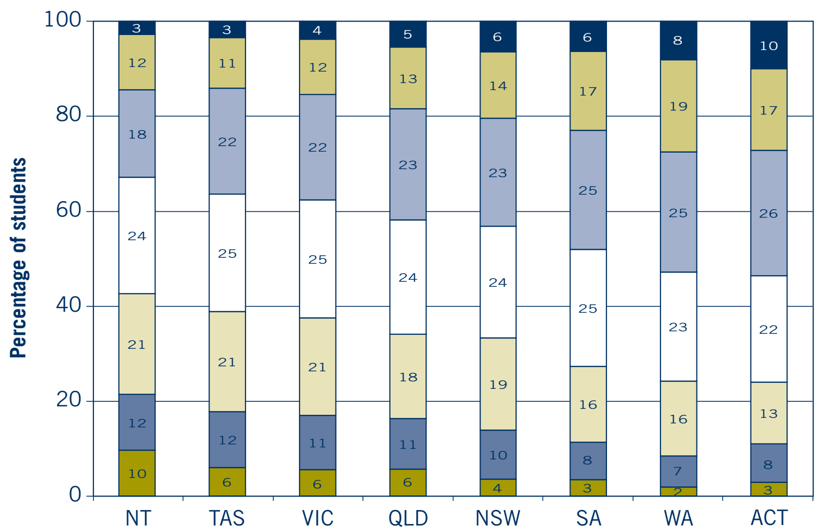
Level 3
- execute clearly described procedures, including those that require sequential decisions.
- select and apply simple problem solving strategies.
- interpret and use representations based on different information sources and reason directly from them.
- develop short communications reporting their 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 carry out routine procedures according to direct instructions in explicit situations.
- perform actions that are obvious and follow immediately from the given stimuli.

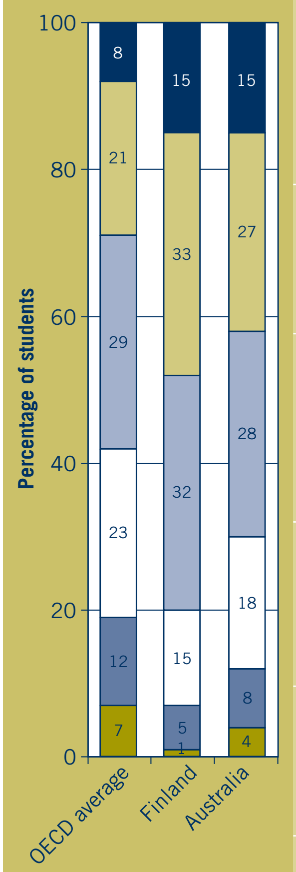
Below 1
- not demonstrate even the most basic types of mathematical literacy that PISA measures. These students are likely to be seriously disadvantaged in their lives beyond school.

Results for Australian states and territories are shown on the chart to the right, in order of average performance on the mathematical literacy scale.



WHAT STUDENTS CAN DO IN READING LITERACY

For reading, five levels of literacy were defined. Level 5 is the highest level and Level 1 the lowest. As for mathematical literacy, in every country, some students could not do even the easiest reading tasks.



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 and 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 and are able to 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

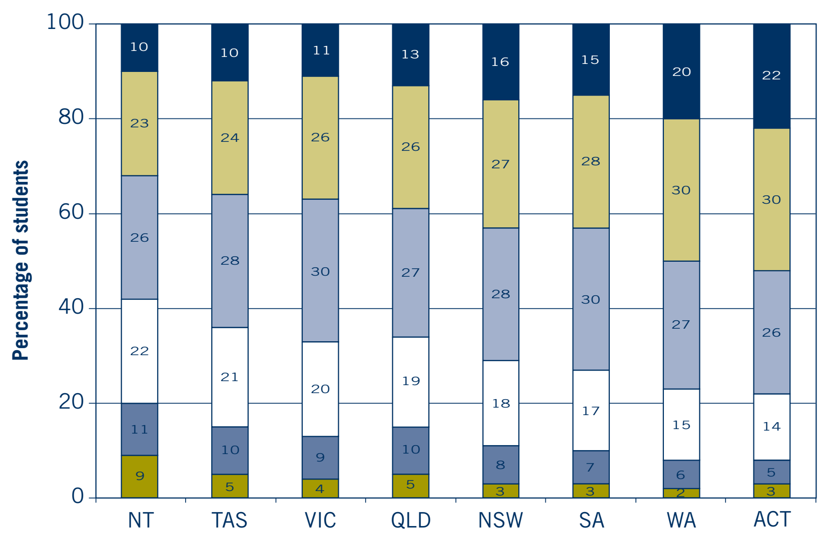
- cope with basic reading tasks such as locating straightforward information.
- make low-level inferences, using some outside knowledge to help understand a well-defined part of a text.
- apply their own experience and attitudes to help explain a feature of a text.

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 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.

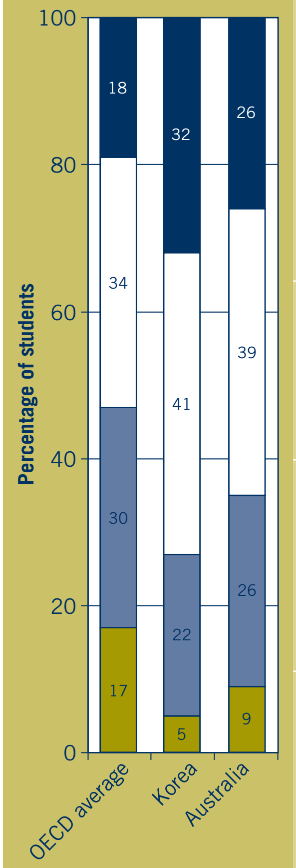


Results for Australian states and territories are shown on the chart to the left, in order of average performance on the reading literacy scale.

Note: Percentages shown for each country or state/territory may not add up to 100 due to rounding.

WHAT STUDENTS CAN DO IN PROBLEM SOLVING

For problem solving, three levels of literacy were defined. Level 3 is the highest level and Level 1 the lowest. As for mathematical literacy, in every country, some students could not do even the easiest problem solving tasks.



Students at this level ...

Level 3

Reflective, communicative problem solvers

- analyse a situation and make decisions.
- think about underlying relationships in a problem and relate these to a solution.
- have a systematic approach to problems, construct a variety of representations to aid in solution to the problem and are effective communicators.

Level 2

Reasoning, decision-making problem solvers

- use reasoning and analytic processes and solve problems requiring decision-making skills.
- apply various types of reasoning to analyse situations and solve problems that require them to make a decision from well-defined alternatives.

Level 1

Basic problem solvers

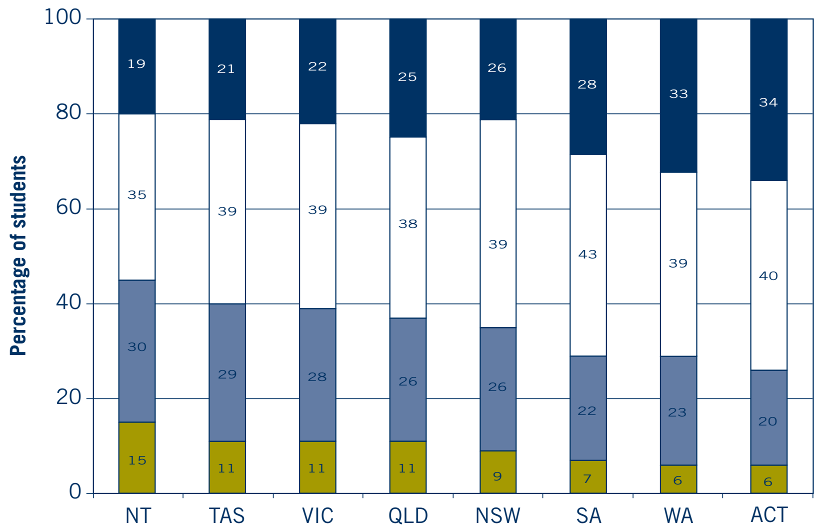
- solve problems where they have to deal with a single data source containing discrete, well-defined information.
- are generally not capable of dealing with multi-faceted problems involving more than one data source or requiring the student to reason with the information provided.

Below 1

- can not demonstrate even the most basic types of problem solving that PISA measures. These students are likely to be seriously disadvantaged in their lives beyond school.

Results for Australian states and territories are shown on the chart to the right, in order of average performance on the problem solving scale.

Proficiency levels for science will be established when scientific literacy is the major assessment domain in 2006.



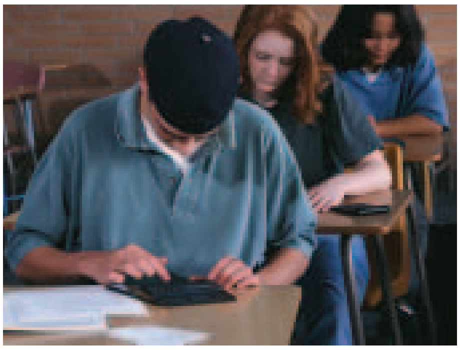
Note: Percentages shown for each country or state/territory may not add up to 100 due to rounding.

Results for females and males

- There was no gender difference in the mean scores for mathematical literacy in Australia. While this was the case for six other OECD countries and five partner countries, it was not found to be the general case internationally. In 27 of the 41 countries, and for the OECD as a whole, males significantly outperformed females. The only country in which there were significant gender differences in favour of females was Iceland.
- While there were no significant differences on the mean scores for mathematical literacy, almost twice as many Australian males as females achieved the highest PISA proficiency level.
- There were no gender differences shown in overall mathematical literacy within the states and territories of Australia.
- Gender differences were found in the subscales space and shape and uncertainty, in which males scored higher than females, but not in quantity or change and relationships.
- As in PISA 2000, the gender difference in favour of females in reading literacy was large, about 0.4 of a standard deviation (40 points), and this was larger than the OECD average.
- Males were under-represented at the higher proficiency levels in reading literacy. Nineteen per cent of females and 11 per cent of males were performing at Level 5, while seven per cent of females and 17 per cent of males were performing below proficiency Level 2.
- There was no evidence of a gender gap in Australia for scientific literacy in either PISA 2003 or PISA 2000. However there was a large number of countries for which this was also the case, and the OECD average for scientific literacy was significantly higher for males than females.
- There was no gender difference in Australia for performance in problem solving, and this was also the case for most other countries, and for the OECD as a whole.
- The largest gender difference was in Iceland, where females scored just over 30 score points higher than males, and the only significant gender difference in favour of males was a difference of 12 scale points, in Macao-China.

Results for Indigenous students

- Altogether, 815 Indigenous students were assessed in PISA 2003. On average, the performance of Indigenous Australians in mathematical literacy was about half a standard deviation (50 points) below the OECD average, while non-Indigenous students achieved, on average, a little more than one-quarter of a standard deviation (25 points) above the OECD average. That is, Indigenous students score around one proficiency level lower than non-Indigenous Australians.
- Similar results were evident for reading and scientific literacy and for problem solving.
- Indigenous students were over-represented in the lower categories of mathematics proficiency and under-represented in the highest category. However, 30 per cent of them demonstrated skills at least at proficiency Level 3, and around one per cent demonstrated skills at the very highest proficiency level.



Results for other student groups

- There were no significant differences in mathematical literacy in Australia based on the country of birth of the student or their parents.
- Students who mainly spoke English at home performed significantly better in mathematical literacy than those whose main home language was other than English.
- Students in a metropolitan area performed at a significantly higher level than students in a provincial city, who in turn performed at a significantly higher level than students in rural areas.

Performance differences in relation to socioeconomic background

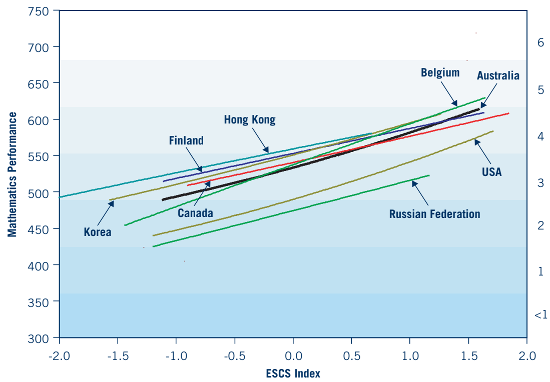
The economic, social and cultural status index (ESCS) is based on parents' education and occupation, books in the home, number of possessions and number of educational resources, as a measure of socioeconomic background.

The relationship between socioeconomic background (as measured by ESCS) and performance is described in terms of the slope and scatter of the social gradient curve. The slope indicates on average how much difference in performance is associated with a given difference in socioeconomic background. Scatter refers to the extent to which results for individuals are scattered around the average line rather than being close to it. It indicates the strength of the relationship and is measured by the percentage of the variation in performance accounted for by socioeconomic background.

The chart above to the right shows mathematical literacy results for several countries in relation to socioeconomic background (as measured by ESCS). The countries in the chart were included to illustrate a range of different social gradients.

Each line is a graph of students' mathematics scores plotted against their score on the ESCS.

The flatter the line for a country, the less the difference in performance between students from socioeconomically disadvantaged and socioeconomically advantaged backgrounds. The OECD considers that a country has been more successful in providing students with equal opportunities in education if its line on the chart is relatively flat, and if the range of scores between its lowest- and highest- scoring students is relatively small.



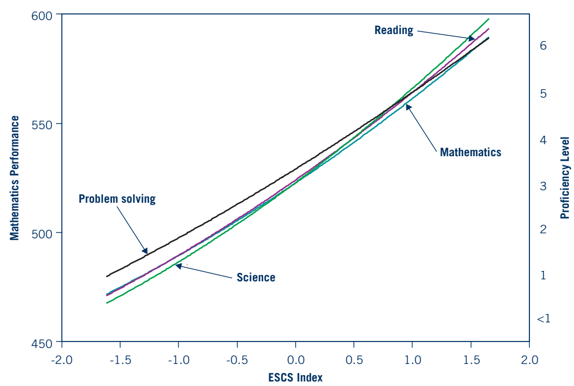
From the chart, the most successful countries in achieving high outcomes in mathematical literacy in PISA 2003 as well as more equitable opportunities for their students were Hong Kong-China and Finland. On the other hand, Belgium has one of the steepest social gradients among countries in PISA 2003. Australia's social gradient is steeper than Hong Kong-China and Finland, but less steep than Belgium.

For mathematical literacy in PISA 2003 the slope of Australia's social gradient was just a little less than for the OECD average (although the difference was not significant). In PISA 2000 the corresponding slope for Australia had been a little steeper than (but still not significantly different from) the slope for the OECD average.

In Australia for PISA 2003 the 'strength' of the relationship between socioeconomic background and performance in mathematical literacy was less than for the OECD on average. The strength of this relationship was less strong in Australia than in countries such as the United States, Germany and Belgium, indicating that socioeconomic background as reflected in the ESCS was not so strong a determinant of mathematical literacy in Australia as in these countries. The relationship was stronger in Australia than in Finland, Iceland and Hong Kong-China. In PISA 2000 the strength of the corresponding relationship in Australia was not significantly different from that of the OECD average for mathematical literacy.

The chart below shows the relationship between socioeconomic background (as measured by ESCS) and performance across each of the domains are very similar.

Problem solving had the least steep slope. The slope for mathematics was just a little less than for reading, which was in turn a little less steep than science.



Performance differences in relation to students' attitudes and beliefs

- Attitudes towards school among Australian students were more positive than for the OECD average. Australian females had significantly more positive attitudes towards school than males.
- Australian students reported more favourable student-teacher relationships than the OECD average. Australian females scored higher on this index than males, indicating more positive relationships.
- Australian students' score on the sense of belonging index was around the OECD average. Australian females had a greater sense of belonging to their school than males.
- Australia's mean on the teacher support index was significantly higher than the OECD average. There was no gender difference in Australia on this index.
- Australia's mean on the interest and enjoyment index for mathematics was not different to that of the OECD average. Australian males reported higher levels of interest and enjoyment in mathematics than females.
- Australian students scored higher on the instrumental motivation index than the OECD average, indicating stronger beliefs in the value of learning mathematics for external reasons such as getting a job in the future. Australian males had a much stronger sense of instrumental motivation than females.
- Among the attitudinal and belief factors examined in PISA 2003, mathematics self-efficacy had the strongest association for Australian students with mathematical literacy. The average for Australian students was slightly higher than the OECD average, and males' scores on the index were significantly higher than females' scores.
- Australian students had a higher sense of self-concept in mathematics than the OECD average, and Australian males had significantly stronger self-concept than females. Mathematics self-concept had a moderately strong relationship with mathematics performance in Australia.

What affects mathematics performance in Australia?

When included together with measures of many other factors in multilevel analyses of contextual factors, it was found that, other things equal:

- students who intend completing higher levels of educational qualifications tend to do better in mathematical literacy.
- Gender did not have a significant effect on mathematical literacy.
- ESCS and computer resources in the home were positively related to mathematical literacy.
- Good student-teacher relationships had a positive effect on mathematical literacy performance.
- Students who reported higher levels on the sense of belonging index performed at a lower level in mathematical literacy.
- Mathematics performance was higher in a classroom environment that is quiet and orderly, and where students are eager to learn.
- Mathematics self-efficacy and mathematics self-concept had the strongest relationships with mathematical literacy.
- Anxiety about mathematics was negatively related to performance in mathematics.

Main Policy Messages from PISA 2003 for Australia

While Australian students' results in PISA 2003 were good to excellent, there are some aspects that are cause for concern.

In relation to socioeconomic background

While the relationship between socioeconomic background and performance in mathematical literacy was less strong than for the OECD on average, there still exists a distinct advantage for those students with higher socioeconomic backgrounds. While schools are not able to influence students' socioeconomic backgrounds, they are able to introduce policies that help to counteract the effects of disadvantage. Although many schools already do this there is work to be done because the differences observed are greater than would be considered desirable in relation to our national aspirations.

In relation to Indigenous students

The low level of performance by most Indigenous students continues to be a concern. While some Indigenous students performed well in PISA mathematical literacy, this was a very small proportion of the overall sample and many more were performing at the lower end of the proficiency levels. It is important for Indigenous students to continue to receive additional support to raise their performance levels.

In relation to gender differences

While no overall gender differences were apparent in mathematics performance, males tend to be over-represented at the upper levels of achievement, although equally represented in the lower levels, and males performed at a significantly higher level than females in two of the four mathematics subscales. Even though the difference between males and females in overall mathematics performance was not significant, it is evident from PISA there are differences in the attitudes and beliefs held by females towards mathematics. Females appear to retain, to a much greater extent than males, a negative attitude towards mathematics and towards their own abilities in the subject. This is reflected in their lesser tendency to study mathematics and related disciplines at tertiary level. PISA suggests a reason for this, finding that there are much larger gender differences at age 15 in approaches to learning mathematics than in performance itself. Females appear to be less engaged, more anxious, and less confident in mathematics than males. This finding suggests that approaches to reducing these gender differences need to start at an early age in order to increase females' engagement in mathematics and build their confidence in their mathematical abilities.

A goal of Australia's education systems is to provide equal and high quality opportunities in learning for all of our students. The PISA survey helps to indicate how well we are succeeding in this respect in comparison with other countries, providing benchmarks over time against which we can measure improved student performance.

PISA was implemented for the Organisation for Economic Co-operation and Development (OECD) by an international consortium led by the Australian Council for Educational Research (ACER). Other members of the consortium were the Netherlands National Institute for Educational Measurement (CITO), the Educational Testing Service (ETS) and Westat Inc. of the United States, and the National Institute for Educational Research (NIER) in Japan. Many countries contributed assessment material.

The Australian component of PISA was also implemented by ACER.

Acknowledgments

The undertaking of PISA 2003 was a collaborative effort. A national survey such as PISA could not be successful without the cooperation of school systems, principals, teachers, students and parents. For high quality data, a high participation rate of the randomly selected schools and students is essential. It is pleasing that Australia was able to satisfy the internationally set response criteria fully for PISA 2003. ACER gratefully acknowledges the assistance of education system officials Australia-wide, and the principals, teachers and students in the participating schools who so generously gave their time and support to the project.

The Commonwealth, state and territory governments provided the funding for the Australian component for the 2003 PISA survey. All of Australia's share of the international overheads and half of the basic funding for PISA within Australia was contributed by the Australian Government Department of Education, Science and Training, while each state and territory government school system provided funding in proportion to the numbers of 15-year-old students enrolled in their schools. The Australian Government also met the additional cost of increasing the size of the sample for PISA 2003 to enable it to become the basis for a cohort of the Longitudinal Surveys of Australian Youth (LSAY).

In Australia, PISA is guided by a National Advisory Committee (NAC). ACER wishes to thank the NAC members, who are listed below, for their continued interest and commitment throughout every phase of the project. Their involvement included reviewing assessment items, assisting with the implementation of PISA in schools from their state and territory and providing valuable information to ensure the success of PISA in Australia.

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Note: Members are listed with their affiliation at the time of publication. Names in italics denote previous members.

Facing the **Future**

How well prepared are students to meet the challenges of the future? Are they able to analyse, reason and communicate their ideas effectively? Do they have the capacity to continue learning throughout life? These are questions that parents, students, employers and those who run education systems frequently ask.

This book, *Facing the future: A focus on mathematical literacy among Australian 15-year-old students in PISA 2003*, provides some important answers to these questions. It is the second Australian report of results from the major OECD activity known as the Programme for International Student Assessment (PISA). This cycle of PISA assessment took place in 2003 in 41 countries, in randomly selected samples of schools and students.

Features of PISA

- *The literacy approach*: PISA aims to define each domain (mathematics, reading, science and problem solving) not merely in terms of mastery of the school curriculum, but in terms of important knowledge and skills needed for full participation in society.
- *A long-term commitment*: spanning over the decade to come, PISA will enable countries to monitor their progress in meeting key learning objectives.
- *The age group covered*: assessing young people near the end of their compulsory schooling provides a significant indication of the performance of education systems.
- *The relevance to lifelong learning*: PISA does not limit itself to assessing the knowledge and skills of students but also asks students to report on their own self-regulated learning, their motivation to learn and their preferences for different types of learning situations.

The report presents evidence from the second assessment, on the performance in mathematical, reading and scientific literacy, and in problem solving, of 15-year-old students, their schools and their countries, interpreted from an Australian perspective. It gives insights into factors that influence the development of these skills at home and at school, and discusses implications of the results for policy development.

Australian students on the whole performed consistently very well in all four of the assessment domains. Four countries outperformed Australia in mathematical literacy in PISA 2003 (Hong Kong-China, Finland, Korea, and the Netherlands). Only one country (Finland) achieved a better result in reading, three countries in scientific literacy (Finland, Japan and Korea), and four countries in problem solving (Korea, Hong Kong-China, Finland and Japan). Within Australia, comparisons between the state and territory results show many more similarities than differences. All the state and territory results were at or above the OECD average.

While the performance of Australian students as a whole was at a high standard, the data revealed some differences of concern to educators and the community. For example, while there were no differences between males' and females' average performances in mathematics, science or problem solving, females performed substantially better than males in reading, and males performed substantially better than females in some aspects of mathematics. The report discusses male and female strengths and weaknesses in all four domains and identifies aspects of particular concern.

PISA 2003 was implemented for the OECD by an international consortium led by the Australian Council for Educational Research (ACER). ACER also carried out the survey within Australia.

For more information about PISA, visit the OECD's website: www.pisa.oecd.org. or the ACER website www.acer.edu.au

www.oecd.org www.acer.edu.au