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**Australia's Indigenous Students in PISA 2000:  
Results from an International Study**

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## EXECUTIVE SUMMARY

In 2000, Australia took part in the inaugural OECD Programme for International Student Assessment (PISA). Approximately 500 Australian Indigenous students were assessed in PISA, providing a representative sample of the 15-year-old Indigenous population.

This report presents the analysis of the results for the Australian Indigenous students in comparison with other Australian students and in relation to other countries' students. It also examines some of the characteristics of the Indigenous students.

- Australia's Indigenous students performed at a lower level than the non-Indigenous students in the three assessment areas - reading literacy, mathematical literacy and scientific literacy. Their results were below the OECD mean.
- Gender differences were similar to the other Australian students, with females outperforming the males in reading literacy. No significant gender differences were found in mathematical or scientific literacy.
- Results using the Reading Proficiency Levels show an over-representation of students in the lower levels (35 per cent) and an under-representation at the highest proficiency level (8 per cent). However, 40 per cent of Indigenous students performed at Level 3 or better.
- The influence of home background factors on performance was examined. Resources, such as books in the home, were fewer in homes of Indigenous students than in non-Indigenous students' homes. The mean socioeconomic status of Indigenous students was lower than that of non-Indigenous students. There was, however, a higher level of equity, with less difference in performance between low and high socioeconomic status Indigenous students than for the performance between low and high socioeconomic status non-Indigenous students.
- In the learning environment, Indigenous students reported fewer disciplinary problems in their English lessons and they had a more positive sense of belonging at school than the non-Indigenous students. They also reported spending less time on homework.
- Differences were found in the learning strategies, learning preferences and behaviours of Indigenous students compared to non-Indigenous students. Indigenous students had less preference for a competitive learning environment. They were also less likely to use elaboration and control strategies.





## **Australia's Indigenous Students in PISA 2000: Results from an International Study**

### **INTRODUCTION**

Australia's Indigenous people have had a continuous existence and culture for many thousands of years. European settlement in the eighteenth century brought about great changes to the Indigenous people and now in the twenty-first century, there are many important issues and challenges relating to the Indigenous population. Foremost among these issues are health and education. This report focuses on education.

In Australia, the gap between educational outcomes for Indigenous<sup>1</sup> and non-Indigenous students at all levels of education has long been a concern (Long, Frigo, & Batten, 1999), although there have been some encouraging signs of improvement in Indigenous students' results in numeracy from 1975 to 1995 (Marks & Ainley, 1997). Indigenous education policy has placed a high priority on gathering data on educational outcomes as a way of monitoring the extent to which educational equity is being achieved for Indigenous students. Whilst national data collections contain achievement data of students at primary school and in the post-compulsory years, less is known about the achievement and characteristics of 15-year-old Indigenous students.

An opportunity to examine a much wider range of data for an older age group of students arose from Australia's participation in the inaugural OECD<sup>2</sup> Programme for International Student Assessment (PISA). The international results for PISA have been published in 2001 (OECD) and also in 2003 (OECD/UNESCO<sup>3</sup>), following the release of results from extra countries that participated in PISA in 2002 (see Figure 1, which shows the participating countries). Indigenous students were oversampled in Australia so that reliable results could be determined for them as a group. Some of these results were included in the initial Australian report, *15-up and counting, reading, writing, reasoning .... How literate are Australia's students? The PISA 2000 survey of students' reading, mathematical and scientific literacy skills*. (Lokan, Greenwood, & Cresswell, 2001). This subsequent report, *Australia's Indigenous Students in PISA 2000*, presents more details and analysis of the results for the Indigenous sample, sometimes in comparison with the remainder of the Australian sample and sometimes in relation to other countries' samples.

### ***What is PISA?***

- PISA is a survey of the knowledge and skills of 15-year-olds which was first carried out in 2000 and will be repeated every three years, so that changes over time can be measured.
- Over 265 000 students from 43 countries took part in PISA 2000.
- Students answered a pen-and paper assessment booklet in their schools. They also answered a 30-minute questionnaire about themselves, and their principals answered a 30-minute questionnaire about their schools.
- Students were asked about their home backgrounds, their attitudes to school and learning, and the strategies they used when studying.
- Principals were asked about the atmosphere and resources for learning at the school, and the kinds of programs the students were studying.
- PISA 2000 assessed 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.
- PISA 2000 assessed literacy in reading, mathematics and science. Within this survey, the word 'literacy' means much more than the common meaning of being able to read and write. In PISA 'reading literacy' is defined as:

*the ability to understand, use and reflect on written texts in order to achieve one's goals, to develop one's knowledge and potential, and to participate effectively in society.*

---

<sup>1</sup> In this paper, Indigenous students refer to Australian Aboriginal and Torres Strait Islander students.

<sup>2</sup> Organisation for Economic Cooperation and Development.

<sup>3</sup> United Nations Educational, Scientific and Cultural Organisation.

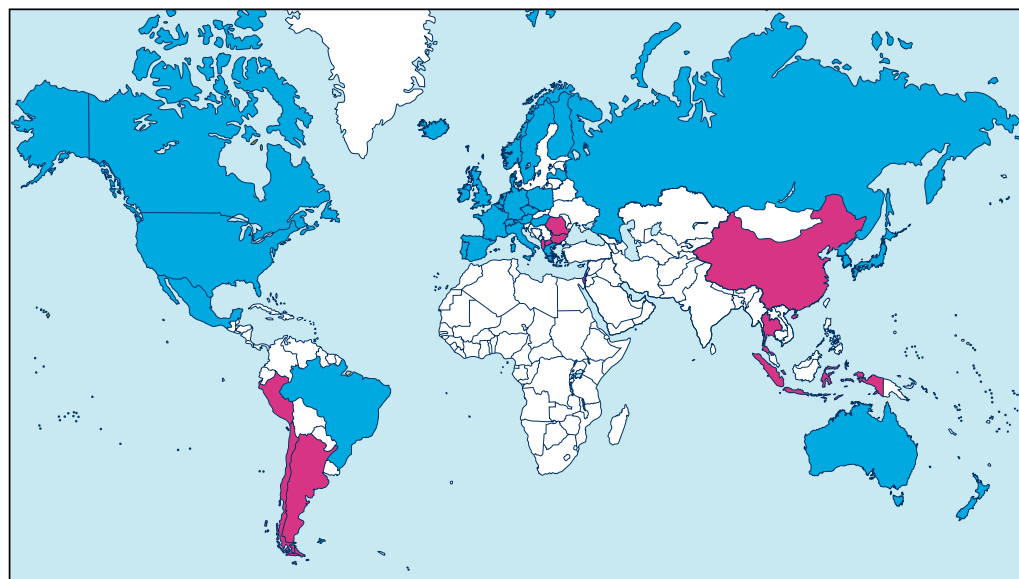
- To answer the PISA 2000 assessment tasks correctly, students had to understand key concepts, use a range of processes in the correct way and apply their knowledge and skills in different situations.
- Some of the assessment tasks were multiple choice questions, but many questions required students to construct their own answers.

Questions addressed by PISA include:

- 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 influence does the quality of school resources have on students' learning?
- To what extent is student performance dependent on their home backgrounds? How can opportunities be improved for students from disadvantaged backgrounds?

**Countries In PISA**

The countries that took part in PISA 2000 and some other countries that have joined the project since then are shown on this map.



■ PISA 2000				■ PISA+*	
Australia	France	Korea	Poland	Albania†	Israel†
Austria	Germany	Latvia†	Portugal	Argentina†	Macedonia†
Belgium	Greece	Liechtenstein†	Russian Federation†	Bulgaria†	Peru†
Brazil†	Hungary	Luxembourg	Spain	Chile†	Romania†
Canada	Iceland	Mexico	Sweden	China†	Thailand†
Czech Republic	Ireland	Netherlands	Switzerland	Special Administrative	
Denmark	Italy	New Zealand	United Kingdom	Region of Hong Kong†	
Finland	Japan	Norway	United States	Indonesia†	

†Non-OECD countries

\*PISA+ countries completed the assessment in 2002

**Figure 1 The Countries participating in PISA**

### ***What did PISA measure?***

There were three main areas of assessment in PISA 2000 – reading, mathematical and scientific literacies.

In PISA 2000 the major domain of assessment was reading literacy, which meant that the majority of the testing time was devoted to this. In reading, assessment was focused on three main areas. The first of these areas or sub-scales as they are known is Retrieving Information, where students have to locate information in a number of different formats, such as text, or a timetable or a plan. The second reading sub-scale was Interpreting Texts, in which students had to demonstrate an understanding of written material or identify the main theme of a piece of writing. The third sub-scale in reading was Reflection and Evaluation, in which students had to draw on knowledge outside the text and make comparisons and connections and critically evaluate the ideas in the text.

The format of the material presented to the students was also varied and either in the form of continuous text (that is, material in written prose format) or non-continuous text (that is, material presented in lists, plans, timetables).

In mathematical literacy students were asked to solve problems and apply computational skills in a number of areas. In scientific literacy students were assessed not only on their understanding of scientific processes but also on the nature of scientific investigation. Mathematical literacy is the major assessment domain in 2003, and scientific literacy in 2006.

Students were also asked to complete a questionnaire designed to give information about their home background, such as their parents' level of occupation and education; and their own attitudes to school, especially to reading. Australia also took up the option of including an extended questionnaire which asked students about their use of computers and their approaches to learning, which included, for example, questions about whether they learnt things by memorisation or by extrapolating existing knowledge to new situations.

School principals completed a questionnaire about their schools and answered items about the level of training of the teachers, the physical and educational resources and what factors the principals identified as hindering the educational development of 15-year-olds in their schools.

## **REPORTING RESULTS IN PISA**

### ***How the literacy domains are measured***

Results need to be comparable within and across countries to be able to interpret them. The literacy scales have been standardised, across the OECD as a whole, to have a mean of 500 points and a standard deviation of 100. This means that, about two-thirds of the students across the OECD countries have scored between 400 and 600 points.

In addition to summarising results using mean scores, proficiency levels have been reported to provide an effective means of describing the skills and knowledge that students possess. Students at a particular level are able to demonstrate the skills and knowledge at that level and also the levels below. A low score indicates the student has limited knowledge and skills whereas a high score indicates the student has advanced skills and knowledge.

### ***How attitudes and behaviours are measured***

In PISA, scales were created to summarise students' responses to a series of similar questions. The attitudinal and behavioural scales were then standardised, to a mean of 0 and a standard deviation of 1, meaning that two-thirds of the students across the OECD countries, have a value between -1 and 1. The value on the scale indicates whether a group of students responded more positively, if they had a positive value, or more negatively, if they had a negative value, in comparison to all students on average, across the OECD countries.

## **PISA IN AUSTRALIA**

### ***Advisory groups***

In Australia, a National Advisory Committee oversees all aspects of the project. The Committee's members include representatives from the Commonwealth and each of the state and territory education authorities as well as subject matter experts and a specialist on Indigenous education.

In addition to the over-sampling of schools in the smaller states and territories, oversampling of Indigenous students has enabled reliable results to be reported for this group on a nation-wide basis.

### ***Sample***

In accordance with the stipulated international practice, the selection of schools and students in Australia for PISA involved sampling in two stages. Schools, in total 246, were first randomly selected with a probability proportional to the enrolment size of the 15-year-olds (that is, larger schools had a greater chance of being selected than smaller schools). Thirty-two students were then randomly selected from a list supplied by the school of all their 15-year-old students.

The achieved Australian PISA sample consisted of 231<sup>4</sup> schools and 5176 students, equating to a weighted student sample of 229 152 students.

In the total PISA sample, the weighted percentage of Indigenous students was 2.4 per cent. This figure consisted of 192 students who identified themselves as being of Aboriginal or Torres Strait Islander descent in the main sample. An additional 301 Indigenous students, not selected for the main sample, accepted an offer to participate in PISA. This report is based on the results of this combined group of 493 Indigenous students. The distribution of the sample is representative of the Indigenous population in Australia.

## **WHO WERE THE PARTICIPANTS?**

Using data collected in the PISA Student Questionnaire, the personal and home background characteristics for the Indigenous and non-Indigenous sample could be described.

### ***Age and gender***

Students born between 1 May 1984 and 30 April 1985 were eligible to take part in PISA. The average age for the Indigenous students was the same as for the non-Indigenous students - approximately 15 years 8 months.

There were more Indigenous females (51 per cent) than non-Indigenous females (47 per cent).

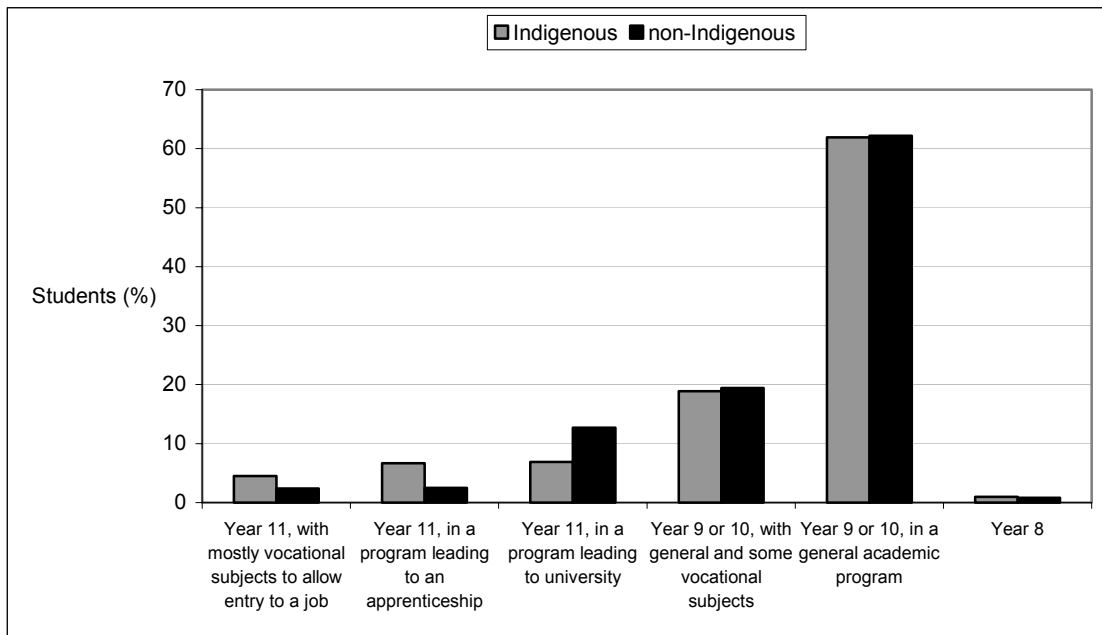
### ***Year level and program at school***

The majority of Indigenous students were in either Year 9 or 10, with 62 per cent of students in a general academic program and 19 per cent in a program with both general and vocational subjects.

Of the Indigenous students who were in Year 11, equal percentages (7 per cent) were in a program leading to university or leading to an apprenticeship and 5 per cent were in a program with mostly vocational subjects designed to allow entry to a job straight from school.

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<sup>4</sup> Data from one further school were not included due to the test administrator becoming ill at the last minute, which meant that test administration procedures were not fully adhered to.



**Figure 2 School Program for Indigenous and Non-Indigenous Students**

The chart shows:

- There were similar percentages of Indigenous and non-Indigenous students in Years 8, 9 and 10.
- There was a much smaller percentage of Indigenous students in Year 11 and in a program leading to university than non-Indigenous students.
- There was a much larger percentage of Indigenous students in Year 11 in a program leading to an apprenticeship or in a program with mostly vocational subjects to allow entry to a job straight from school.

## RESULTS ON THE LITERACY MEASURES

A brief discussion of results in reading, mathematical and scientific literacy incorporating results for the Indigenous students is presented in this section using both mean scores and proficiency levels. Gender differences are also discussed.

### *Results using mean scores*

The National PISA report (Lokan et al., 2001) describes Australia's results in an international perspective. Overall, Australia performed very well, with results above the OECD average in all three literacy domains.

On comparing Australia with the other participating countries, only one country – Finland, achieved significantly higher than Australia in reading literacy overall. In mathematical literacy, Hong Kong and Japan scored significantly higher than Australia and in scientific literacy, Japan and Korea scored significantly higher than Australia.

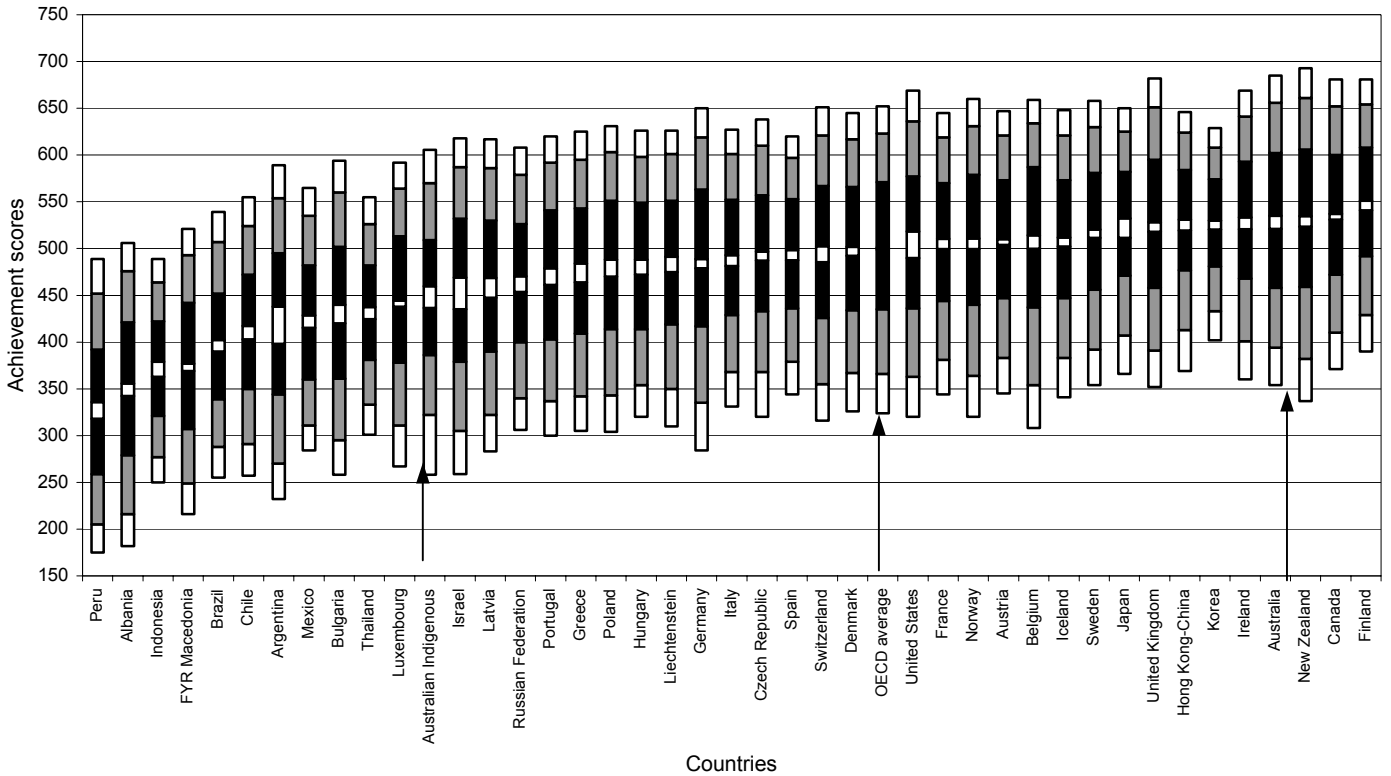
Comparable analyses were undertaken to determine the mean scores and standard errors for the Indigenous students across the three domains. Three figures, one for each domain, illustrate the comparisons in achievement for all participating countries, including Australia's Indigenous sample.

Comparing the results of the Australian Indigenous sample with students from other participating countries, the relative standing of the Indigenous sample shows their performance is lower than for students in the majority of countries in each domain and that their mean score is below that of the OECD average.

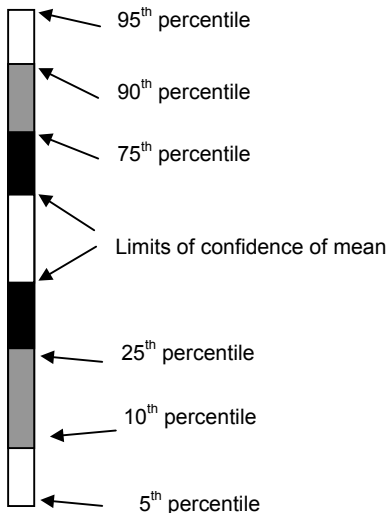
The standard error bar associated with the Indigenous students' mean is larger than those for the country means because of the smaller number of students in this sample.

**Reading literacy**

Results on the combined reading literacy scale show that the Indigenous students, with a mean score of 448, scored between the students of Latvia and Luxembourg, as shown in the figure below. The highest scoring country, Finland, achieved a mean score of 546. The lowest country, Peru, achieved a mean score of 327. Although the mean score for Australia was 528, as represented on this chart, the mean score for the non-Indigenous students was slightly higher, at 531.



**Figure 3 Student Achievement on the Combined Reading Literacy Scale by Country, including the Australian Indigenous Students.** Arrows indicate Indigenous students, the OECD mean and the Australian (Indigenous and Non-Indigenous) mean.



**READING THE GRAPHS**

Each country's results are represented in a band with various colours. The bottom of the band is the 5<sup>th</sup> percentile – this is the score below which 5 per cent of the students have scored. The next two lines indicate the 10<sup>th</sup> percentile and the 25<sup>th</sup> percentile. The next line at the bottom 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 lines above the white band indicate the 75<sup>th</sup>, 90<sup>th</sup> and 95<sup>th</sup> percentiles.

The Australian Indigenous students scored at an equivalent level to the students from the Russian Federation, Portugal and Greece, but significantly better than students from Peru, Albania, Indonesia, Macedonia, Brazil, Chile, Argentina and Mexico. The results for the Australian Indigenous students were also lower than non-Indigenous students for the three separate aspects of reading for which results have been reported internationally, as shown in Table 1. The largest difference between Indigenous and non-Indigenous students was in the area of retrieving information.

**Table 1 Reading Sub-Scale Means for Indigenous and Non-Indigenous Students**

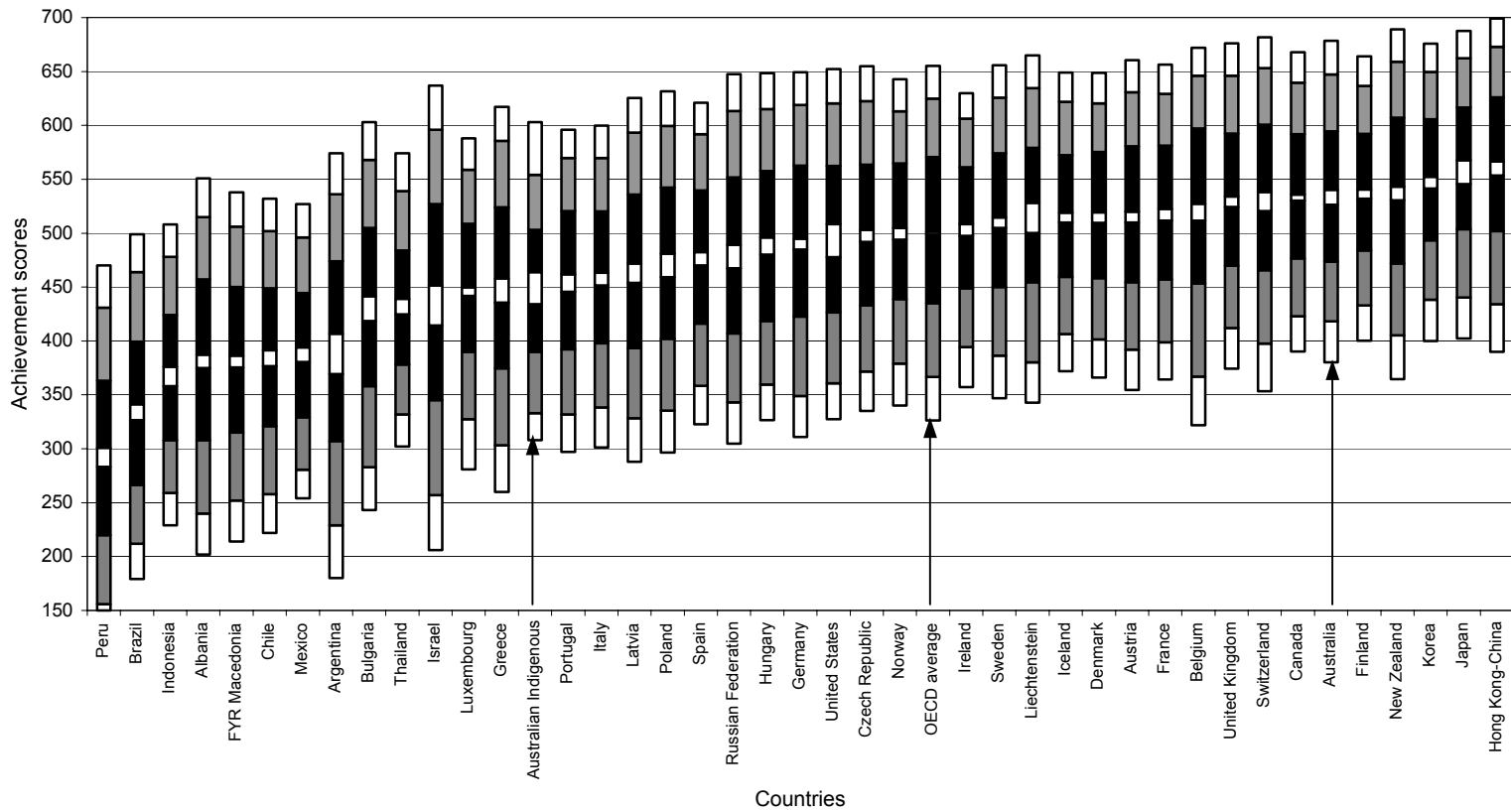
Reading Sub-scale	Indigenous Students	Non-Indigenous Students
Retrieving Information	451	537
Interpreting Texts	446	529
Reflecting and Evaluating Texts	450	528

### *Mathematical literacy*

The results for mathematical literacy were similar to those for reading literacy (Figure 4). The mean score for the Indigenous students was 450, which places the results as being not significantly different to a number of countries, including Luxembourg, Greece and Portugal, but significantly better than a greater number of countries than is the case for Reading Literacy. These countries include Peru, Brazil, Indonesia, Albania, Macedonia, Chile, Mexico and Argentina. The lowest scoring country, Peru, achieved a mean score of 292. At the higher end of the scale, Hong Kong achieved a mean score of 560. Australia's mean score was 533 and the mean score for the non-Indigenous sample in mathematical literacy was 535.

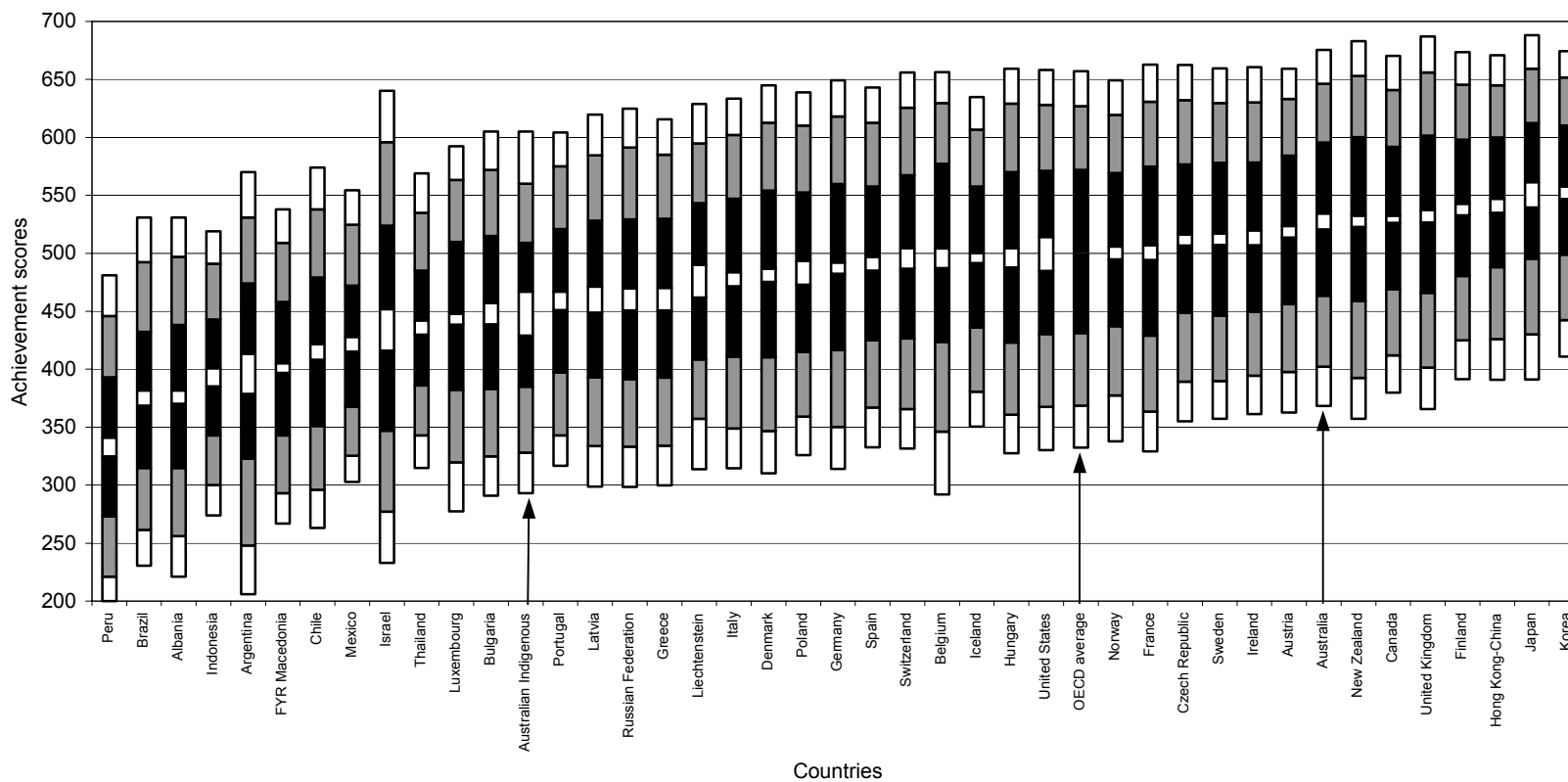
### *Scientific literacy*

The results for scientific literacy are shown in Figure 5. The highest scoring country, Korea, achieved a mean score of 552. Peru, the lowest scoring country attained a mean score of 333. Australia's mean was 528. The Australian Indigenous sample achieved a mean score of 448 and is positioned between Luxembourg and Portugal. The mean score for the non-Indigenous sample was 529.



**Figure 4 Student Achievement on the Mathematical Literacy Scale by Country, including the Australian Indigenous Students.**  
 Arrows indicate Indigenous students, the OECD mean and the Australian (Indigenous and non-Indigenous) mean.





**Figure 5 Student Achievement on the Scientific Literacy Scale by Country, including the Australian Indigenous Students.**  
 Arrows indicate Indigenous students, the OECD mean and the Australian (Indigenous and non-Indigenous) mean.

### Summary of results overall

There were large differences between the performance of Australia's Indigenous students and non-Indigenous students. This table summarises the mean scores for the combined reading literacy, scientific literacy and mathematical literacy scales for Indigenous and non-Indigenous students.

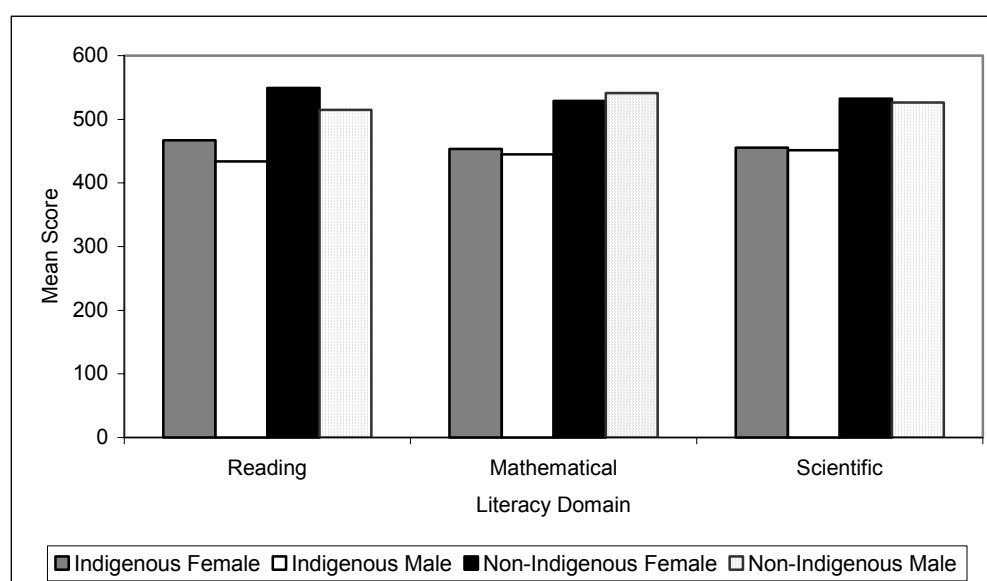
**Table 2 Summary of Indigenous Students' and Non-Indigenous Students' Performance in PISA\***

Domain	Indigenous Students Average	Non-Indigenous Students Average
Reading literacy (combined)	448.1 (5.8)	530.8 (3.4)
Mathematical literacy	449.4 (7.5)	535.1 (3.4)
Scientific literacy	447.9 (9.4)	529.3 (3.5)

\* Standard errors are shown in parentheses.

### Results by gender

Gender differences were more pronounced in reading literacy than for mathematical literacy or scientific literacy. This graph shows the average score on the three literacy domains by gender for Indigenous students and non-Indigenous students.



**Figure 6 Student Achievement for the Indigenous and Non-Indigenous Students by Gender on the Reading, Mathematical and Scientific Literacy Scales**

### Reading literacy

- International comparisons found that females achieved significantly higher results than males across all countries in reading literacy.
- Differences between the performance of females and males in Australia were similar (around 33.5 score points), for both Indigenous and non-Indigenous students.

### ***Reading literacy sub-scales***

- The largest difference between Indigenous females and males across the three reading sub-scales was found in the reflecting and evaluating texts sub-scale.
- The average score on the reflecting and evaluating texts sub-scale for Indigenous females was 470, 37 points higher than for Indigenous males.
- Indigenous females scored 463 compared with 433 for Indigenous males on the interpreting texts sub-scale.
- The average score for Indigenous females on the retrieving information sub-scale was 468, 27 points higher than the average score for Indigenous males.

### ***Mathematical literacy***

- The difference in mean score between males and females in mathematical literacy was less than reading literacy and was not significant.
- In most countries males scored higher than females, with half the countries reporting significant differences, although in Australia this was not the case for either the Indigenous or non-Indigenous students.
- There was an 11 score point difference higher for males than females in the OECD mean overall.

### ***Scientific literacy***

- There was no overall difference between males and females in the OECD mean for scientific literacy.
- In Australia there was no significant difference in scientific literacy mean scores between males and females, for Indigenous and non-Indigenous students.

## **RESULTS USING PROFICIENCY LEVELS**

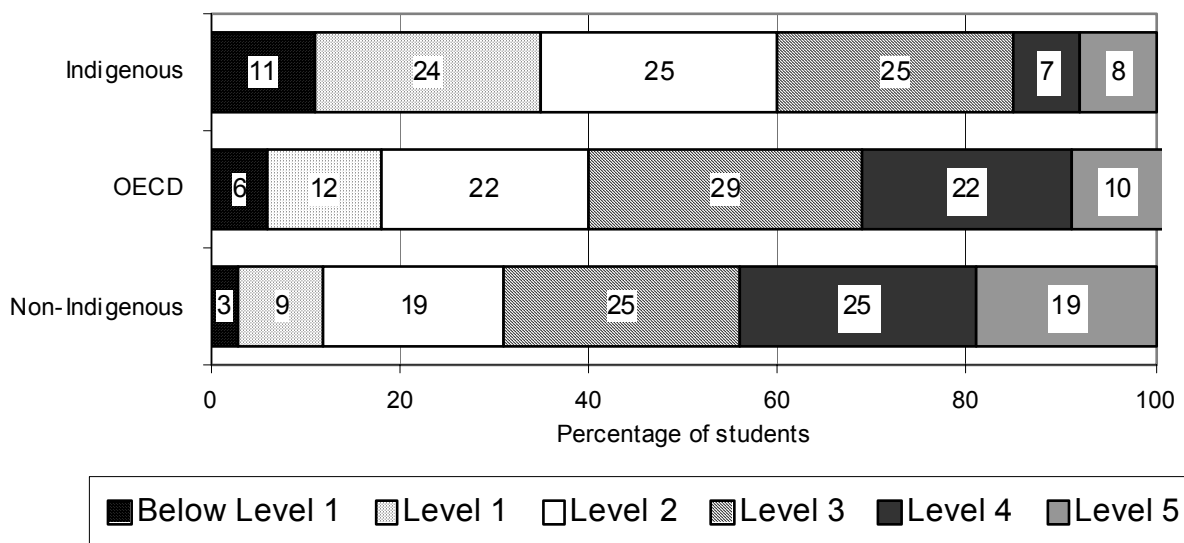
It was decided to divide the results obtained in reading into proficiency levels, to give a clearer view of the knowledge and skills that students possess. In PISA, in reading literacy, there were five proficiency levels described, Level 1 being the most basic skills and Level 5 being the most advanced. There were a small number of students who scored below Level 1, which meant that this assessment was unable to clearly describe the reading skills possessed by those students – it doesn't mean that these students possess no reading skills.

The percentages of Indigenous and non-Indigenous students at each reading proficiency level, along with the OECD average are shown in Figure 7.

The lower performance of the Indigenous students is seen with an over-representation of students in the lower levels and an under-representation in the higher levels.

The 35 per cent of Indigenous students at or below Level 1 raises an area of concern. In terms of PISA, these students do not have the adequate skills and knowledge in reading literacy to meet real-life challenges and may well be disadvantaged in their lives beyond school.

There are, however, Indigenous students who have demonstrated excellent skills and knowledge in reading literacy with 8 per cent of students placed at the highest proficiency level. Forty per cent of Indigenous students performed at Level 3 or better.



**Figure 7 Proficiency Levels for Indigenous Students and Non-Indigenous Students on the Reading Literacy Scale**

#### PERFORMANCE DIFFERENCES IN RELATION TO BACKGROUND CHARACTERISTICS

One of the main aims of PISA was to determine the extent of the influence of home background on the academic performance of the participating students. Details about this were collected in the Student Questionnaire, which students completed following the cognitive assessment.

##### *Family structure*

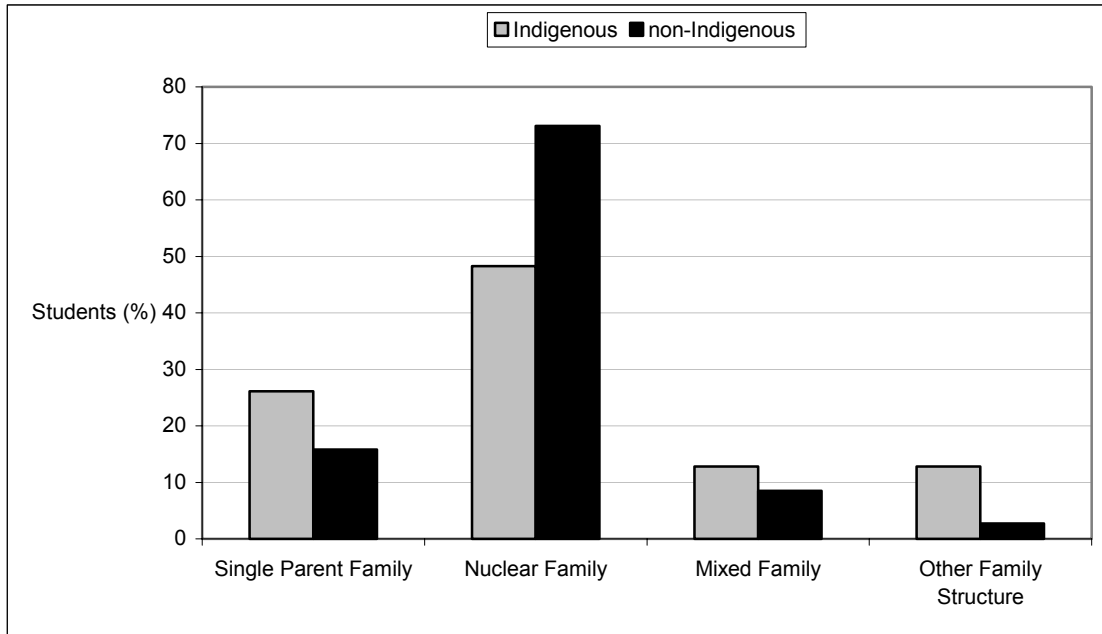
Students were asked about the make-up of their family and the following definitions were used:

- Single parent family: students who reported living with one of the following: mother, father, female guardian or male guardian;
- Nuclear family: students who reported living with a mother and a father;
- Mixed: students who reported living with a mother and a male guardian, a father and a female guardian, or two guardians.

Some interesting differences in family structure emerged between the Indigenous students and non-Indigenous students participating in PISA.

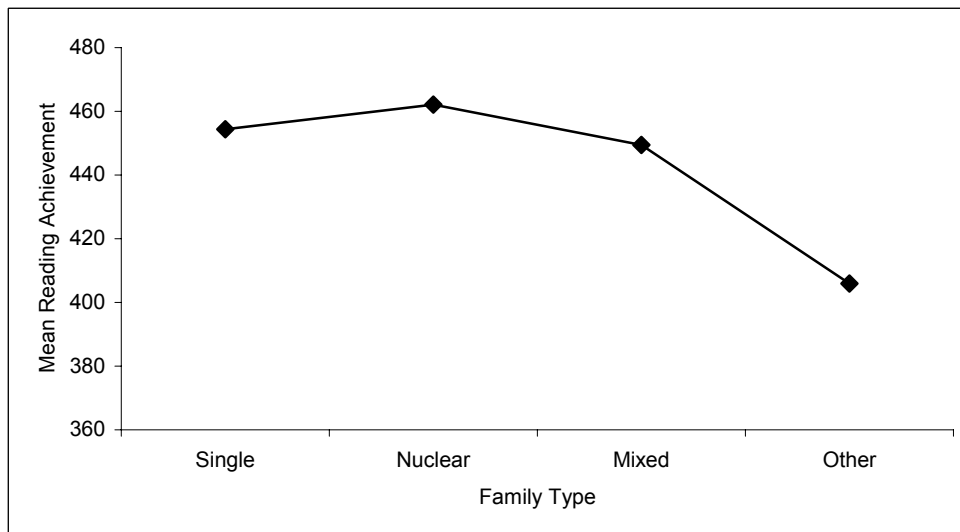
Compared with the non-Indigenous students:

- There were 10 per cent more Indigenous students who came from a single parent family.
- There were 25 per cent fewer Indigenous students who lived in a nuclear family.
- There were 4 per cent more Indigenous students who came from a mixed family.
- There were 10 per cent more Indigenous students who came from a different family structure.



**Figure 8 Family Structure of Indigenous and Non-Indigenous Students in Australia**

In Figure 9 it can be seen that for Indigenous Students, those who came from a nuclear family tended to score higher than students from other family types.



**Figure 9 Reading Achievement and Family Type of Indigenous Students**

The pattern shown in Figure 9 was similar to that for mathematical and scientific literacy achievement.

#### ***Language spoken at home and English proficiency***

The majority (83 per cent) of participating students in PISA in Australia spoke only English in their home. The next most frequently spoken languages in the home were Asian and European languages.

There were 13 per cent of Indigenous students in PISA who indicated they spoke an Indigenous Australian language at home. Of the students who spoke an Indigenous Australian language at

home, 11 per cent reported not speaking English well, 16 per cent reported they spoke English well and 73 per cent reported they spoke English very well.

### *Home possessions*

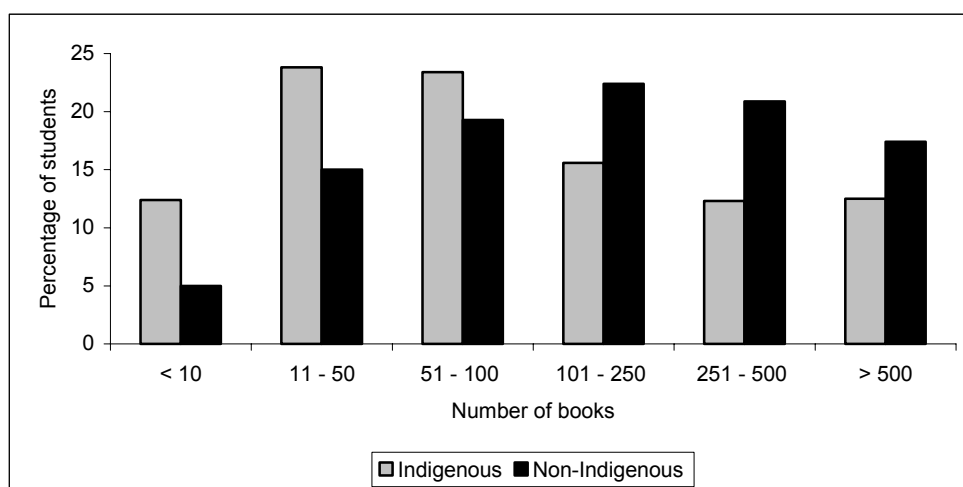
Two questions in the Student Questionnaire asked students about different possessions in their home. The first question listed 11 items and asked students to identify which of these items they had in the home. The second question also consisted of a list and asked students to indicate how many of each of the items listed they had in their home.

Overall, significantly fewer Indigenous students indicated they had the following possessions in their home - a dishwashing machine, a room of their own, educational software, a link to the internet, a dictionary, a quiet place to study, a desk for study, school text books and literary works. There were also more Indigenous students who did not have a mobile phone, a calculator, computer, musical instrument or a motor car at their home.

The PISA Student Questionnaire also asked the students about cultural possessions in the home as these have been found to be associated with student success. It was found that there were no significant differences in the percentage of Indigenous and non-Indigenous students who indicated they had books of poetry or works of art in their home.

### *Books in the home*

The number of books in the home can also be associated with student performance and the accompanying graph shows the number of books Indigenous and non-Indigenous students reported to have in their homes.



**Figure 10** Number of Books in the Homes of Indigenous and Non-Indigenous Students in Australia

Differences found between the Indigenous students and non-Indigenous students:

- Indigenous students reported having fewer books in the home.
- Approximately a third of Indigenous students have no more than 50 books in the home compared with a fifth of non-Indigenous students.
- There were significantly fewer Indigenous students (13 per cent) than non-Indigenous students (17 per cent) who have more than 500 books in the home.
- No significant differences were found between females and males and the number of books found in the home.

### Parents' education

The level of parental education is correlated with student success in reading. In PISA there was a correlation of 0.28 between fathers' education and student performance and 0.23 for mothers' education.

#### CORRELATION ANALYSIS

An analysis of the correlation between two variables can be used to investigate the association between them. If there is a significant positive correlation, it does not imply that one factor depends on the other or there is a cause-effect relationship between them – it simply means that they occur together. Further analysis and investigation is needed to determine the nature of the association. Correlation values range from  $-1$  (a negative correlation – as one goes up the other goes down) to  $+1$  (a positive correlation – as one goes up so does the other). One of the most commonly used measures is the Pearson correlation coefficient, which is abbreviated as  $r$ .

In PISA, parental educational attainment was assessed by asking students about their parents' highest level of education at secondary school and whether parents had completed a university degree. Table 3 shows parents' educational levels with the percentages for parents of both Indigenous and non-Indigenous students.

**Table 3 Parents' Educational Attainment**

Education Level	Indigenous Students		Non-Indigenous Students	
	Mother (%)	Father (%)	Mother (%)	Father (%)
Did not go to school	1.6	2.4	1.1	1.0
Completed primary school only	2.8	4.8	2.0	3.0
Completed some secondary school, but no more than Year 10	46.0	39.9	25.5	24.2
Completed Year 10 or 11 and did some training courses	13.5	22.1	15.6	16.1
Completed Year 12	19.4	16.4	24.7	21.8
Completed a university degree	16.7	14.3	31.1	33.9

Differences between mothers and fathers of Indigenous students:

- A small percentage of parents of Indigenous students either had no schooling or had not completed primary school.
- A higher percentage of fathers of Indigenous students completed Year 10 or 11 and attended some training courses than mothers of Indigenous students.
- A higher percentage of mothers of Indigenous students had completed Year 12.

Differences between parents of Indigenous students and parents of non-Indigenous students:

- Overall, the educational attainment of parents of Indigenous students was lower than for parents of non-Indigenous students.
- A higher percentage of parents of Indigenous students completed no more than Year 10 than parents of non-Indigenous students.
- Fewer parents of Indigenous students completed Year 12 compared with the parents of non-Indigenous students.
- Fewer parents of Indigenous students completed a university degree compared with the parents of non-Indigenous students.

### ***Home education resources***

The presence of educational resources in the home was found to be correlated positively with student performance in PISA ( $r=0.23$ ). The availability of a dictionary, a quiet place to study, a desk for study, textbooks and the number of calculators at home were used to create a scale of home educational resources.

This scale was standardised so that the mean of the scale across the OECD student population was zero and the standard deviation was one. The mean of -0.63 on the home educational resources scale indicates Indigenous students have fewer of these home educational resources than the OECD average. The mean for non-Indigenous students was about the OECD average at 0.07.

### ***Socioeconomic background***

The data collected on parents' occupation levels was used to give an indication of socioeconomic status. Level of occupation is an accepted means of comparing socioeconomic status across different countries. In PISA this is done according to the International Standard Classification of Occupations (ISCO). Socioeconomic status was found to be one of the most important background variables in relation to performance in Australia.

One way to compare the influence of socioeconomic status in different countries or of different groups is to plot students' performance against their socioeconomic status. If the gradient of this line is steep, it indicates that socioeconomic status has a greater influence on performance than if the gradient is flatter. A country would probably be aiming for a line that is high (indicating a superior level of performance) and flat (indicating a smaller effect of socioeconomic status). Figure 11 shows the social gradients<sup>5</sup> for several countries, and also for the Australian Indigenous sample.

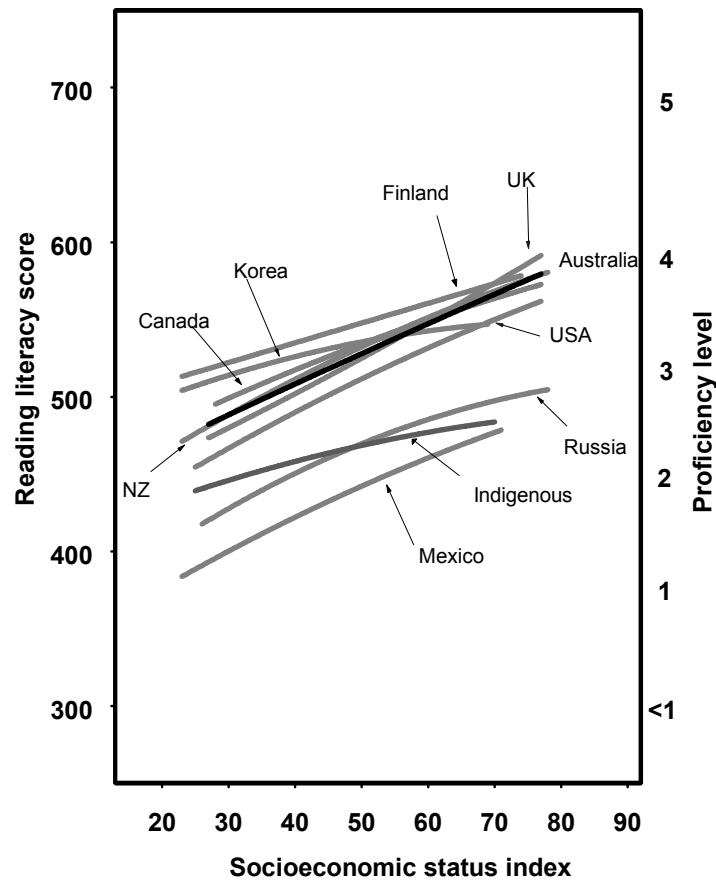
Generally, the relationship shows that students with lower levels of SES are more likely to have a lower achievement level. Likewise, students with higher levels of SES are more likely to have a higher achievement level.

The Indigenous sample has a smaller range of SES compared with the whole Australian sample. There is also a notable difference towards the end of the social gradient between the whole sample and the Indigenous sample. In the case of the whole sample, students with a high SES were also those students who were more likely to achieve higher. For the Indigenous sample, however, the social gradient shows there is less SES effect – that is, those students from a high SES, are likely to perform better, but the difference between low SES students and high SES is not as great as in the whole Australian sample. On its own, a flatter SES gradient indicates greater equity of outcomes in relation to background. The challenge is to raise the overall level rather than just the top end (see, for example, Korea, which shows relatively high achievement as well as relatively high equity in comparison with other countries).

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<sup>5</sup> The social gradient is able to provide information about how strongly students' results are related to SES (socioeconomic status) and the range of SES for a country.





**Figure 11 Relationship between Socioeconomic Status and Reading Literacy Performance for Several Countries as well as the Australian Indigenous Students**

#### OTHER STUDENT CHARACTERISTICS

The Australian PISA Student Questionnaire was adapted to include additional questions considered to be important for Indigenous students. These related to:

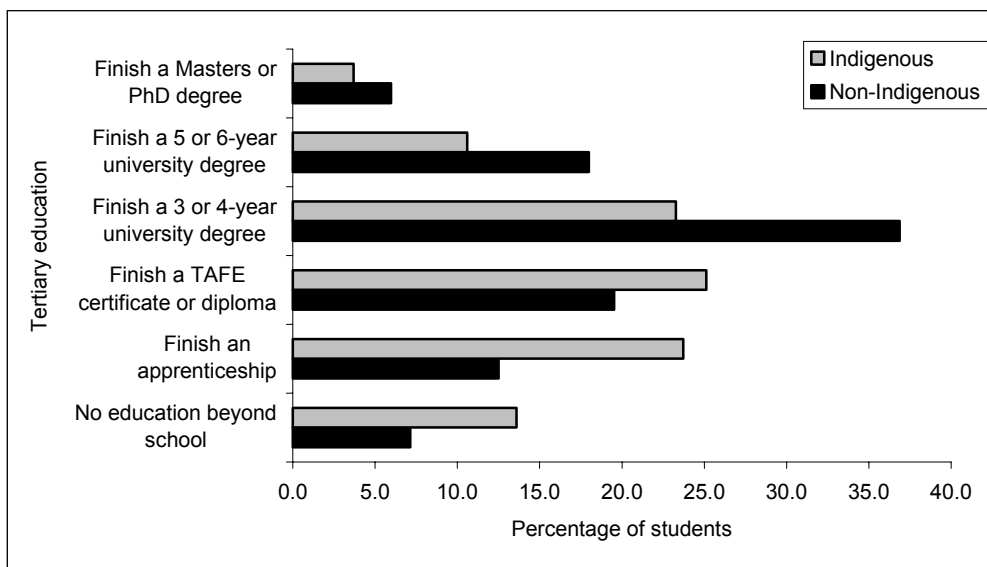
- Educational aspirations
- Absences from school over a given time period
- Travelling time to school
- Attitudes towards reading

The questions on country of birth and language spoken at home were also expanded to provide more detail than in the international questionnaire.

This section begins with a brief discussion of background information of Indigenous students and is followed by an examination of a range of student characteristics to provide insight about them, as well as determining which factors may be important for Indigenous students in influencing achievement.

### *Educational aspirations*

In PISA it was found that educational aspirations of students were strongly related to their academic performance in all three domains. Figure 12 shows the difference in educational aspirations of Indigenous and non-Indigenous students.



**Figure 12 Educational Aspirations for Indigenous and Non-Indigenous students beyond Secondary School**

Generally, Indigenous students have plans to stay in education for a shorter time than non-Indigenous students. It can be seen in Figure 12 that a greater percentage of non-Indigenous students intend to undertake university education.

About 13 per cent of the Indigenous students planned not to undertake any further education after completing secondary school. For those students continuing their education, a quarter of students expected to finish an apprenticeship and a further quarter indicated that they would finish a TAFE certificate or diploma.

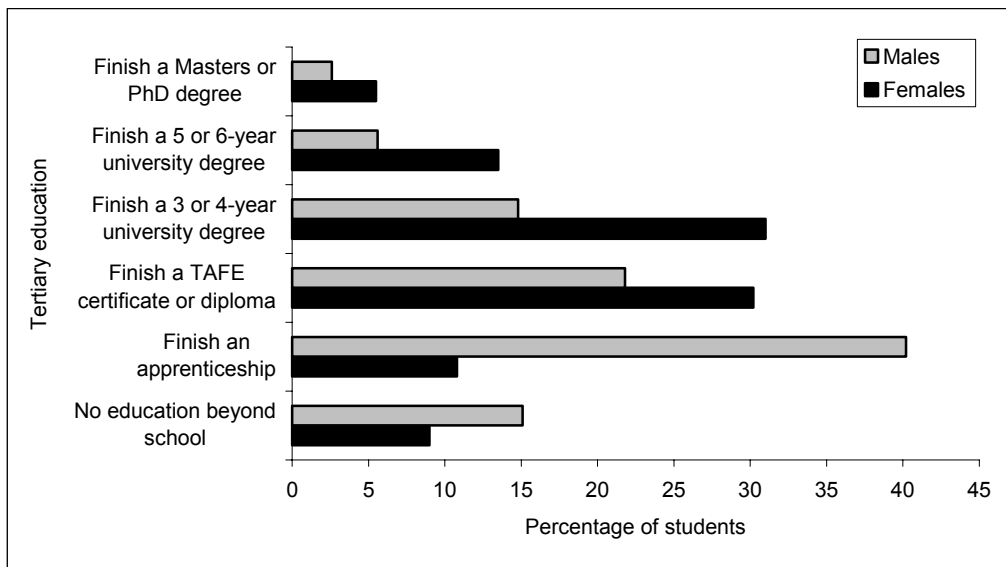
For those Indigenous students planning to attend university, almost a quarter intended finishing a 3- or 4-year degree, whilst a tenth hoped to finish a 5- or 6- year degree. Only a small percentage would aim to complete a Masters or PhD degree.

The differences between Indigenous and non-Indigenous students' educational aspirations beyond secondary school were significantly different for every category except finishing a Masters or PhD degree. There were higher percentages of Indigenous than non-Indigenous students who planned no further education beyond secondary school, finishing an apprenticeship or completing a TAFE certificate. There were lower percentages of Indigenous than non-Indigenous students who planned on finishing a 3-6 year degree.

Eighty-three per cent of Indigenous students, with a significantly higher percentage of females than males, indicated they planned to complete Year 12. Approximately 5 per cent of Indigenous students intended to finish their secondary education at Year 11. Twelve per cent indicated at Year 9 or 10, and twice as many Indigenous males than Indigenous females indicated going no further with their education after secondary school.

There were also some differences noted between Indigenous males and females. Figure 13 shows the educational aspirations of Indigenous students by gender.

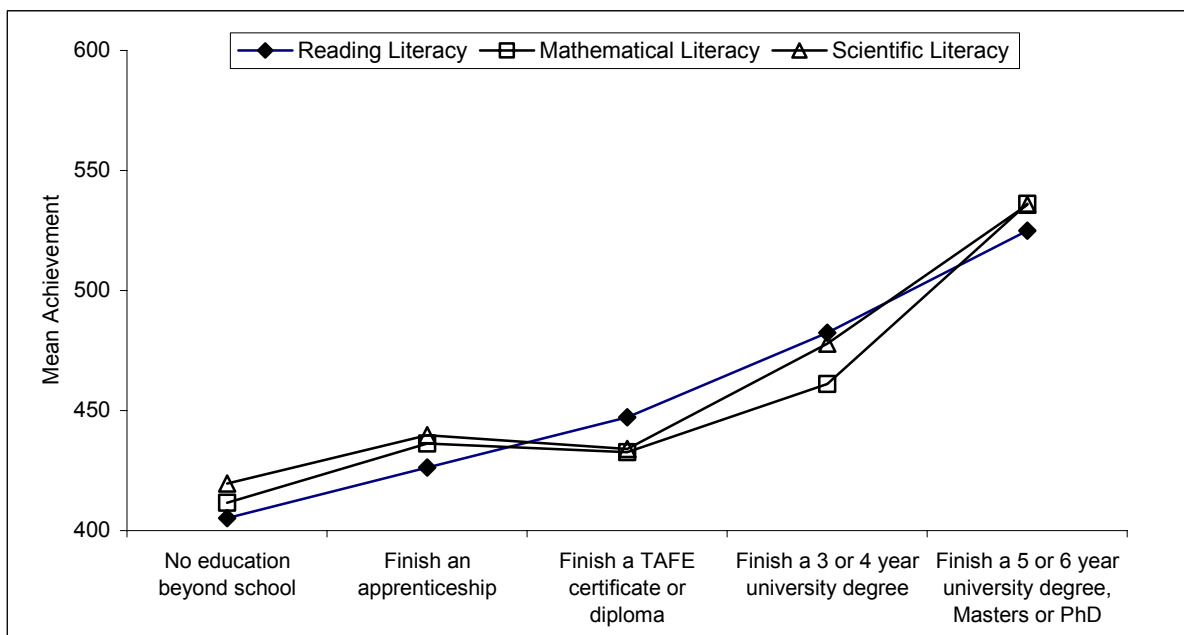
There were more Indigenous males than Indigenous females not planning to continue into tertiary education but a greater percentage of males planned to finish an apprenticeship. There were more Indigenous females than Indigenous males planning to complete a TAFE certificate or a degree at university.



**Figure 13 Educational Aspirations for Indigenous Males and Females beyond Secondary School**

The positive relationship between educational aspirations and achievement was found to be one of the highest of all the contextual variables. The correlation was 0.27 for Indigenous students and 0.31 for non-Indigenous students.

The positive relationship between educational aspirations and student performance for Indigenous students is illustrated in Figure 14.



**Figure 14 Student Performance and Educational Aspirations beyond School for Indigenous Students**

*Absence from school*

A question relating to student absence was added to the Australian PISA Student Questionnaire. Previous studies have shown a higher absentee rate for Indigenous students compared with non-Indigenous students, and subsequently performance is affected. Students were asked about the number of times in the previous two weeks they had been absent from school, skipped a class or arrived late for school. Table 4 shows the mean scores obtained by the students according to their pattern of absences. It shows that, generally, students with a smaller number of absences tend to perform better.

**Table 4 Mean Scores for Students with Different Patterns of Absence**

Pattern of absences	Mean score
A few days	532.5
One or two weeks	530.6
Three weeks to a month	530.1
Half a term	517.3
More than half a term	482.4

The pattern of absences is shown in Table 5, and it can be seen that Indigenous students tend to be absent from school more frequently than non-Indigenous students.

**Table 5 Percentage of Indigenous and Non-Indigenous Students who were Absent or Arrived Late for School in the Previous Two Weeks\***

		No days	1 or 2 days	3 or 4 days	More than 5 days
Miss a whole day of school?	Indigenous	<b>40.7</b>	<b>45.7</b>	<b>8.9</b>	4.7
	Non-Indigenous	<b>57.7</b>	<b>34.1</b>	<b>5.3</b>	2.9
Arrive late for school?	Indigenous	<b>52.0</b>	29.5	<b>10.5</b>	<b>8.0</b>
	Non-Indigenous	<b>67.6</b>	23.6	<b>5.7</b>	<b>3.2</b>
Skip classes?	Indigenous	<b>81.6</b>	12.5	4.1	1.8
	Non-Indigenous	<b>86.1</b>	10.4	2.3	1.2

\* Figures in bold indicate a statistically significant difference ( $p \leq 0.05$ ) between Indigenous and non-Indigenous students in that category.

*Travel time to school*

Students were asked about how long it takes them to get to school. Overall, Indigenous students reported shorter travelling times to school compared with the non-Indigenous students, as can be seen in Table 6.

The differences are possibly related to the fact that there is a larger percentage of Indigenous students in smaller, remote communities where the school is part of the community, compared with metropolitan areas where students may use public transport to reach schools some distance from their homes. Travelling time does not appear to be a significant factor related to student performance.

**Table 6 Travelling Time to School for Indigenous and Non-Indigenous Students\***

	Indigenous students	Non-Indigenous students
Less than 15 minutes	<b>56.5</b>	<b>47.2</b>
15 – 30 minutes	24.8	27.5
30 – 60 minutes	15.7	18.0
More than 60 minutes	<b>3.0</b>	<b>7.4</b>

\* Figures in bold indicate a statistically significant difference ( $p \leq 0.05$ ) between Indigenous and non-Indigenous students in that category.

### *Students' attitudes towards reading*

The importance of attitudes on achievement has been explored through numerous studies (Kirsch et al., 2002). The PISA Student Questionnaire also included a section measuring the attitudes of students towards reading and found that engagement with reading is a most important factor associated with student performance.

Nine attitudinal statements related to reading were used to create a scale of engagement in reading (see Table A1). This scale has been standardised so that the mean of the scale across the OECD was zero and the standard deviation was 1.0. As can be seen in Table 7, Indigenous students had a mean of -0.22, which was lower than the OECD average and below the mean for non-Indigenous students (-0.07).

The mean for Indigenous females on the engagement in reading scale was at the OECD average of 0.02, while the mean for Indigenous males -0.48, illustrating that Indigenous males were not only less likely to engage in reading than Indigenous females, but were actually less engaged in reading than non-Indigenous males and females.

**Table 7 Student Engagement with Reading**

Engagement with Reading			
Non-Indigenous	-0.07	male	-0.28
		female	0.17
Indigenous	-0.22	male	-0.48
		female	0.02

There were differences between the Indigenous and non-Indigenous students noted in some of the items that contributed towards the measurement of reading engagement. The percentage student responses in some individual items are shown in Table 8. It can be seen, for example, that 50 per cent of Indigenous students responded positively to the item that they only read if they have to compared with the 39 per cent of non-Indigenous students; and 59 per cent of Indigenous students compared with 45 per cent of non-Indigenous students agreed or strongly agreed that they read only to get information that they need.

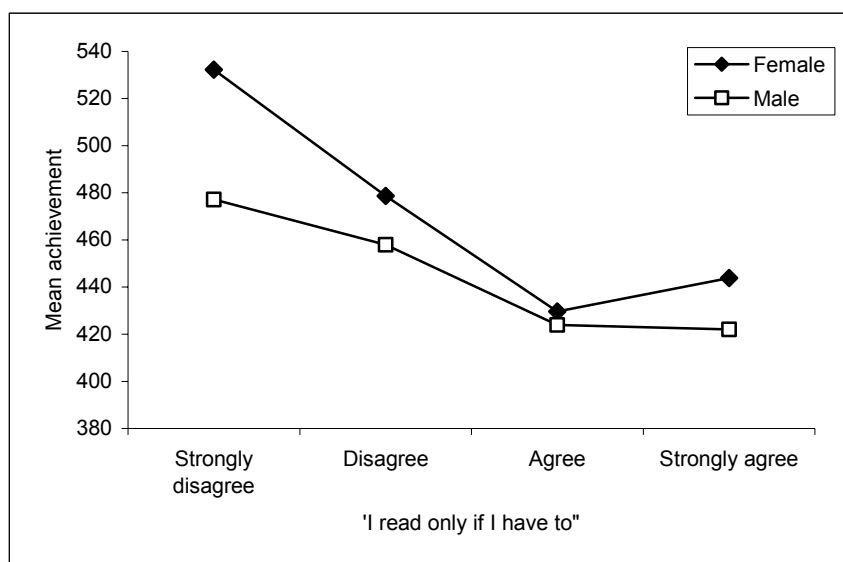
Differences between Indigenous females and males were also found for some of the response categories from the attitudinal items. Table A1 (in Annex 1) shows that more males than females read only if they have to, that they find it hard to finish a book and think that reading is a waste of time. Overall, the differences show that Indigenous females have more positive attitudes towards reading than Indigenous males – this same pattern was also observed for non-Indigenous students.

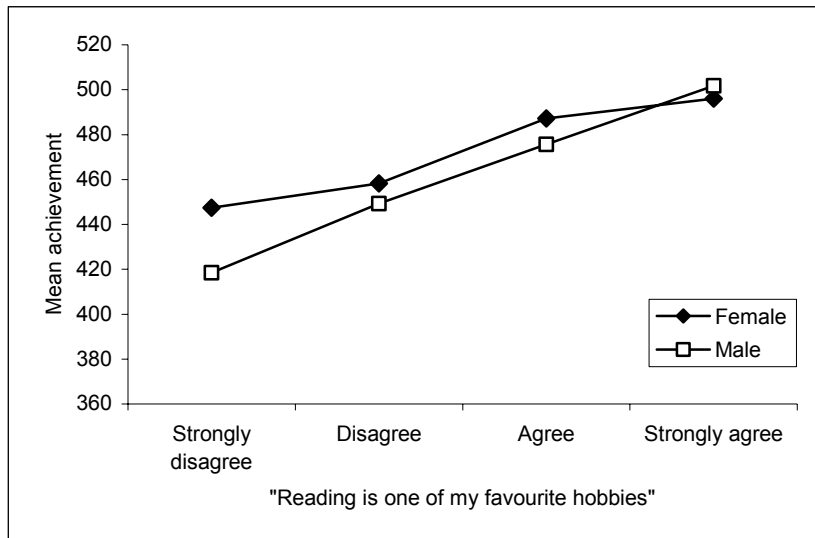
**Table 8 Percentages of Indigenous and Non-Indigenous Students' Responses on some of the Reading Attitude Items**

Item	Strongly Disagree		Disagree		Agree		Strongly Agree	
	Indig	Non I	Indig	Non I	Indig	Non I	Indig	Non I
I read only if I have to.	16.0	23.3	34.5	38.2	36.0	25.3	13.5	13.2
For me, reading is a waste of time.	25.3	33.0	48.0	43.3	17.3	15.1	9.4	8.6
I read only to get information that I need.	8.6	14.5	32.5	40.8	45.3	32.6	13.7	12.1
I cannot sit still and read for more than a few minutes.	27.2	38.8	44.4	40.3	18.1	13.2	10.4	7.7

It has been found in PISA, that engagement with reading is significantly associated with achievement (Kirsch et al., 2002). The level of correlation between engagement and reading literacy achievement for the whole Australian sample was 0.43. Engagement with reading has less impact on Indigenous students, with a correlation of 0.31 with reading performance. When socioeconomic status and other home background factors are taken into account, engagement with reading is still the most important factor related to student performance in reading.

Examples of the relationship between some of the attitudinal items and reading achievement for the Indigenous students are shown in the following figures:

**Figure 15 Relationship between Reading Achievement and Indigenous Students' Responses to 'I only read if I have to'**



**Figure 16 Relationship between Reading Achievement and Indigenous Students' Responses to 'Reading is one of my favourite hobbies'**

## STUDENTS' READING HABITS

### *Types of reading materials*

Students were given a list of six different reading materials – magazines, comic books, fiction (for example, novels, narratives, stories), non-fiction books, emails/web pages and newspapers and were asked to indicate how often they read these materials. The responses showed that the materials which Indigenous students read several times a week were: newspapers (45 per cent), magazines (35 per cent) and emails and web pages (23 per cent). Comic books were the least chosen reading material with 58 per cent of Indigenous students reporting they never read this kind of material.

Thirty-four per cent of Indigenous students never read fiction or non-fiction books. Fiction and non-fiction books were read several times a week by only 12 and 5 per cent of Indigenous students respectively.

On comparing the significant differences between Indigenous females and males, males read comic books more frequently than females. Fewer males than females read fiction books, with twice as many males reported never reading fiction books.

A reading diversity scale was created using the six different reading materials. The mean for Indigenous students was just below the OECD average, at  $-0.05$ , and above the OECD average, at  $0.06$ , for non-Indigenous students.

The mean for Indigenous females was at the OECD average and for Indigenous males was  $-0.12$ , indicating the reading material they read was not as diverse as the OECD average or the Indigenous females.

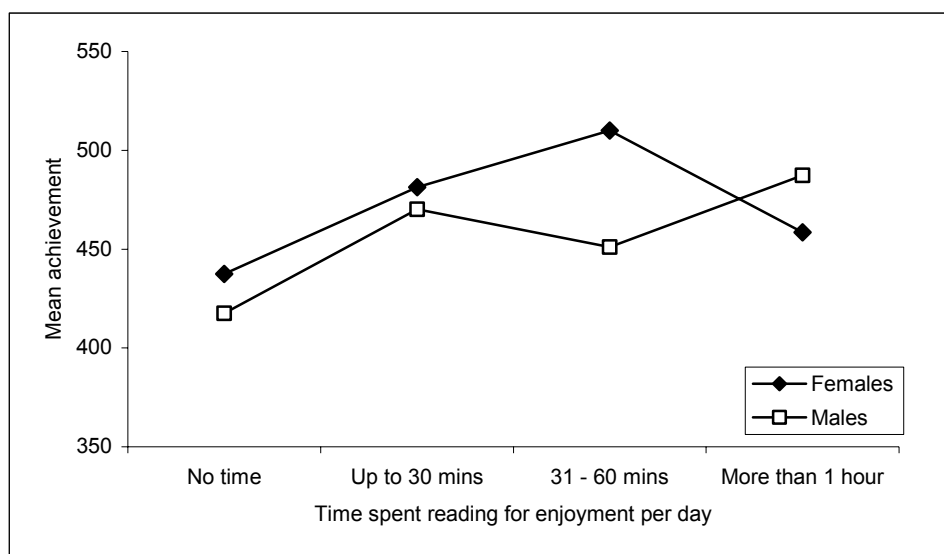
The association between reading diversity and reading achievement literacy was positive for both Indigenous and non-Indigenous students and showed one of the strongest relationships compared with the other PISA scales at  $0.32$ .

### *Reading for enjoyment*

A third of Australian students do not read each day for enjoyment and there are significantly more Indigenous students (39 per cent) than non-Indigenous students (33 per cent) in this group. For students reading up to and more than 30 minutes per day, there were no significant differences between Indigenous and non-Indigenous students with 21 per cent of students spending between 30 to 60 minutes and 16 per cent of students spending at least one hour per day reading.

Overall differences within the Indigenous student sample showed that females read more for enjoyment than males. Half the Indigenous males spent no time reading for enjoyment each day compared with a third of Indigenous females. The relationship between reading enjoyment and student performance for Indigenous students by gender is shown in Figure 17. It can be seen that Indigenous females who read for up to one hour per day had a higher level of achievement than those Indigenous females who spent no time reading for enjoyment. However, spending more than one hour per day on this activity does not increase the level of achievement. In fact, the 18 per cent of Indigenous females who reported they spent more than one hour per day reading for enjoyment achieved a lower reading achievement score than the 52 per cent of Indigenous females spending up to one hour per day.

It can also be seen in Figure 17, that the relationship between reading achievement and reading for enjoyment for Indigenous females is different to that for Indigenous males. The graph illustrates that reading achievement increases for the 26 per cent of Indigenous males who spent up to 30 minutes or the 9 per cent who spent more than one hour per day reading for enjoyment. However the 15 per cent of Indigenous males who spent between 31 and 60 minutes reading achieved slightly lower than the other Indigenous male students who spent either less or more time reading.



**Figure 17 Relationship between Reading Achievement and Time Spent on Reading for Enjoyment by Gender**

### *Borrowing books from the library*

A library provides a facility for students to have access to books and other educational resources. The findings show that students, in Australia, generally are not so inclined to borrow books to read for pleasure from a public or school library. The responses show that 45 per cent of Indigenous students reported they never or hardly ever borrow books for this purpose. This percentage was significantly higher compared with the 38 per cent of non-Indigenous students who also never or hardly ever borrowed books for reading for enjoyment. (The Indigenous students participating in



PISA did not generally come from extremely remote areas so inaccessibility to a library may not be the reason for these students not borrowing books.)

In Australia, females were found to use the public or school library more often than males. These differences were significant except for those students who borrowed books once a month. Table 9 shows the frequency PISA Indigenous females and males borrow books from a public or school library.

**Table 9 Percentages of Indigenous Female and Male Students Borrowing Books from a Public or School Library**

Frequency of Borrowing	Females	Males
Never/hardly ever	33.0	58.3
Few times a year	37.6	20.9
About once a month	17.3	18.0
Several times a month	12.2	2.8

## LEARNING STRATEGIES

Learning continues throughout life and each individual needs to have processes to be able to monitor their own learning and integrate new skills and knowledge once they have completed their 'formal' education. PISA assesses a range of learning strategies, preferences and behaviours which are relevant to all areas of study during and beyond formal schooling.

The PISA Student Questionnaire, in the self-regulated learning section, asked questions related to different styles of students' learning strategies – for example, how students control their learning process, whether they use memorisation strategies and whether they use elaboration strategies.

### *Control strategies*

Control strategies relate to the way students monitor their learning. The control strategies scale was derived from how often students agreed with a series of statements such as, 'I start by working out exactly what I need to learn' and 'I force myself to check to see if I remember what I have learned'. All the statements are listed in Table A2.

The results of these items were combined into a scale which was standardised to a mean of zero and a standard deviation of 1.0 across the OECD. It was found that Indigenous students were less likely to use control strategies than non-Indigenous students with means of -0.06 and 0.02 respectively, although this was not statistically significant<sup>6</sup>.

Indigenous females were more frequent users of control strategies than Indigenous males. The mean for Indigenous females (0.03) was close to the OECD average compared with the Indigenous males' mean of -0.17, which was below the OECD average – this difference is not statistically significant.

Examining the statements individually showed that about twice as many Indigenous females than males almost always worked out exactly what they needed to learn, forced themselves to check to see if they remembered what they had learnt and made sure that they remembered the most important things.

<sup>6</sup> Statistical significance is related to sample size. The relatively small sample of Indigenous students leads to a larger standard error and less likelihood of significant differences. It has been decided to report the means of both populations, with an indication of significance.

For the whole Australian sample, the relationship between control strategies and student achievement was positive and higher for reading literacy achievement ( $r = 0.21$ ) than for mathematical literacy achievement ( $r = 0.17$ ) or scientific literacy achievement ( $r = 0.19$ ).

### ***Elaboration strategies***

Elaboration strategies relate to the degree that students will apply knowledge to new situations. They answered a series of items such as, 'I try to relate new materials to things I have learned in other subjects' and 'I think about how the information might be useful in the real world'.

Both Indigenous and non-Indigenous students reported using elaboration strategies more often than the OECD average. The Indigenous students' mean (0.04) was slightly lower than for the non-Indigenous students' (0.07).

Indigenous females used elaboration strategies less than Indigenous males. The mean for Indigenous females was  $-0.03$  compared with the  $0.11$  mean for the Indigenous males. Table A3 in Annex 1 shows two significant differences where Indigenous males more often tried to relate materials to things they had learnt in other subjects and they tried to understand the material better by relating it to things they already knew.

### ***Memorisation strategies***

Students were asked how much they use memorisation as a strategy for learning. The means for memorisation strategies for both Indigenous and non-Indigenous students were similar (mean of  $0.14$  and  $0.15$  respectively). Indigenous females were twice as likely to use memorisation strategies for learning (with a mean of  $0.19$ ) than Indigenous males (a mean of  $0.11$ ).

A very weak association was found between the three literacy domains and memorisation strategies. A correlation of  $0.14$  was found for both reading literacy and scientific literacy and a slightly smaller correlation for mathematical literacy and memorisation strategies ( $r = 0.06$ ).

## **LEARNING PREFERENCES AND BEHAVIOURS**

### ***Competitive learning***

Students were asked if they were competitive in their approach to learning – whether they were conscious of trying to be better than the other students. The statements relating to the competitive learning scale are listed in A5 in Annex 1. There was a significant difference observed between the mean of the Indigenous students and non-Indigenous students on this scale. The mean for the Indigenous students was below the OECD average at  $-0.04$  compared with the non-Indigenous mean of  $0.10$ . It was found that a competitive learning approach is significantly associated with student performance for non-Indigenous students.

### ***Cooperative learning***

Students were asked how much they liked working with and helping other students (see Table A6 in Annex 1 for the statements). The mean was slightly (but not significantly) higher for the Indigenous students ( $0.06$ ) than for the non-Indigenous students ( $0.03$ ).

The largest difference between the mean for Indigenous females and males was found with this learning preference. Indigenous females favoured the style of cooperative learning more than Indigenous males ( $0.18$  and  $-0.06$  respectively).

The correlations were higher for mathematical literacy achievement and the cooperative learning scale ( $r = 0.25$ ) and reading literacy achievement and the cooperative learning scale ( $r = 0.18$ ) than for scientific literacy achievement and the cooperative learning scale ( $r = 0.13$ ).

### *Self-efficacy*

Indigenous students' perception of self-efficacy was slightly more negative, with a mean of -0.04, than for the OECD average and for the non-Indigenous students (mean of 0.10).

Self-efficacy was also lower for the Indigenous females than the Indigenous males. (The mean for Indigenous females was -0.12 compared with a mean of 0.04 for the Indigenous males.) Results are shown in Table A8 in Annex 1.

The relationship between self-efficacy and performance in the literacy domains showed the higher the belief in perceived self-efficacy, the higher the achievement. The correlation with self-efficacy was higher for scientific literacy achievement ( $r = 0.27$ ), than reading literacy achievement ( $r = 0.19$ ) and mathematical literacy achievement ( $r = 0.18$ ).

### *Effort and perseverance*

The mean for the Indigenous students was -0.06 compared with the mean for non-Indigenous students of 0.02. The statements in Table A9 in Annex 1 were used to construct the effort and perseverance scale.

Indigenous females reported putting more effort and perseverance into studying than the Indigenous males with means of 0.00 and -0.12 respectively.

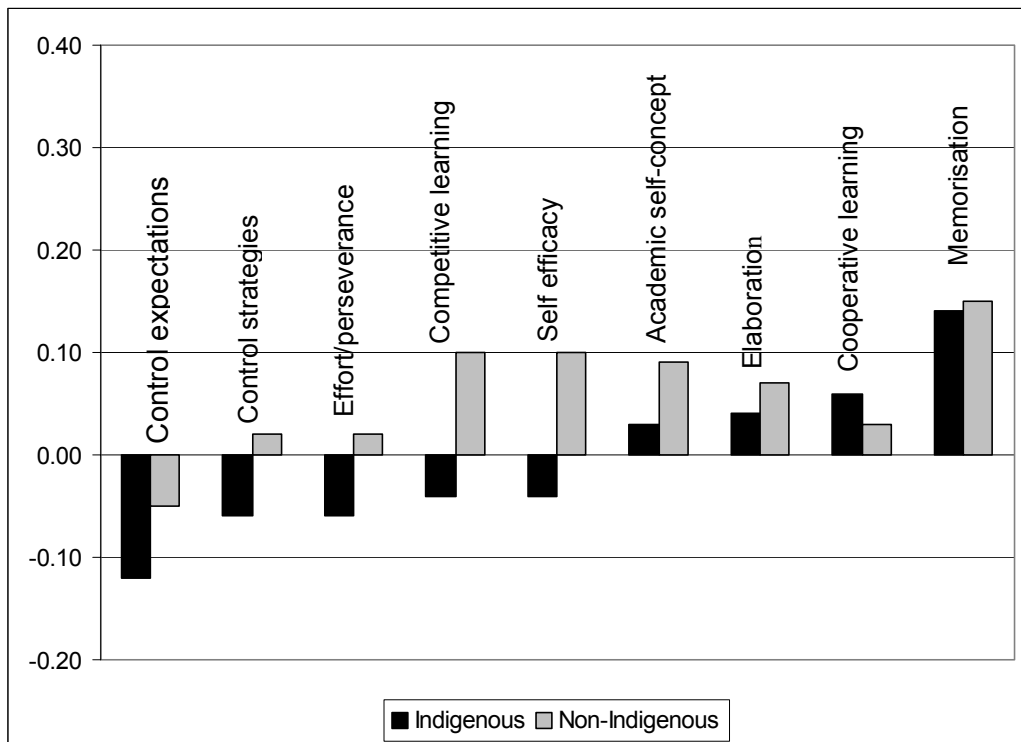
The relationship between effort with perseverance and performance in the literacy domains was weak with the correlation for reading literacy achievement at 0.10, for mathematical literacy achievement at 0.07 and scientific literacy achievement at 0.08.

## **COMPARING LEARNING STRATEGIES, LEARNING PREFERENCES AND BEHAVIOURS FOR INDIGENOUS STUDENTS**

Students need to be able to assess their own learning capabilities and set their own goals for life-long learning. PISA has examined some of the learning strategies, preferences and behaviours used by students. Some of the findings include:

- The largest differences between Indigenous and non-Indigenous students were found in the competitive learning and self-efficacy scales.
- Indigenous students were less frequent users of elaboration and control strategies compared with the non-Indigenous students.
- There was little difference between Indigenous and non-Indigenous students in their use of memorisation strategies.
- Indigenous students were more likely to be cooperative learners whereas non-Indigenous students were more likely to be competitive learners.
- The learning preference scale means indicate the Indigenous students used control expectations and control strategies the least.
- Memorisation was the most frequent learning strategy used by the Indigenous students.
- Indigenous students had a lower belief of self-efficacy than non-Indigenous students.

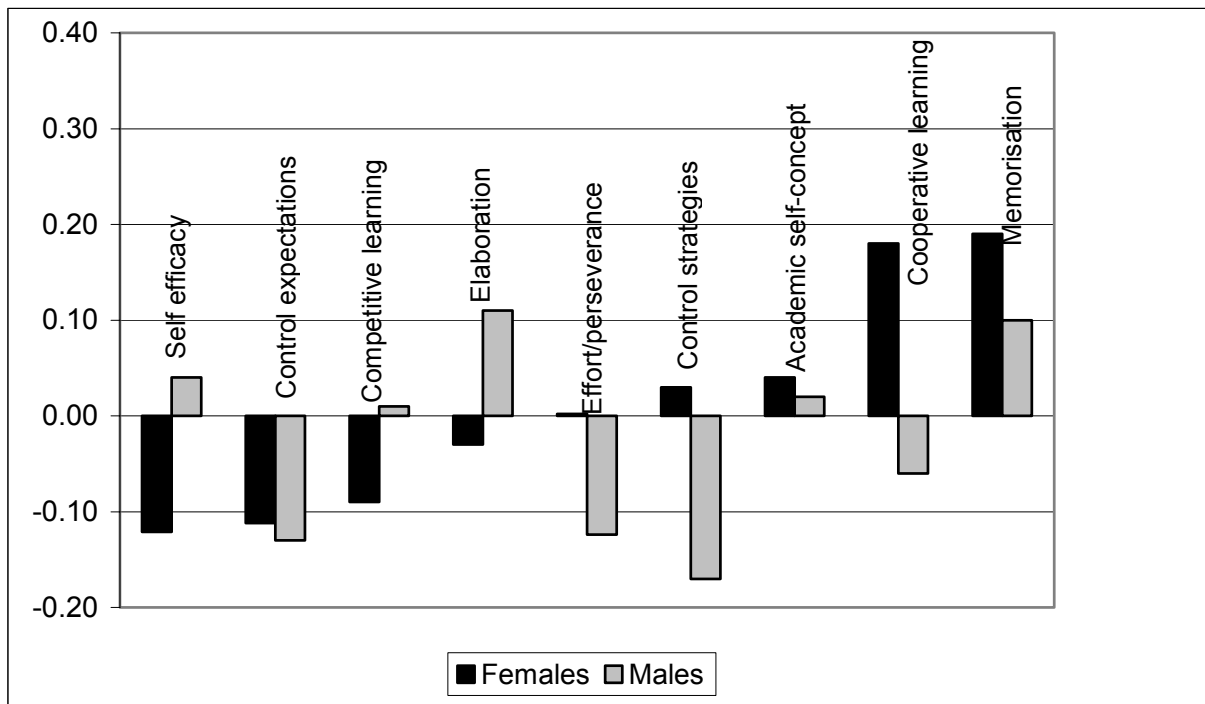
Figure 18 shows the means for Indigenous and non-Indigenous students on each of the scales.



**Figure 18 Indigenous and Non-Indigenous Students' Means on Each of the Self-regulated Learning Scales**

There were also differences found between Indigenous males and females. The findings are listed below, followed by Figure 19, which shows the means on each of the scales for Indigenous females and males.

- The largest differences between Indigenous females and males were found in cooperative learning and control strategies.
- The learning strategies of control and memorisation were favoured more by Indigenous females than males.
- Indigenous females were less likely to use elaboration strategies than Indigenous males.
- The means for both Indigenous females and males were similar for control expectations and academic self-concept.
- Indigenous females were more likely to prefer cooperative learning whereas Indigenous males were more likely to prefer competitive learning.
- Indigenous females had a lower self-efficacy than Indigenous males.
- Indigenous females were more likely to use effort and perseverance when studying compared with Indigenous males.



**Figure 19 Indigenous Females' and Males' Means on Each of the Self-regulated Learning Scales**

For the Australian sample, positive relationships between each of the scales and literacy domains were found. The association between each literacy domain and the academic self-concept scale were found to be the highest ( $r = 0.24$  for reading and mathematical literacy achievement and  $r = 0.27$  for scientific literacy achievement). The next highest correlations were found between reading literacy achievement and control strategies ( $r = 0.21$ ), and mathematical literacy achievement and cooperative learning ( $r = 0.25$ ).

The relationship between scientific literacy achievement and the different scales showed correlations between 0.22 and 0.27 for five of the scales, including academic self-concept. The other scales, from lowest to highest, were elaboration strategies, control expectations, competitive learning and self-efficacy.

Although preliminary analyses have found a positive association between learning styles and achievement, this has not been found to be consistent across countries, i.e. those countries that have performed well in PISA are not necessarily those countries which achieved the highest mean scores on the scales related to learning style. It appears that while these factors are important there are more significant influences on student performance.

The analysis of strategies has also been able to identify those which are linked to achievement and also to identify differences found between Indigenous and non-Indigenous students, and Indigenous females and males.

### THE LEARNING ENVIRONMENT

Factors such as the classroom climate, a student's sense of belonging, teacher support and the teacher-student relationship may influence a student's achievement through their attitudes and beliefs about school. It would be expected that students who have supportive relationships with their teacher and feel they are a part of the school community would perform better than those students who have negative beliefs about their school environment.

This section reports on the scales created in PISA that relate to students' perceptions of their classrooms and schools. Two of the scales related to behaviour of students and teachers in their English class. Other scales were more general and related to students' relationship to the school and with their teachers. The following scales were derived: student's sense of belonging; family educational support, teacher support, teacher-student relations and disciplinary climate.

Two additional scales – family educational support and time spent on homework have also been reported in this section as they relate to schoolwork.

### ***Student's sense of belonging at school***

The student's sense of belonging scale consisted of six statements, such as 'My school is a place where I make friends easily'. (All details are shown in Table A10 in Annex 1) The data suggests that Indigenous students have a more positive sense of belonging in their school compared with non-Indigenous students. The mean for Indigenous students was 0.10 which was significantly higher than the mean for non-Indigenous students at -0.05. It may be that Indigenous students are more likely to be part of a community school, and they feel comfortable with the links between the community and the school.

This finding is important in itself although the association between a student's sense of belonging and the three literacy domains were weak, with a correlation of 0.08 for scientific literacy achievement, 0.11 for reading literacy achievement and 0.15 for mathematical literacy achievement.

### ***Teacher-student relations***

The statements relating to the teacher-student relations scale are shown in Table A11 in Annex 1. Indigenous students had a lower level on the teacher-student relations scale than the non-Indigenous students (mean of 0.08 and 0.17 respectively). Indigenous females had a higher level on the scale with a mean of 0.15 compared with a mean of zero for the Indigenous males.

There were weak positive correlations between the teacher-student relations scale and achievement. The relationship between teacher-student relations and mathematics literacy was 0.17, for reading literacy  $r = 0.17$  and for scientific literacy  $r = 0.16$ .

### ***Teacher support***

The teacher support scale was constructed using the statements which related to the frequency of various behaviours or activities that occur in English lessons (Table A12). Indigenous students reported their teachers being very supportive in their English lessons, with a mean of 0.37, which is well above the OECD mean of zero. It was slightly lower than the mean for the non-Indigenous students (0.42) – although this difference was not statistically significant.

### ***Disciplinary climate***

The disciplinary climate scale related to the students' perceptions of their English lessons. The Indigenous students, with a mean of 0.17, reported there were fewer disciplinary problems in their English lessons than the non-Indigenous students, who had a lower mean of 0.09. The Indigenous females also reported that their English lessons were also hindered more by disciplinary problems than Indigenous males (means of 0.09 and 0.25 respectively). See Table A13 for a full description of the items.

## LEARNING OUTSIDE SCHOOL

### *Family educational support*

The family educational support scale related to the frequency with which their mother, father, and/or siblings work with them on their schoolwork (Table A14). The mean of 0.18 for Indigenous students (compared with the OECD mean of zero) indicated they had family members with them more frequently. Indigenous females reported their family members worked with them on their schoolwork (0.26) more than Indigenous males (0.01).

Having family members work with the student on schoolwork was not significantly associated with achievement. Only low correlations were found between each literacy domain and the family educational support scale ( $r = 0.16$  for scientific literacy;  $r = 0.09$  for reading literacy and  $r = 0.06$  for mathematical literacy).

### *Time spent on homework*

In both the national and international reports, one of the significant findings is that the amount of homework done by students is associated with their performance. The responses for Indigenous females and males are shown in Table A15. The mean of -0.21 for Indigenous students compared with a mean of 0.06 for non-Indigenous students, indicated the Indigenous students reported less time was spent on homework for English, Mathematics and Science than the non-Indigenous students. Indigenous females also reported spending more time on homework with a mean of -0.09, than for the Indigenous males, with a mean of -0.36.

The correlations between achievement in each literacy domain and the time spent on homework were all similar, and compared with the other scales relating to the learning environment at school were higher. For reading literacy, the correlation was 0.28, for mathematical literacy, 0.29, and for the scientific literacy, 0.29. There were no significant differences between Indigenous and non-Indigenous students.

### *Summary*

The scales derived in PISA have shown some interesting findings. A summary of points is listed below:

#### *Differences between Indigenous and non-Indigenous students*

- The largest differences between Indigenous and non-Indigenous students were found in the time spent on homework. Indigenous students reported spending less time on homework each week than the non-Indigenous students. Homework was found to be positively correlated with performance for both Indigenous and non-Indigenous students;
- Indigenous students have a more positive sense of belonging at school than the non-Indigenous students. The mean for Indigenous students was above the OECD average whereas the mean for the non-Indigenous students was below the OECD average;
- Indigenous students reported having a very supportive teacher in their English lessons with a mean above the OECD average and only slightly lower than the mean for non-Indigenous students;
- Indigenous students reported their family members work with them more often on their schoolwork than non-Indigenous students; and
- Indigenous students reported fewer disciplinary problems in their English lessons than non-Indigenous students.

*Differences between Indigenous males and females*

- The largest differences between Indigenous females and males were found in the amount of time spent on homework during the week. Indigenous females spent more time on homework than Indigenous males;
- Indigenous females reported there being more disciplinary problems and had a slightly weaker sense of belonging in the school than Indigenous males; and
- Indigenous females reported having stronger teacher-student relationships, a more supportive teacher in English lessons and had family members work with them on schoolwork more often than Indigenous males.

**FAMILIARITY AND COMPETENCY IN USING COMPUTERS**

A questionnaire assessing the familiarity with and competency in using computers among 15-year-olds was offered internationally as an option. Our world is becoming more technologically oriented and students now need to be competent in using these tools. Australian students took part in this option, which involved a self-assessment of their attitudes and ability to work with computers.

*Availability and usage of computers*

There were significantly more Indigenous students who reported that they did not have a computer in their home – 35 per cent, compared with 8 per cent of non-Indigenous students. This resulted in a generally lower level of computer usage for Indigenous students at home: 24 per cent of Indigenous students reported using a computer almost every day at home, compared with 45 per cent of non-Indigenous students.

At school, however, no significant differences were found between the percentages of Indigenous and non-Indigenous students and the frequency they used a computer.

*Comfort and perceived ability with computers*

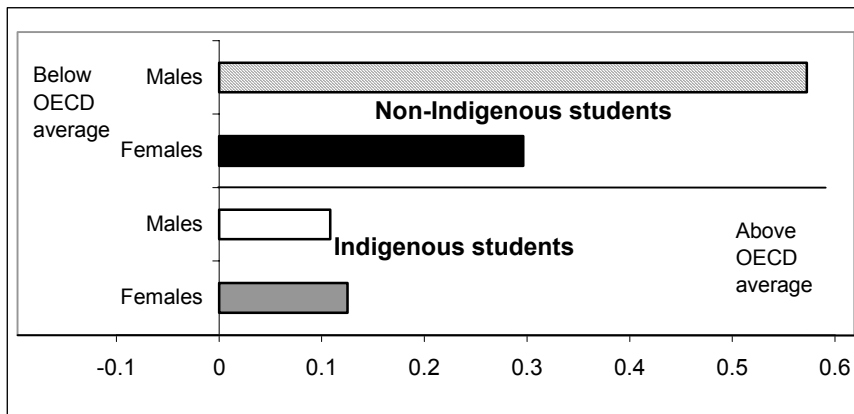
Sixty-seven per cent of the Indigenous students rated their ability to use a computer as 'good' or 'excellent' compared with 75 per cent of non-Indigenous students. There were little differences between the Indigenous females' and males' perceptions on their ability to use a computer.

The question above, along with three other questions (how comfortable are you using a computer, in general, to write an essay and taking a test on a computer) were constructed to form the 'comfort and perceived ability with computers' scale. The mean for the OECD as a whole was set to zero and a standard deviation of one. A positive value indicated a mean above the OECD and a negative value indicated a mean below the OECD.

Indigenous students in Australia were, on the whole, less comfortable with computers than non-Indigenous students. They were, however, more comfortable than the majority of the countries taking part in this optional questionnaire.

There was little difference between Indigenous females and males in their perceived comfort and ability with computer.





**Figure 20 Comfort and Perceived Ability with Computers - Means for Indigenous and Non-Indigenous Males and Females**

### *Interest in computers*

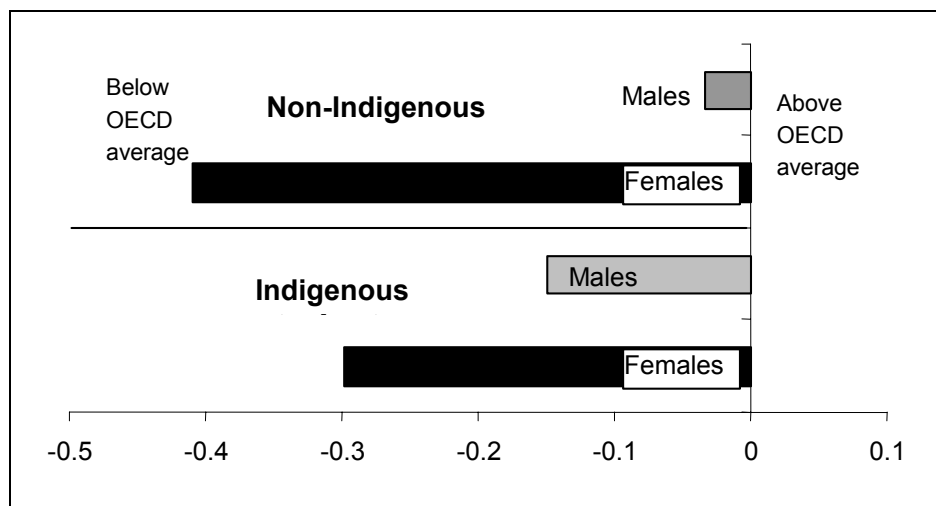
Four questions were posed relating to students' interest in computers and consisted of the following statements, of which students were asked to respond with a 'Yes' or 'No':

- It is very important to work with a computer
- To play or work with a computer is really fun
- I use a computer because I am very interested in this
- I forget the time when I am working with the computer

Significant differences between Indigenous and non-Indigenous students were found on two of the four questions. Although more Indigenous students (86 per cent) stated it was fun to work or play with a computer than non-Indigenous students (80 per cent), there were fewer Indigenous students (53 per cent) compared with 68 per cent of non-Indigenous students who indicated the importance of working with a computer.

The interest in computers scale, constructed using the above four statements, was standardised to a mean of zero and a standard deviation of one for the OECD as a whole. The levels of interest in computers scale for Indigenous and non-Indigenous students were similar and were found to be below the OECD average, with males generally more interested in computers than females (Figure 21). The Indigenous females were more interested and enthusiastic about computers than the non-Indigenous females. There was a smaller gender gap for the Indigenous students (0.15) than for the non-Indigenous students (0.38).

The association between the reading literacy domain and interest in computers was not as strong as found between the reading literacy domain and comfort and perceived ability with computers. The correlation between scientific literacy and interest in computers, although low, was the highest of the literacy domains at 0.18. There was no relationship between the mathematical ( $r = 0.04$ ) or the reading literacy achievement ( $r = 0.07$ ) and interest in computers scale.



**Figure 21 Interest in Computers - Means for Indigenous and Non-Indigenous Males and Females**

### HIGH AND LOW ACHIEVING INDIGENOUS STUDENTS

Previous sections of this report have summarised the results achieved for the Indigenous students across the three assessment domains and described several background, student and school characteristics which may be related to achievement.

This section examines the high and low achievers, and the different characteristics between these two groups in reading literacy. For the purpose of this exercise, low achievers have been defined as those Indigenous students who performed at Level 1 or below on the reading proficiency level, and high achievers have been defined as those students who performed at Level 4 or 5.

A series of tables contain the percentages of Indigenous students in each of the low and high achieving groups for various background variables, attitudes and behaviours.

**Table 10 Percentage of Low and High Achieving Indigenous Students on Background Characteristics**

Characteristic	Low Achieving Students (%)	High Achieving Students (%)
Year 9 or 10	84.0	71.0
Male	57.5	39.7
Speak an Indigenous language at home	11.6	6.9
Have no more than 50 books in the home	47.3	14.0
Mother completed Year 12	27.2	38.6
Mother completed a university degree	15.1	22.0
Father completed Year 12	26.9	29.3
Father completed a university degree	15.8	22.2

The students in the high achieving group are more likely to be female, have more than 50 books in the home, and have one or more parents who have achieved higher educational levels than students in the low achieving group.

Students in the high achieving group have more positive attitudes and behaviours towards reading than the low achieving group. High achieving students are also more likely to be motivated to manage their own learning.

**Table 11 Means for Low and High Achieving Indigenous Students on Reading Scale**

Scale	Low Achieving Students	High Achieving Students
Engagement in Reading	-.39	.44
Reading Diversity	-.42	.58

**Table 12 Means for Low Achieving and High Achieving Indigenous Students on Self-Regulated Learning Scales**

Scale	Low Achieving Students	High Achieving Students
Control strategies	-.31	.23
Elaboration strategies	-.11	.35
Memorisation strategies	-.11	.24
Competitive learning	-.15	.13
Cooperative learning	-.12	.20
Control expectations	-.32	.15
Self-efficacy	-.31	.38
Effort and Perseverance	-.26	-.03

Students in the high achieving group have a more positive sense of their belonging at school and have better teacher-student relationships. They report their English teacher is more supportive than students in the low achieving group.

**Table 13 Means for Low Achieving and High Achieving Indigenous Students on the Learning Environment Scales**

Scale	Low Achieving Students	High Achieving Students
Student's Sense of Belonging at School	-.09	.09
Teacher-Student Relations	-.09	.42
Teacher Support	.27	.46
Disciplinary Climate	.26	.08
Family Educational Support	.04	.32
Time spent on homework	-.61	.08

A goal for educators is to find ways in which to further support students in the low achieving group, as well as provide them with the skills to enable them to change their attitudes and behaviours towards reading, and become more motivated about their own learning.

## **CONCLUSION**

This report has examined the performance of Australia's Indigenous students in a significant international comparative study – the OECD/Programme for International Student Assessment (PISA 2000).

It was found that Australia's Indigenous students performed at a lower level than the non-Indigenous students in all three areas of assessment – reading, mathematical and scientific literacy. In reading literacy the score difference was greater than one proficiency level. Forty per cent of the Indigenous students, however, performed at Level 3 or better in the PISA reading literacy proficiency levels.

The pattern of differences between males and females was similar in both the Indigenous and non-Indigenous samples – that is, females outperform males in reading literacy and there are no significant differences in mathematical and scientific literacy.

It was found that home background factors were significantly associated with student performance for both Indigenous and non-Indigenous students. There was less difference in performance between low and high socioeconomic status Indigenous students than there was between low and high socioeconomic status non-Indigenous students. The mean socioeconomic status of Indigenous students was also lower. It was found, also, that the range of socioeconomic status in the Indigenous community was smaller than the range in the non-Indigenous community.

Home education resources such as the number of books in the home were at a lower level for Indigenous students – this resource has been found to have a significant association with performance for all students. The amount of time spent on homework was also significant with Indigenous students reporting spending less time on homework than non-Indigenous students - although Indigenous students reported a higher level of family support in helping them with their school work.

Indigenous students appear to enjoy generally good relations with their schools, indicated by a mean score on the 'sense of belonging' scale above the OECD mean and above that for non-Indigenous students. They also reported more favourably on the disciplinary climate in their classes.

It is important that teachers recognise different approaches preferred by students in classroom situations. In the strategies that they use for learning, Indigenous students reported a preference for a cooperative, less competitive approach than did their non-Indigenous counterparts.

The pattern for high achieving Indigenous students compared with low achieving Indigenous students was similar to that of non-Indigenous students.

The detailed analysis of student performance and attitudes afforded by PISA, placed into the context of home background, should provide a guide for further development and improvement in the educational outcomes for Australia's Indigenous population.

**REFERENCES**

- Kirsch, I., de Jong, J., Lafontaine, D., McQueen, J., Mendelovits, J., & Monseur, C. (2002). *Reading for Change: Performance and Engagement Across Countries - Results from PISA 2000*. Paris: Organisation for Economic Cooperation and Development (OECD).
- Lokan, J., Greenwood, L., & Cresswell, J. (2001). *15-up and counting, reading, writing, reasoning .... How literate are Australia's students? The PISA 2000 survey of students' reading, mathematical and scientific literacy skills*. Melbourne: Australian Council for Educational Research.
- Long, M., Frigo, T., & Batten, M. (1999). *Indigenous school to work transition*. Canberra: Dept of Employment, Education, Training and Youth Affairs (DEETYA).
- Marks, G., & Ainley, J. (1997). *Reading comprehension and numeracy among junior secondary school students in Australia. (Longitudinal surveys of Australian youth research report ; n.3)*. Melbourne: Australian Council for Educational Research (ACER).
- OECD. (2001). *Knowledge and skills for life: First results from PISA 2000*. Paris: Organisation for Economic Co-operation and Development.
- OECD/UNESCO. (2003). *Literacy Skills for the World of Tomorrow - Further results from PISA 2000*. Paris: Organisation for Economic Co-operation and Development.

## ANNEX 1

**Table A1 Percentages of Indigenous Female and Male Responses on the Reading Attitude Items\***

	Strongly disagree		Disagree		Agree		Strongly agree	
	Female	Male	Female	Male	Female	Male	Female	Male
I read only if I have to.	16.8	15.2	<b>42.0</b>	<b>26.1</b>	33.7	38.5	<b>7.5</b>	<b>20.3</b>
Reading is one of my favourite hobbies.	<b>15.7</b>	<b>38.4</b>	45.0	46.0	<b>31.3</b>	<b>11.5</b>	8.1	4.1
I like talking about books with other people.	<b>15.3</b>	<b>35.5</b>	52.2	42.9	28.5	20.1	4.1	1.5
I find it hard to finish books.	20.0	21.4	<b>53.6</b>	<b>30.6</b>	<b>17.0</b>	<b>38.0</b>	9.4	9.9
I feel happy if I receive a book as a present.	<b>9.7</b>	<b>33.3</b>	33.3	35.9	<b>45</b>	<b>25.8</b>	11.9	5.0
For me, reading is a waste of time.	<b>33.3</b>	<b>16.3</b>	47.5	48.6	15	19.8	<b>4.2</b>	<b>15.3</b>
I enjoy going to a bookshop or library.	<b>7.7</b>	<b>33.4</b>	39.7	38.1	<b>46.5</b>	<b>23.4</b>	6.1	5.1
I read only to get information that I need.	10.1	6.9	<b>41.3</b>	<b>22.6</b>	<b>37.0</b>	<b>54.6</b>	11.6	16.0
I cannot sit still and read for more than a few minutes.	31.3	22.5	44.6	44.2	16.8	19.5	7.3	13.8

\* Percentages in bold indicate significant differences between gender for that response category.

**Table A2 Percentages of Indigenous Students' Responses to Control Strategies Statements in Learning by Gender\***

When I study ...	Almost never		Sometimes		Often		Almost always	
	Females	Males	Females	Males	Females	Males	Females	Males
I start by working out exactly what I need to learn.	7.8	5.9	28.5	34.8	<b>32.7</b>	<b>45.2</b>	<b>31.0</b>	<b>14.1</b>
I force myself to check to see if I remember what I have learned.	<b>3.2</b>	<b>11.0</b>	42.8	42.9	33.8	35.6	<b>20.2</b>	<b>10.5</b>
I try to work out which concepts I still haven't really understood.	2.1	5.3	48.2	39.4	38.1	45.2	11.6	10.1
I make sure that I remember the most important things.	4.9	4.7	23.2	27.8	40.5	48.5	<b>31.4</b>	<b>19.0</b>
and I don't understand something, I look for additional information to clarify this.	8.0	4.7	42.7	41.5	33.0	41.4	16.3	12.4

\* Figures in bold indicate a statistically significant difference ( $p \leq 0.05$ ) between Indigenous females and males in that category.

**Table A3 Percentages of Indigenous Students' Responses to Elaboration Strategies Statements in Learning by Gender\***

When I study ...	Almost never		Sometimes		Often		Almost always	
	Females	Males	Females	Males	Females	Males	Females	Males
I try to relate new materials to things I have learned in other subjects.	9.9	5.0	51.6	40.7	<b>26.9</b>	<b>44.2</b>	11.6	10.1
I think about how the information might be useful in the real world.	13.7	14.3	43.7	40.8	28.8	33.9	13.8	11.0
I try to understand the material better by relating it to things I already know.	5.4	4.9	44.2	31.8	<b>36.3</b>	<b>51.7</b>	14.1	11.6
I work out how the material fits in with what I have already learned.	7.1	5.3	43.7	38.5	34.0	46.8	15.2	9.4

\* Figures in bold indicate a statistically significant difference ( $p \leq 0.05$ ) between Indigenous females and males in that category.

**Table A4 Percentages of Indigenous Students' Responses to Memorisation Strategies Statements in Learning by Gender\***

When I study ...	Almost never		Sometimes		Often		Almost always	
	Females	Males	Females	Males	Females	Males	Females	Males
I try to memorise everything that might be covered.	8.0	6.4	35.9	36.3	27.3	37.6	28.8	19.7
I memorise as much as possible.	6.1	4.5	26.4	31.3	38.1	45.8	29.4	18.4
I memorise all new material so that I can recite it.	13.7	8.1	53.2	48.6	<b>21.4</b>	<b>38.4</b>	11.7	4.9
I practise by saying the material to myself over and over.	14.6	11.4	41.0	44.2	26.1	37.1	<b>18.3</b>	<b>7.3</b>

\* Figures in bold indicate a statistically significant difference ( $p \leq 0.05$ ) between Indigenous females and males in that category.

**Table A5 Percentages of Indigenous Students' Responses to Competitive Learning Statements in Learning by Gender\***

	Strongly disagree		Disagree		Agree		Strongly agree	
	Females	Males	Females	Males	Females	Males	Females	Males
I like to try to be better than other students.	7.1	5.1	<b>39.4</b>	<b>24.4</b>	<b>35.0</b>	<b>55.6</b>	18.5	14.9
Trying to be better than others makes me work well.	8.6	4.4	46.6	36.0	<b>36.1</b>	<b>49.8</b>	8.7	9.8
I would like to be the best at something.	<b>0.3</b>	<b>3.6</b>	22.8	20.8	42.3	48.2	34.6	27.4
I learn faster if I'm trying to do better than the others.	7.9	7.2	39.5	30.3	40.6	45.1	12.0	17.4

\* Figures in bold indicate a statistically significant difference ( $p \leq 0.05$ ) between Indigenous females and males in that category.

**Table A6 Percentages of Indigenous Students' Responses to Cooperative Learning Statements in Learning by Gender\***

	Strongly disagree		Disagree		Agree		Strongly agree	
	Females	Males	Females	Males	Females	Males	Females	Males
I like to work with other students.	0.2	0.9	8.5	7.2	60.8	63.4	30.5	28.5
I learn most when I work with other students.	2.7	3.3	25.9	19.2	<b>56.4</b>	<b>68.8</b>	15.0	8.7
I like to help other people do well in a group.	<b>0.5</b>	<b>5.3</b>	<b>9.2</b>	<b>22.4</b>	70.5	61.6	19.8	10.7
It is helpful to put together everyone's ideas when working on a project.	3.2	2.1	<b>8.5</b>	<b>20.2</b>	61.7	66.6	<b>26.6</b>	<b>11.1</b>

\* Figures in bold indicate a statistically significant difference ( $p \leq 0.05$ ) between Indigenous females and males in that category.

**Table A7 Percentages of Indigenous Students' Responses to Control Expectation Statements in Learning by Gender**

	Strongly disagree		Disagree		Agree		Strongly agree	
	Females	Males	Females	Males	Females	Males	Females	Males
I like to try to be better than other students.	4.7	8.4	43.1	43.7	35.3	36.3	16.9	11.6
Trying to be better than others makes me work well.	5.9	5.2	30.8	30.1	34.7	41.2	28.6	23.5
I would like to be the best at something.	14.6	7.7	42.8	35.1	28.8	40.9	13.8	16.3
I learn faster if I'm trying to do better than the others.	2.8	3.2	33.6	32.8	36.2	44.6	27.4	19.4

The association between control expectations and scientific literacy achievement was stronger ( $r = 0.24$ ) than the relationship between control expectations and reading literacy achievement or mathematical literacy achievement ( $r = 0.17$ ).

**Table A8 Percentages of Indigenous Students' Responses to Self-efficacy Statements in Learning by Gender\***

	Almost never		Sometimes		Often		Almost always	
	Females	Males	Females	Males	Females	Males	Females	Males
I'm certain I can understand the most difficult material presented in texts.	10.1	7.8	40.9	39.4	40.5	47.3	8.5	5.5
I'm confident I can do an excellent job on assignments and tests.	7.3	7.9	<b>44.7</b>	<b>31.6</b>	<b>32.1</b>	<b>46.2</b>	15.9	14.3
I'm certain I can master the skills being taught.	8.8	3.8	40.1	38.7	38.4	43.7	12.7	13.8

\* Figures in bold indicate a statistically significant difference ( $p \leq 0.05$ ) between Indigenous females and males in that category.

**Table A9 Percentages of Indigenous Students' Responses to Effort and Perseverance Statements in Learning by Gender\***

When studying ...	Almost never		Sometimes		Often		Almost always	
	Females	Males	Females	Males	Females	Males	Females	Males
I work as hard as possible.	4.0	7.4	32.4	36.0	35.8	37.7	27.8	18.9
I keep working even if the material is difficult.	9.7	5.9	49.5	46.1	<b>25.0</b>	<b>38.2</b>	15.8	9.8
I try to do my best to acquire the knowledge and skills taught.	4.5	5.5	36.6	40.6	41.9	39.8	17.0	14.1
I put in my best effort.	5.1	3.5	34.9	37.0	31.2	38.7	28.8	20.8

\* Figures in bold indicate a statistically significant difference ( $p \leq 0.05$ ) between Indigenous females and males in that category.

**Table A10 Percentages of Indigenous Students' Responses to the Student's Sense of Belonging Scale by Gender**

My school is a place where ...	Strongly disagree		Disagree		Agree		Strongly agree	
	Females	Males	Females	Males	Females	Males	Females	Males
I feel left out of things.	45.4	53.2	44.6	41.3	9.0	4.4	1.0	1.1
I make friends easily.	0.4	1.2	4.9	5.1	64.4	62.7	30.3	31.0
I feel I like I belong.	0.9	1.8	15.4	14.4	60.7	59.5	23.0	24.3
I feel awkward and out of place.	37.3	38.4	51.4	46.0	10.3	14.3	1.0	1.3
Other students seem to like me.	1.0	1.1	4.3	9.4	76.7	70.5	18.0	19.0
I feel lonely.	44.2	52.8	50.2	39.9	5.5	6.4	0.1	0.9

There were no statistically significant differences between Indigenous females and Indigenous males for each of these statements. The mean for Indigenous females was slightly lower than for Indigenous males at 0.08 and 0.10 respectively.



**Table A11 Percentages of Indigenous Students' Responses to Teacher-Student Relations Scale by Gender\***

	Strongly disagree		Disagree		Agree		Strongly agree	
	Females	Males	Females	Males	Females	Males	Females	Males
Students get along well with most teachers	7.3	14.2	25.3	29.6	65.4	50.2	<b>2.0</b>	<b>6.0</b>
Most teachers are interested in students' well-being	2.1	6.1	21.6	17.0	64.9	71.4	11.4	5.5
Most of my teachers really listen to what I have to say	<b>1.6</b>	<b>8.3</b>	29.7	20.7	53.7	59.2	15.0	11.8
If I need extra help, I will receive it from my teachers	2.0	5.2	18.1	12.7	59.3	64.3	20.6	17.8
Most of my teachers treat me fairly	2.7	9.1	13.4	14.5	70.6	64.4	13.3	12.0

\* Figures in bold indicate a statistically significant difference ( $p \leq 0.05$ ) between Indigenous females and males in that category.

**Table A12 Percentages of Indigenous Students' Responses to the Teacher Support Scale by Gender\***

The teacher ...	Never		Some lessons		Most lessons		Every lesson	
	Females	Males	Females	Males	Females	Males	Females	Males
shows an interesting every student's learning	5.6	7.4	17.5	23.7	28.4	27.6	48.5	41.3
gives students an opportunity to express opinions	4.1	8.2	20.2	19.1	37.0	37.2	38.7	35.5
helps students with their work	3.7	1.3	14.7	18.4	25.6	31.4	56.0	48.9
continues teaching until the students understand	6.5	6.5	28.1	27.1	<b>25.9</b>	<b>37.7</b>	39.6	28.7
does a lot to help the students	3.3	4.6	27.1	21.4	<b>29.0</b>	<b>42.0</b>	40.6	32.0
helps students with their learning	4.6	4.1	18.1	17.2	30.1	44.0	47.2	34.7

\* Figures in bold indicate a statistically significant difference ( $p \leq 0.05$ ) between Indigenous females and males in that category.

**Table A13 Percentages of Indigenous Students' Responses to the Disciplinary Climate Scale by Gender\***

	Never		Some lessons		Most lessons		Every lesson	
	Females	Males	Females	Males	Females	Males	Females	Males
The teacher has to wait a long time for students to settle down	10.7	6.4	62.9	55.9	<b>13.0</b>	<b>23.0</b>	13.4	14.7
Students cannot work well	12.1	16.6	<b>67.5</b>	<b>55.0</b>	17.2	19.0	<b>3.2</b>	<b>9.4</b>
Students don't listen to what the teacher says	11.2	15.8	66.3	55.9	16.5	18.2	6.0	10.1
Students' don't start working for a long time after the lesson begins	16.2	12.5	55.4	50.7	18.3	19.5	10.1	17.3
There is noise and disorder	11.1	13.1	57.2	44.9	18.3	27.0	13.4	15.0
At the start of the lesson, more than five minutes are spent doing nothing	12.7	18.0	44.2	40.0	21.2	20.9	21.9	21.1

\* Figures in bold indicate a statistically significant difference ( $p \leq 0.05$ ) between Indigenous females and males in that category.

**Table A14 Percentages of Indigenous Students' Responses to the Family Educational Support Scale by Gender\***

Family member	Never		A few times a year		About once a month		Several times a month		Several times a week	
	Females	Males	Females	Males	Females	Males	Females	Males	Females	Males
Your mother	26.0	23.4	16.2	18.6	13.1	15.2	21.6	22.5	23.1	20.3
Your father	44.6	40.8	14.2	16.2	9.5	9.4	19.0	17.3	12.7	16.3
Your brothers and sisters	<b>41.3</b>	<b>56.5</b>	19.7	15.8	13.7	14.1	14.7	10.0	<b>10.6</b>	<b>3.6</b>

\* Figures in bold indicate a statistically significant difference ( $p \leq 0.05$ ) between Indigenous females and males in that category.

**Table A15 Percentages of Indigenous Students' Responses to the Time Spent on Homework each Week by Gender\***

	No time		< 1 hour		1 – 3 hours/week		≥ 3 hours	
	Females	Males	Females	Males	Females	Males	Females	Males
English	7.9	11.0	<b>32.3</b>	<b>46.9</b>	46.4	35.5	13.4	6.6
Mathematics	<b>7.0</b>	<b>14.5</b>	41.2	43.7	41.6	34.9	10.2	6.9
Science	22.4	23.9	34.7	39.6	37.2	32.2	5.7	4.3

\* Figures in bold indicate a statistically significant difference ( $p \leq 0.05$ ) between Indigenous females and males in that category.