Programme for International Student Assessment

# Preparing Australian Students for the Digital World:

## Results from the PISA 2009 Digital Reading Literacy Assessment

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# Contents

# Executive Summary

In PISA 2009, the assessment of digital reading literacy was offered as an international option for the first time. The digital reading literacy assessment assessed 15-year-old students' ability to read, understand and apply digital texts. Australia and eighteen other countries or economies participated in this assessment.

This report presents the results of the PISA digital reading literacy assessment for Australia. It presents the results for Australia as a whole, and where relevant makes comparisons to the other participants in the study. Results are also reported for the Australian states and territories and for different social groups within Australia.

## Australia's performance in digital reading literacy

### Internationally

- Student performance in print and digital reading literacy was closely related.
- Australia achieved a mean score of 537 score points, which was significantly higher than the OECD average of 499 score points.
- Australia was outperformed by one country, Korea. Australia and New Zealand achieved a similar score, while all other countries performed at a level significantly lower than Australia.
- Generally, countries that were high performers in print reading literacy performed more strongly in digital than print reading literacy. The lower achieving countries in print reading literacy were also the lower performers in digital reading literacy; however, they performed more strongly in print than digital reading literacy. Australian students performed, on average, 22 score points higher on digital than print reading literacy.
- Seventeen per cent of Australian students were highly skilled digital readers (Level 5 or above) compared to eight per cent of students across the OECD.
- Ten per cent of Australian students were low performers in digital reading literacy (below Level 2) compared to 17 per cent of students across the OECD.

### The states and territories

- Digital reading scores for students in the Australian Capital Territory, Victoria, New South Wales, Western Australia and Queensland were statistically similar to each other.
- The Australian Capital Territory and Victoria outperformed South Australia, while New South Wales, Western Australia and Queensland performed on par with South Australia.
- Tasmania and the Northern Territory scored significantly lower on average than the other states, but were not statistically different from one another.
- Students in every state performed significantly higher in digital than print reading literacy. The mean score difference ranged from 13 score points in Queensland to 28 score points in Victoria.

### Gender

- Significant gender differences, in favour of females, were found in all countries except for Colombia.
- The gender difference in Australia was, on average, 28 score points, while the gender difference across OECD countries was, on average, 24 score points.

- The gender gap in performance was smaller than for print literacy, both in Australia and internationally. In Australia, the gender difference for print literacy was 37 score points.
- The largest gender differences in digital reading literacy were found in Tasmania, with a difference of, on average, 43 score points, while the smallest gender differences were found in Victoria, with an average difference of 24 score points.

### School sectors

- The average digital reading literacy achievement of students in the independent school sector was significantly higher than that of students in the Catholic school sector, who in turn performed significantly higher than students in the government school sector.

### Results by geographic location

- Students attending schools in metropolitan areas performed significantly higher than students in provincial or remote schools. Students in provincial schools also performed significantly higher than students attending schools in remote areas.

### Results for Indigenous students

- The average digital reading literacy performance of non-Indigenous students was significantly higher than that of Indigenous students.

### Results by socioeconomic background

- Students in the higher socioeconomic quartiles achieved significantly higher than students in lower socioeconomic quartiles. The difference between the highest and lowest quartile of socioeconomic quartile was, on average, 84 score points.

### Results by immigrant status and language background

- The average digital reading literacy performance of first-generation students was significantly higher than that of Australian-born students and foreign-born students.
- Students who spoke English as their main language at home achieved at a significantly higher level than students whose main language at home was a language other than English.
- Across the different reporting groups within Australia, students performed significantly higher in digital reading literacy than print reading literacy, except for students who attended schools in remote areas, whose digital and print reading literacy performances were not significantly different.

## Student's access and use of information and communication technologies (ICT) at home and school

### Access to ICT

- Ninety-nine per cent of Australian students reported having a computer in their home, with 95 per cent of these computers connected to the Internet. These proportions were higher than the OECD average.
- The number of computers in the home was positively related to digital reading literacy, with students having three or more computers in the home having much higher scores than students with one computer in the home.

- Access to the Internet at school was significantly higher for students in Catholic and independent schools; students in provincial schools, non-Indigenous students and students from higher socioeconomic backgrounds.

## Use of ICT in the home

- Availability and usage of a computer in the home were significantly higher for students in Catholic or independent schools; students in metropolitan schools than provincial schools, who were significantly higher than students in remote schools; non-Indigenous students and students from higher socioeconomic backgrounds.
- Generally, the frequency of computer use at home for leisure-related activities was highest in Victoria and lowest in Tasmania, whereas the frequency of computer use at home for school-related activities was higher in the Australian Capital Territory and lowest in Tasmania. The frequency of online reading activities was highest in the Australian Capital Territory and lowest in Tasmania.
- The most popular leisure-related computer activities at home reported by students were browsing the Internet for fun, chatting online and using email, while the most common school-related activities at home reported by students were using the Internet for school work and doing homework.
- Females reported significantly more frequent use of computers at home for school-related activities while males reported significantly more frequent use of computers at home for leisure-related activities.
- Students from metropolitan schools reported significantly more frequent use of computers at home for leisure-related activities than students in provincial or remote schools. Students from metropolitan schools also reported significantly more frequent use of computers for school-related activities and performing online reading activities than students in provincial schools, who in turn reported significantly more frequent use of computers for school-related activities and performing online reading activities than students in remote schools.
- Indigenous students reported significantly less frequent use of computers at home for leisure-related activities and school-related activities, and performing online reading activities compared to non-Indigenous students.
- Students from lower socioeconomic backgrounds reported less frequent use of computers at home for leisure-related activities, for school-related activities and performing online reading activities than students from higher socioeconomic backgrounds.

## Use of ICT at school

- The most common computer activity at school reported by students is browsing the Internet for school work.
- Students from government schools reported significantly less frequent use of computers at home for school-related activities than students from Catholic schools, who reported significantly less frequent use of computers at home for school-related activities than students from independent schools. Students from government schools reported significantly less frequent use of performing online reading activities than students in Catholic or independent schools.
- Students from government schools reported significantly less frequent use of computers at school than students in Catholic or independent schools.
- Students in remote schools reported significantly more frequent use of computers at school than students attending schools in metropolitan or provincial areas.

## Students' attitudes and confidence in using information and communication technologies

### Students' attitudes to ICT

- Australian students reported a significantly less positive attitude to computers than on average across the OECD.
- Males were found to hold significantly more positive attitudes towards computers than females. Australian females reported the least positive attitudes towards computers of females in all participating countries.
- Students from the most disadvantaged backgrounds reported the least positive attitudes towards computers.

### Students' confidence in using ICT

- Australian students were very confident about performing high-level computer tasks, and male students reported significantly higher levels of confidence than females.
- Students in New South Wales reported the highest level of confidence in performing high-level tasks across Australia, and there were no gender differences found in ICT confidence.
- Confidence in performing these tasks was found to be the lowest amongst students from disadvantaged backgrounds, and highest amongst those from advantaged backgrounds.

## Policy issues

Overall, Australian students performed very well in digital reading literacy and had high levels of access to computers and the Internet at home and school. However, this report has identified two major areas for policy attention:

- The gender gap found in print reading literacy is also evident in digital reading literacy. On average, Australian males performed at a significantly lower level than females. At the same time, male students have stronger skills in digital navigation than female students, which will have negative repercussions in a digital age.
- Significant differences in digital reading literacy performance have been found in different social groups: those attending government schools; those in remote areas; Indigenous students and students from low socioeconomic backgrounds. These are generally the same groups that are disadvantaged in print reading and other literacy areas, so strategies that are applied to increase students' understanding more generally need also be applied in this area.

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# Reader's Guide

## OECD average

An OECD average was calculated for most indicators in this report and is presented for comparative purposes. The OECD average takes the OECD countries as a single entity, to which each country contributes with equal weight. The OECD average is equivalent to the arithmetic mean of the respective country statistics.

In this report, different OECD averages have been calculated, depending on the number of OECD countries participating in the assessment of digital reading (16 OECD countries) or in the Information and Communication Technologies Questionnaire (29 countries). The OECD average in the tables is presented as OECD average-xx "xx" corresponds to the number of countries taken into account in this average.

## Rounding of figures

Because of rounding, some figures in tables may not exactly add to the totals. Totals, differences and averages are always calculated on the basis of exact numbers and are rounded only after calculation. When standard errors have been rounded to one or two decimal places and the value 0.0 or 0.00 is shown, this does not imply that the standard error is zero, but that it is smaller than 0.05 or 0.005 respectively.

## Reporting of student data

The report uses "15-year-olds" as shorthand for the PISA target population. In practice, the target population is students who were aged between 15 years and 3 (complete) months and 16 years and 2 (complete) months at the beginning of the assessment period and who were enrolled in an educational institution that they were attending full-time or part-time.

## Confidence intervals and standard errors

In this and other reports, student achievement is often described by a mean score. For PISA, each mean score is calculated from the sample of students who undertook the PISA assessment, and is referred to as the sample mean. These sample means are an approximation of the actual mean score, known as the population mean, which would have been derived had all students in Australia actually sat the PISA assessment. Since the sample mean is just one point along the range of student achievement scores, more information is needed to gauge whether the sample mean is an underestimation or overestimation of the population mean. The calculation of confidence intervals can assist our assessment of a sample mean's precision as a population mean. Confidence intervals provide a range of scores within which we are 'confident' that the population mean actually lies. In this report, sample means are presented with an associated standard error. The confidence interval, which can be calculated using the standard error, indicates that there is a 95 per cent chance that the actual population mean lies within plus or minus 1.96 standard errors of the sample mean.

## Bonferroni correction

The Bonferroni correction states that if an experimenter is testing '*n*' independent hypotheses on a set of data, then the statistical significance level that should be used for each hypothesis separately is 1/n times what it would be if only one hypothesis were tested. The Bonferroni correction was used in the multiple comparison tables in PISA 2000 and PISA 2003. However, it is widely acknowledged that there are technical issues with using the Bonferroni correction with

such a large group of countries, and that its results are very conservative. As such, the Bonferroni correction has not been used in PISA 2009.

## Proficiency levels

To summarise data from responses to the PISA tests, performance scales were constructed for each assessment domain. The scales are used to describe the performance of students in different countries, including in terms of described performance levels. The described performance levels are known as proficiency levels.

## PISA indices

The measures that are presented as indices summarise student responses to a series of related questions constructed on the basis of previous research. In describing students in terms of each characteristic (e.g. enjoyment in reading or student-related factors affecting school climate), scales were constructed on which the average OECD student was given an index value of zero[1], and about two-thirds of the OECD population were given values between –1 and +1 (i.e. the index has a mean of 0 and a standard deviation of 1). Negative values on an index do not necessarily imply that students responded negatively to the underlying questions. Rather, a student with a negative score responded less positively than students on average across OECD countries.

Definitions of background characteristics

There are a number of definitions used in this report that are particular to the Australian context, as well as many which are international. This section provides an explanation for those that are not self-evident.

## Indigenous background

Indigenous background is derived from information provided by the school, which was taken from school records. Students were identified as being of Australian Aboriginal or Torres Strait Islander descent. For the purposes of this report, data for the two groups are presented together for Indigenous Australian students.

## Socioeconomic background

Two measures are used by the OECD to represent elements of socioeconomic background. One is the highest level of the father's and mother's occupation (known as HISEI), which is coded in accordance with the International Standard Classification of Occupations. The other measure is the index of economic, social and cultural status (ESCS), which was created to capture the wider aspects of a student's family and home background. The ESCS is based on three indices: the highest occupational status of parents (HISEI); the highest educational level of parents in years of education (PARED); and home possessions (HOMEPOS). The index of home possessions (HOMEPOS) comprises all items on the indices of family wealth, cultural resources, access to home educational and cultural resources and books in the home.

1 However, for the school-based indices the OECD average may not be zero.

## Geographic location

In Australia, the participating schools were coded with respect to the MCEECDYA Schools Geographic Location Classification. For the analysis in this report, only the broadest categories are used:

- Metropolitan – including mainland state capital cities or major urban districts with a population of 100,000 or more (e.g. Queanbeyan, Cairns, Geelong, Hobart)
- Provincial – including provincial cities and other non-remote provincial areas (e.g. Darwin, Ballarat, Bundaberg, Geraldton, Tamworth)
- Remote – Remote areas and Very Remote areas. Remote: very restricted accessibility of goods, services and opportunities for social interaction (e.g. Coolabah, Mallacoota, Capella, Mt Isa, Port Lincoln, Port Hedland, Swansea and Alice Springs). Very Remote: very little accessibility of goods, services and opportunities for social interaction (e.g. Bourke, Thursday Island, Yalata, Condingup, Nhulunbuy).

## Immigrant status

For the analysis in this report, immigrant status has been defined by the following categories:

- Australian-born students – students born in Australia with both parents born in Australia
- First-generation students – students born in Australia with at least one parent born overseas
- Foreign-born students – students born overseas with both parents also born overseas.

# An Introduction to PISA

This report focuses on the outcomes of the Digital Reading Assessment conducted as an optional component of PISA 2009. For those unfamiliar with PISA, this chapter outlines the study.

## The main goals of PISA

PISA seeks to measure how well young adults, at age 15 and therefore near the end of compulsory schooling in most participating education systems, are prepared to use knowledge and skills in particular areas to meet real-life challenges. This is in contrast to assessments that seek to measure the extent to which students have mastered a specific curriculum. PISA's orientation reflects a change in the goals and objectives of curricula themselves, which increasingly address how well students are able to apply what they learn at school.

As part of the PISA process, students complete an assessment on reading literacy, mathematical literacy and scientific literacy as well as an extensive background questionnaire. School principals complete a survey describing the context of education at their school, including the level of resources in the school, qualifications and teacher morale. The reporting of the findings from PISA is then able to focus on issues such as:

- How well are young adults prepared to meet the challenges of the future?
- Can they analyse, reason and communicate their ideas effectively?
- What skills do they possess that will facilitate their capacity to adapt to rapid societal change?
- Are some ways of organising schools or school learning more effective than others?
- What influence does the quality of school resources have on student outcomes?
- What educational structures and practices maximise the opportunities of students from disadvantaged backgrounds?
- How equitable is the provision of education within a country or across countries?

## What do PISA participants do?

### Cognitive Assessment

In PISA 2009, the majority of the assessment was devoted to reading literacy, with mathematical literacy and scientific literacy assessed to a lesser extent. Participating students each responded to a two-hour paper-and-pen assessment.

A sub-sample of students who participated in the paper-and-pen assessment also completed an assessment of digital reading literacy, which used the information technology infrastructure (computer laboratories) at schools. This assessment took 40 minutes to complete.

### Context questionnaire

The data collected in the 35-minute Student Questionnaire provide an opportunity to investigate factors that may influence performance and consequently give context to the achievement scores. Responses to a set of 'core' questions about the student and their family background (including age, year level and socioeconomic status), are collected in each cycle. In 2009, students were also asked about their engagement with reading, reading activities, learning strategies and aspects of instruction.

Australia also took part in two of the international, optional questionnaires: one on students' familiarity with information and communication technology (ICT) and another on educational career paths. These questionnaires were incorporated into the student questionnaire.

Information at the school level was collected through a 30-minute online School Questionnaire, answered by the principal (or the principal's designate). The questionnaire sought descriptive information about the school and information about instructional practices.

## Features of PISA 2009

The fourth cycle of PISA, completed in 2009, marked not only the beginning of a new round of PISA but a return to reading literacy as the major focus. In PISA 2009:

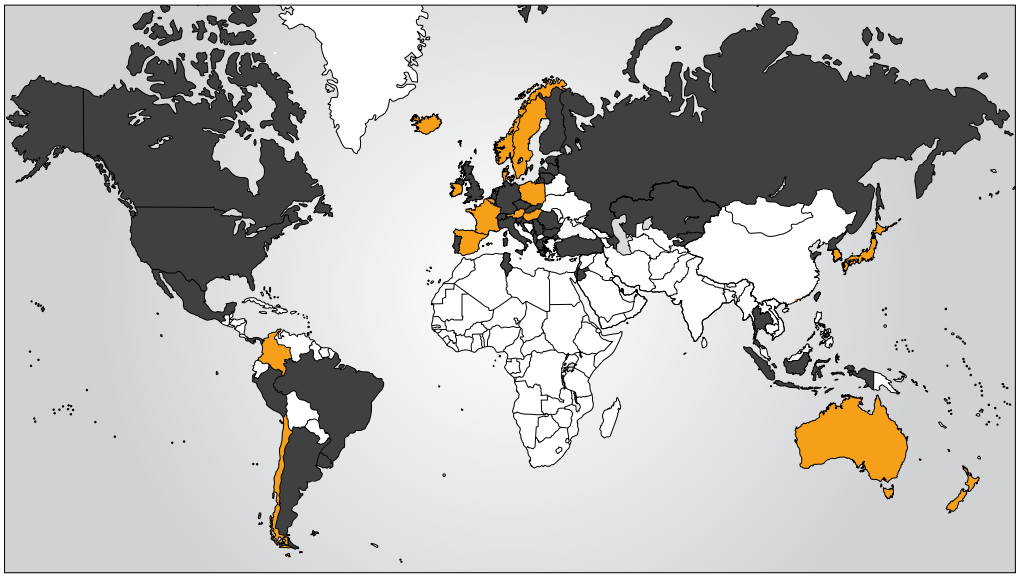
- the reading literacy framework was revised to reflect the changes since 2000, in the way people read and to incorporate the assessment of digital media.
- the paper-based assessment focused on how well students *retrieve and access* information; how well students *interpret and integrate* what they read; and how well students *reflect on and evaluate* what they read.
- the paper-based reading literacy proficiency scale was extended to obtain more detailed descriptions at the lower and the higher end of the scale.
- the student questionnaire reflected the main cognitive assessment area (reading literacy) by asking students about their engagement in reading activities and use of different learning strategies.
- students' ability to read, understand and apply digital texts were assessed. This element of PISA 2009 was optional.

The National report, *Challenges for Australian Education: Results from PISA 2009*, provides the results of the PISA 2009 assessment for Australia. It describes the conceptual framework for the assessment of reading literacy, the major literacy domain in PISA 2009, and presents the results for Australian students in reading, mathematical and scientific literacy, in an international and national context. The assessment of reading literacy in the National PISA 2009 report was based on the paper-and-pen assessment completed by students. In this report, the paper-and-pen based reading literacy is referred to as 'print reading literacy'.

This report focuses on the assessment of digital reading literacy, which was offered as an international option for the first time in PISA 2009. The report describes how PISA measures digital reading literacy, the performance of Australian students in digital reading literacy, and students' access and use of information and communication technologies.

# Participants in PISA 2009

Although PISA was originally created by OECD governments, it has become a major assessment tool in many regions and countries around the world. Since the first PISA assessment in 2000, the number of countries or economic regions who have participated from one PISA cycle to the next has increased. Sixty-five countries participated in PISA 2009, including 34 OECD countries and 31 partner countries/economies (Figure 1). Nineteen countries participated in the assessment of digital literacy, including 16 OECD countries. The OECD averages referred to in this report are the average scores for students in those 16 countries.



The 19 countries in orange were also involved in the assessment of digital reading literacy.

**OECD Countries**

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

**Partner Countries/Economies**

| | | |
|---|---|---|
| Albania | Kazakhstan | Serbia |
| Argentina | Kyrgyzstan | Shanghai – China |
| Azerbaijan | Latvia | Singapore |
| Brazil | Liechtenstein | Thailand |
| Bulgaria | Lithuania | Trinidad and Tobago |
| Chinese Taipei | Macao – China | Tunisia |
| Colombia | Montenegro | Uruguay |
| Croatia | Panama | |
| Dubai (UAE) | Peru | |
| Hong Kong – China | Qatar | |
| Indonesia | Romania | |
| Jordan | Russian Federation | |

**Figure 1** Countries participating in PISA 2009

## Schools and students

The target population for PISA is students who are 15 years old[1] and enrolled at an educational institution, either full- or part-time, at the time of testing. In most countries, 150 schools and 35 students in each school were randomly selected to participate in PISA. In some countries, including Australia, a larger sample of schools and students participated. The Australian sample for PISA 2009 consisted of 353 schools and 14,251 students.

A sub-sample of students was randomly selected to participate in the digital reading literacy assessment. Table 1 shows the number of students sub-sampled for the digital reading literacy assessment and the number of students included in the digital reading assessment database.[2]

**Table 1** Student response rates for the digital reading assessment

| Country/Economy | Number of students included in the digital reading literacy assessment database | Weighted number of students included in the digital reading literacy assessment database | Number of students sub-sampled for the digital reading literacy assessment | Number of students who participated in the digital reading literacy assessment |
|---|---|---|---|---|
| **Australia** | 14 251 | 240 851 | 3 673 | 2 990 |
| Austria | 6 590 | 87 326 | 3 187 | 2 622 |
| Belgium | 5 801 | 119 140 | 3 161 | 2 796 |
| Chile | 5 669 | 247 270 | 2 131 | 1 699 |
| Colombia | 4 572 | 515 130 | 1 957 | 1 478 |
| Denmark | 5 924 | 60 854 | 1 830 | 1 270 |
| France | 4 298 | 677 620 | 1 730 | 1 301 |
| Hong Kong-China | 4 837 | 75 548 | 1 661 | 1 450 |
| Hungary | 4 605 | 105 611 | 2 022 | 1 792 |
| Iceland | 3 646 | 4 410 | 1 273 | 960 |
| Ireland | 3 937 | 52 794 | 1 710 | 1 407 |
| Japan | 6 088 | 1 113 40 | 6 088 | 3 429 |
| Korea | 4 989 | 630 030 | 1 508 | 1 477 |
| Macao-China | 5 952 | 5 978 | 2 540 | 2 519 |
| New Zealand | 4 643 | 55 129 | 2 180 | 1 752 |
| Norway | 4 660 | 57 367 | 2 268 | 1 972 |
| Poland | 4 917 | 448 866 | 2 072 | 1 986 |
| Spain | 4 748 | 385 725 | 1 989 | 1 681 |
| Sweden | 4 567 | 113 054 | 2 249 | 1 921 |

1 Refer to the Reader's Guide for information about the age of students

2 Refer to the Reader's Guide for more information about the sampling outcomes.

Chapter

# 1 Digital reading literacy

This report focuses on the assessment of digital reading literacy, which was offered as an international option for the first time in PISA 2009. Australia and eighteen other countries or economies participated in this assessment.

## Context[1]

Since the invention of the microcomputer some 30 years ago, the number of computers in use worldwide has been growing at an exponential rate. By mid-2010, it was estimated that almost two billion people, or 29% of the world population, were using the Internet, with percentages ranging from 77% in North America to about 11% in Africa (Miniwatts Marketing Group, 2010). The past decade has also seen the explosion of mobile technologies, with laptops, digital pads, smart phones and other portable digital devices being used in increasingly large numbers.

Information and communication devices based on digital technologies are used in a wide range of contexts and for many different purposes. Their most important common characteristic is that they all permit the display and perusal of text. Indeed, most applications of computer technologies, including videogames, involve some type of textual information. As a result, whatever their purposes, tasks or goals, users of computers and networked digital technologies are compelled to read digital texts.

Moreover, digital technologies deeply affect the shape, content and life-cycle of texts and, consequently, the very nature of reading. It is important for governments and societies to understand these changes as they have begun to affect, in turn, almost every aspect of life in society, including government, education, work, commerce and civic life. To cite just a few examples: more and more taxpayers fill in online forms; students search the web for information; jobseekers look up ads on employment websites; consumers order goods in online stores; and people build and maintain social communities on line. All these activities, and many others, require the production, dissemination, and reading of some type of text.

## New ways of reading

From the invention of the cathode ray tube to the latest mobile communication devices, the advent of digital technologies has had a profound impact on the design, production, dissemination and uses of text. From a linguistic standpoint, a text is usually defined as a passage forming a "unified whole" (Halliday & Hasan, 1976). Linguists agree that textual "unity" is not conferred through

1 Parts of this chapter have been taken from: OECD (2011). *PISA 2009 Results: Students On Line: Digital Technologies and Performance* and from Thomson, S. & De Bortoli, L., Nicholas, M., Hillman, K. & Buckley, S. (2011). *Challenges for Australian Education: Results from PISA 2009.*

strict criteria of length or grammatical rules, but rather through the communication act that the text fulfils. Texts originate from a source and are intended for an audience. They are meant to perform a specific communicative act, for instance, to tell, describe, explain, persuade, and so forth.

Texts can only communicate effectively to the extent that they are coherent, cohesive, informative, relevant and acceptable. The general principles that define textuality are arguably similar across media. However, printed and digital technologies each possess some unique features that result in important differences in the way texts are produced, displayed, organised and connected to other texts. Furthermore, whereas printed texts have a relative permanence, digital texts are potentially dynamic and can be constantly completed, edited and updated. These differences have consequences for the access, comprehension and uses of text in a wide variety of situations, ranging from education to work to personal and civic purposes. It is therefore crucial to understand and assess the new forms of reading literacy that come with the practice of reading on digital displays (Coiro, 2009).

Although digital text is often associated with microcomputing, information societies are replete with devices that display digital texts, without the reader having to manipulate a computer. Examples include videoprojected slides used during conferences, electronic advertisements or public communication signs, information booths in railway stations, shopping centres and airports, but also displays of iPods, mobile phones, digital pads and many more.

Throughout the past decade, the list of these new devices has been continually expanded and updated. The growing practice of displaying text digitally is having a deep impact on the shape and contents of the texts themselves. Digital texts differ from printed texts in readability and usability, and also in the social and economic processes that drive the creation, dissemination and multi-dimensional uses of text.

## Differences in the readability and usability of text

Superficially, texts displayed digitally may seem very similar to those that are printed on paper. They use the same basic sign systems (for example, the Roman alphabet or Japanese Kanji, punctuation marks), the same syntax and, to some extent, the same rules for composing passages and signalling structure (margins, paragraphs, headings and so forth). However, a closer examination reveals important differences. One prominent difference is the physical size of the display area or "page". A15-inch computer screen is about the physical size of an A4 page, which is smaller than printed newspapers, catalogues or supermarket flyers. In recent years electronic devices with much smaller displays, such as digital pads and smartphones, have become increasingly popular.

The combination of smaller size and poorer quality of digital information means that the reader of digital text must generally cope with reduced readability and piecemeal presentation of information. A simple illustration is provided in Figure 1.1, which shows the amount of text featured on a printed and a digital page of a newspaper. The excerpt of the printed page roughly corresponds to the display size of the web page.

That said, digital texts should not be regarded as mere impoverished versions of printed texts. Digital technologies are constantly being improved and may eventually be comparable to high-quality printing technologies. In addition, designers of digital documents have created new publishing standards to cope with the limitations inherent in the digital medium (consider, for instance, the increasingly popular web-based applications tailored to small screens).

**Print**


THE ARTS

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**Figure 1.1** Comparison of print and digital texts

## Impact of digital texts on reading literacy

This section outlines the new literacy demands and opportunities that are associated with digital texts[2].

Some types of reading are still mostly done using printed materials, while others are specific to the electronic medium. For instance, even experienced computer users read novels and extended informational texts on paper (see study of medical school students' printing, Martin & Platt, 2001). On the other hand, the activity of reading search engine lists is almost exclusive to reading on line, as is reading a personal blog (a genre that seems to have been born with the new millennium: Blood, 2000) or the comprehension of an online job-application form. Thus, digital reading cannot always be strictly compared to print reading. This is, in fact, the best evidence in support of the design of a new framework and new assessment procedures for digital reading.

However, a wide range of reading activities can be performed using both types of texts. Popular examples include reading news, informational texts, texts with a practical purpose such as buying goods or getting directions. However, because the digital versions of these texts differ – sometimes dramatically – from their printed counterparts, it is useful to consider how they affect reading skills and reading literacy. A powerful illustration of this is found in the area of literacy-assessment research itself, where so-called test-mode effects have been found with computerised versions of tests, resulting in better or worse performance than when printed versions are used (Clariana & Wallace, 2002).

## Which aspects of reading are affected by digital text?

Independent of the particular reading situation or purpose, there is a need to identify those components of reading literacy that are relatively preserved and those that are the most affected by digital texts. Low-level processes such as word identification or syntactic parsing are presumably very similar in printed and digital reading, aside from the general surface readability issues discussed in the previous section. The processes involved in building a mental representation of the text, such as identifying referents of anaphoric expressions or maintaining coherence locally and globally, would also appear to be relatively unaffected. These processes may simply be

2 For more extended reviews, see Britt & Gabrys, 2000; Coiro, et al., 2008; Kemp, 2011; Reinking, 1994; Rouet, 2006; Warschauer, 1999.

hindered in the case of lengthy texts displayed on line, because the reader will have more trouble referring to a previously read section (for a discussion see Foltz, 1996).

Differences between print and digital reading are more apparent when considering macro-aspects of reading, such as accessing texts of interest, integrating information across texts, or evaluating texts for quality and credibility.

## Access to text

Printed texts require the reader to locate a material artefact, and use the categorisation and organisers to locate information of interest within that artefact. Digital texts require the reader to search phrases, scan heterogeneous links, and use navigation devices. The latter procedures call upon the reader's ability to generate vocabulary, assess the relevance of verbal expressions (and disregard distractors), and understand the hierarchical structuring of information in menu trees.

The skilled reader of digital texts must be familiar with the use of navigation devices and tools. He or she must also be able to mentally represent the movement of the window over the text page, so as to be able to move in the correct direction. This includes an ability to overcome apparent discrepancies, for example the fact that the arrow oriented downwards on the scrollbar actually moves the text upwards. As early as 1989, Foss noted that some users tended to get lost in the maze of windows that ended up covering each other on their computer screen; early human-factors experiments often concluded that just two side-by-side windows seemed to be a good compromise for most readers (Wiley, 2001; Wright, 1993). The opening, layout and closing of multiple windows is arguably a skill in itself. There is indeed some evidence that reading complex digital texts relies on visuo-spatial abilities as much as on language processing abilities (Pazzaglia, et al., 2008; see also Naumann, et al., 2008).

## Integration across texts

Integration, defined as comparing and relating different pieces of texts, calls upon similar processes, whatever the medium. However, because digital texts do not follow any stable categorisation scheme, and because the digital medium makes it so easy to cross-reference texts, readers are much more likely to find themselves jumping across different texts within a single reading episode. Furthermore, the web offers readers the possibility of compiling a large number of different sources on any given topic. Therefore, the accumulation of information across multiple passages is becoming typical of the sustained reading of digital texts. Integration across text requires sophisticated reading skills and strategies, which are not spontaneously mastered by young readers (Britt & Rouet, forthcoming). Even though these skills are not specific to digital reading, they may explain a significant portion of readers' digital reading proficiency.

## Evaluation of text

Readers of web-based documents are faced with a wide array of materials, given the open, unregulated nature of web publishing. Current retrieval systems are mostly based on the semantic match between the query and the contents, regardless of any indication of genre, accuracy, authority or trustworthiness. It is up to the reader to find out not just what the text is about, but also who wrote it, who published it, when, for what purpose and with what potential biases. In the printed world, a range of perceptual and contextual cues (what the text looks like and where it is found), as well as the presence of human mediators (for example, the librarian, the bookseller, the

critic) often facilitate these attributions. On the web, however, most of these cues and mediations are missing and the reader has to resort to deeper levels of reasoning to evaluate the quality of the text (Britt & Gabrys, 2000). There is mounting evidence that evaluating web information is indeed a difficult aspect of digital reading for most teenagers, even though they rely more and more on the web to acquire new information about subjects of interest (Dinet, et al., 2003; Darroch, et al., 2005; Kuiper, et al., 2005).

## Some issues for assessing digital reading

The PISA digital reading assessment addresses a number of important issues that arise from the differences between print and digital reading outlined above.

First, it considers whether print and digital reading belong to the same construct. The PISA 2009 reading framework (OECD, 2009) points out that, while many of the skills required for print and digital reading are similar, digital reading demands some new emphases and strategies to be added to the reader's repertoire. Gathering information on the Internet requires skimming and scanning through large amounts of material and immediately evaluating its credibility. Critical thinking, therefore, has become more important than ever in reading literacy (Halpern, 1989; Shetzer & Warschauer, 2000; Warschauer, 1999). It is important to find out which specific dimensions of tasks and students' characteristics explain students' proficiency in digital reading, while also accounting for print reading proficiency.

Over the past ten years, there has been a discussion as to whether the people who have been exposed to information technology from a young age, so-called "digital natives", might readily possess the skills and abilities required to make use of digital devices, compared to older people, the so-called "digital immigrants" (Prensky, 2001). There is mounting evidence that mere exposure to technology is not sufficient for becoming a skilled user. As time elapses, the gap in technology use between generations is progressively decreasing. The Pew Research Center (2010) has found that even though "millenials" (people who were between 5 and 20 years old at the turn of the 21st century) are more likely than older generations to use mobile digital devices and social networks, they are no longer dominant in other types of digital activities, such as looking up government websites or financial information.

Access to technology is necessary but certainly not sufficient in itself to acquire digital reading literacy. As noted by Warschauer (1999), overcoming the "digital divide" is not only a matter of developing access to online technology, but also of enhancing people's abilities to access and make use of information through electronic devices. Indeed, recent studies show a wide range of proficiency levels among groups of "digital natives" (Kennedy, et al., 2008). A growing number of experts call for "a more nuanced understanding of students' technology experiences", to use the words of Bennett and Maton (2010).

## Organisation of the report

This report focuses on Australia's results in digital literacy from PISA 2009. Chapter 2 provides a profile of student performance in digital reading literacy. Chapter 3 will focus on the ways that readers approach texts and deal with reading tasks, Chapter 4 examines the relationship between access to computers and socioeconomic background, Chapter 5 examines students' access and use of information and communication technologies, Chapter 6 reviews students' attitudes and confidence in using information and communication technologies and the final chapter, Chapter 7, provides a summary and policy implications.

# The reading literacy framework[3]

The reading literacy framework developed for PISA 2009 covers both print and digital literacy.

## The definition of reading literacy

The PISA concept of reading literacy emphasises skills in using written information in situations that students may encounter in their life at and beyond school. PISA 2009 defines reading literacy as:

> *understanding, using, reflecting on and engaging with written texts, in order to achieve one's goals, to develop one's knowledge and potential, and to participate in society.*

The definition goes beyond the traditional notion of reading literacy as decoding information and literal comprehension. It implies that reading literacy involves understanding, using and reflecting on written information in a range of situations. Furthermore, it recognises the awareness of and the ability to use a variety of appropriate strategies when processing texts. The definition applies to both digital and print reading.

## How reading literacy is measured in PISA

PISA acknowledges that readers respond to a given text in a variety of ways as they seek to use and understand what they are reading. The concept of reading literacy in PISA is defined by three dimensions: *texts* (the range and format of the reading material), *aspects* (the type of reading task or reading processes involved), and *situations* (the use for which the text was constructed). The relationships between the major dimensions are shown in Figure 1.2.

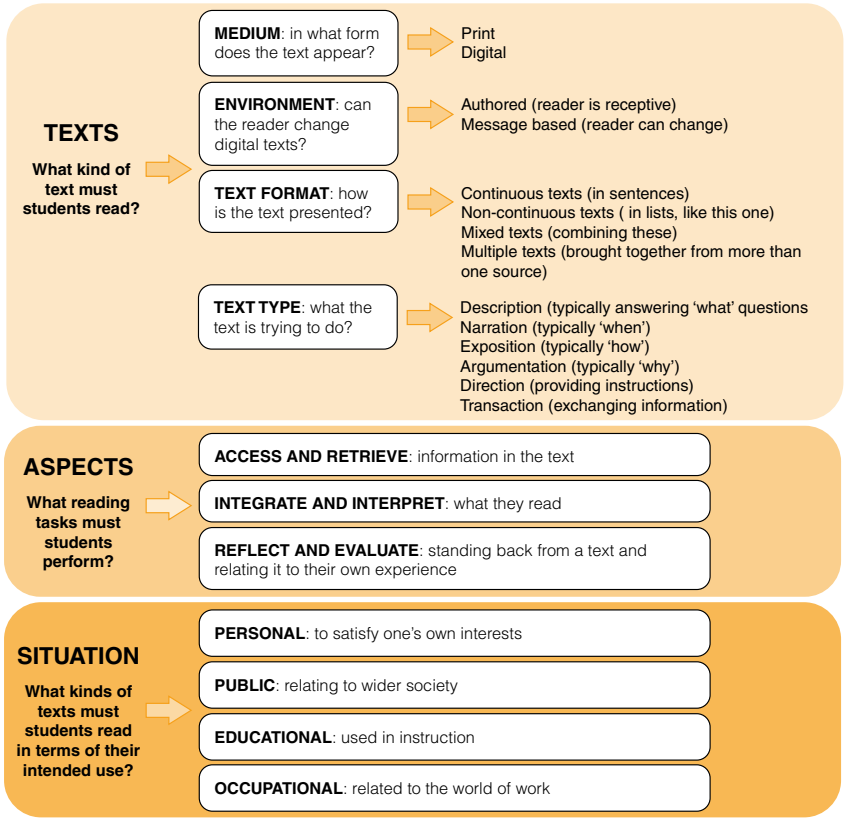



**Figure 1.2** Main features of the PISA 2009 reading literacy framework

3 For more information about the Reading Literacy Framework and print reading literacy: see Chapter 2 in Thomson, S. & De Bortoli, L., Nicholas, M., Hillman, K. & Buckley, S. (2011). *Challenges for Australian Education: Results from PISA 2009.*

These dimensions define the PISA Reading Literacy Framework, which was used by test developers to construct the tasks that made up the assessment. Some of the elements in the three dimensions are used as the basis for constructing scales and subscales, and subsequently for reporting, whereas other elements ensure that reading literacy is adequately covered.

### Texts

Texts cover the range of materials that are read. Digital texts are a subset of written texts. For the purposes of PISA 2009, digital text is synonymous with hypertext (a text or texts that are displayed on a computer or other electronic device with hyperlinks that allow the reader to immediately access text that are located in a different area.). They are texts composed predominantly of language rendered in a graphic form. Non-verbal graphic elements (including illustrations, photographs, icons and animations) constitute part of a digital text in PISA, however oral language (such as audio recordings) are not included in this definition of text.

In order to represent the digital medium as fully as possible, many kinds of hypertexts were included in the PISA 2009 assessment. Digital texts in PISA can be characterised in terms of *environment*, *text format*, *text type*, and *navigation tools and features*.

The first text characteristic defined for digital reading is *environment*. Two kinds of digital environments (authored or message-based) have been identified for the assessment of reading of digital texts. The distinction between them is based on whether or not the reader has the potential to influence the content of the site.

An *authored environment* is one in which the reader is primarily receptive – the content cannot be modified (for example, text objects within home pages, government information sites, news sites and lists of search results), whereas a *message-based environment*, is one in which the reader has the opportunity to contribute by adapting the content (for example, emails, blogs, chat rooms, web forums and online forms). As with many of the variables in the reading framework, the environment classifications are not strictly partitioned. A given website, for example, may include some authored text and a section in which the reader is invited to add a comment. The integration of both authored and message-based texts results in an additional environment classification of 'mixed'. An individual task, however, generally draws predominantly upon one of the environment categories and is classified accordingly.

In PISA 2009, 66 per cent of digital reading literacy tasks were authored environments, 28 per cent were message-based environments and six per cent were mixed environments.

The second text characteristic defined for digital reading is *text format*. In PISA 2009, there are four different text formats: *continuous*, *non-continuous*, *mixed* and *multiple*. *Continuous texts* are formed by sentences that are, in turn, organised into paragraphs. *Non-continuous texts* are organised in matrix format, based on combinations of lists. *Mixed texts* are single, coherent objects consisting of a set of elements in both a continuous and non-continuous format. Only tasks that focus on a single digital page are classified as continuous, non-continuous or mixed.

In PISA, *multiple texts* are defined as those which have been generated independently, and make sense independently, of the content in which each text was originally authored; they are juxtaposed for a particular occasion or may be loosely linked together for the purposes of the assessment. The relationship between the texts may not be obvious; they may be complementary or may contradict one another. Tasks that have been classified as multiple texts are based on sets of continuous, non-continuous and mixed text format material.

Given the assessment was intended to represent the experience of navigating across multiple pages and sites that is typical of digital reading, there are many multiple tasks in the assessment. In PISA 2009, the distribution of digital reading literacy tasks by text format were: seven per cent continuous, 10 per cent non-continuous, seven per cent mixed and 76 per cent multiple.

The third text characteristic defined for digital reading is *text type*. All texts in PISA are classified by text type and are assigned according to the main rhetorical purpose of the text. Although there are six categories of text type (argumentation, description, exposition, instruction, narration and transaction), only four of the six are represented in the digital reading literacy assessment. *Description* refers to the type of text where the information refers to properties of objects in space and typically provides answers to *what* questions. *Exposition* is the type of text in which the information is presented as composite or mental constructs and often answers questions about *how*. *Argumentation* presents the relationship among concepts or propositions, typically answering *why* questions. *Transaction* refers to the exchange of information in an interaction with the reader. Narrative texts were not included in the assessment as no suitable material of an appropriate length and quality was found. Instructional texts were also absent from the PISA 2009 assessment.

In PISA 2009, the digital reading tasks were composed of 21 per cent argumentation texts, 31 per cent description texts, 31 per cent exposition texts, 14 per cent transaction texts, and three per cent mixed texts.

The fourth characteristic defined for digital reading literacy is *navigational tools and features*, which help readers to negotiate their way into, around and across texts. While there are parallels in the print medium, such as tables of contents, headings and page numbers, many navigation tools and features are unique to the digital medium, and they are indeed part of the definition of hypertext.

A range of navigation tools and structures was included as one important component in measuring proficiency in digital reading in the PISA 2009 digital reading assessment. The tools and features include: scroll bars for moving up and down a page; tabs for different websites; lists of hyperlinks displayed in a row, in a column or as a drop-down menu; embedded hyperlinks – that is, hyperlinks included in paragraphs, tables of information or a list of search results; and site maps.

### Aspects

These are the cognitive skills involved in processing texts and are fundamental to both digital and print reading. There are four aspects: *access and retrieve, integrate and interpret, reflect and evaluate* and *complex*.

Accessing and retrieving draws upon skills associated with finding, selecting and collecting relevant information. Some items in the digital medium require little more than accessing (for example, clicking on an embedded link to open a web page or clinking to select an item in a list of search results). A digital item that requires accessing and retrieving might involve navigating across several pages of a website, or using menus, or lists of tabs to locate relevant information.

Integrate and interpret tasks involve processing what is read to make internal sense of a text. While integrating focuses on demonstrating an understanding of the relations between different parts of a text, interpreting refers to the process of making meaning from something that is not stated. Within this aspect, some tasks might require the student to identify a specific piece of text, such as where a theme or main idea is explicitly stated. Other tasks may require the student to focus on more than one part of the text; for instance, if the reader has to deduce the theme from the repetition of a particular category of information.

Tasks that involve reflecting and evaluating skills draw upon knowledge, ideas or attitudes beyond the text in order to relate to information provided within the text of one's conceptual and experiential frames of reference. The kinds of reflection and evaluation called for in the print medium are also required in the digital medium, although evaluation in the digital medium takes on a slightly different emphasis. While printed texts are typically edited and filtered as part of the publication process, texts can be published by anyone on the web. The digital medium increases the need for the reader to be aware of authorship, accuracy, quality and credibility. They must know how to evaluate information that may be questionable and know how to use a search engine to gather additional information.

A few digital readings tasks are classified as complex, in that they may draw on all aspects described above. Complex tasks have been designed to take advantage of the relative freedom of reading in the digital medium, where the arrangement and organisation given to a print text by the author's ordering of pages, chapters or larger sections is absent, and the sequence of steps to be taken by the reader in completing a task is thus much more fluid. These tasks involve the interaction between accessing, retrieving, interpreting, integrating and reflecting, as they are intended to simulate the uncertainty of negotiating hyperspace and thus are not as readily classified as belonging predominantly to one of the three aspects.

In the digital medium, the cognitive processes of accessing, retrieving, interpreting, integrating, reflecting and evaluating are called upon for both text processing and navigation. Text processing in the digital medium is very similar to the array of skills and strategies typically associated with print reading. The digital reader may need to locate key pieces of information, interpret nuances of language, integrate different elements of the text, draw on prior knowledge of textual and linguistic structures and features, make judgements about the cogency of an argument or the appropriateness of the style, and reflect on the relationship between the content and his or her own experience or knowledge of the world.

In PISA 2009, the breakdown of digital reading tasks by aspect was: 24 per cent access and retrieve, 35 per cent integrate and interpret, 21 per cent reflect and evaluate and 21 per cent complex.

### Situation

*Situation* is used in PISA to define texts and their associated tasks, and refers to the contexts and uses for which the author constructed the text. While content is not used for the purpose of reporting results, by sampling texts across a variety of situations the intent is to maximise the diversity of content included in the PISA reading literacy assessment. In PISA, texts are assigned to one of four situations – *personal*, *public*, *educational* and *occupational* – according to their supposed audience and purpose, rather than on the place where the reading activity may be carried out.

The personal category relates to texts that are intended to satisfy an individual's personal interests. This category also includes texts that are intended to maintain or develop personal connections with other people and experiences. In the digital medium, it includes personal emails, instant messages and diary-style blogs.

The public category includes texts that relate to activities and concerns of the larger society. The category includes official documents as well as information about public events. In general, the texts associated with this category assume a more or less anonymous contact with others; they also include forum-style blogs, news websites and public notices that are encountered both online and in print.

The content of educational texts is usually designed specifically for the purpose of instruction and imparting knowledge. Printed textbooks and interactive learning software are typical examples of material generated for this kind of reading.

Occupational texts are those associated with the workplace or texts that support the accomplishment of some immediate task. Such texts might be intended to help readers searching for a job, either in a print newspaper's classified advertisement section or online; or following workplace directions. The tasks addressing this kind of text are often referred to as 'reading to do' as opposed to the 'reading to learn' of educational texts.

## Similarities and differences between digital and print reading literacy assessments

The framework for reading literacy treats digital and print reading literacy as a single domain, while acknowledging that there are some intrinsic differences. A key distinction that underpins many consequential differences is the fact that, in the digital medium, the reader is generally

unable to see the physical extent of the available text at any given moment, while at the same time he or she has almost immediate access to a nearly infinite array of material via the Internet. The differences reflected in the framework were built into the design of the two assessments and the tests themselves.

Table 1.1 provides some of the similarities and differences between print and electronic reading in the PISA assessment. Although there are some features that exist in both media, they cannot be or were not assessed in PISA. These are represented by a '*' symbol. A feature that was given relatively little emphasis in the PISA assessment is represented by a '#' symbol.

**Table 1.1** Similarities and differences between digital and print reading literacy, by main framework characteristic[4]

| Framework characteristic | Digital reading literacy | Print reading literacy |
|---|---|---|
| Situations | Personal | Personal |
| | Public | Public |
| | Educational | Educational |
| | Occupational | Occupational |
| Texts: Environments | Authored | * Not applicable |
| | Message-based | |
| Texts: Formats | # Continuous | Continuous |
| | # Non-continuous | Non-continuous |
| | # Mixed | # Mixed |
| | Multiple | # Multiple |
| Texts: Text type | Argumentation | Argumentation |
| | Description | Description |
| | Exposition | Exposition |
| | Narration | Narration |
| | Instruction | Instruction |
| | Transaction | * Transaction |
| Aspects: Access and retrieve | Search | Search |
| | * Orient and navigate in abstract information space<br>e.g. Enter URL, user search engines | * Orient and navigate in concrete information space<br>e.g. Go to library, search in a catalogue, find a book |
| | Use navigation tools and structures e.g. Menus, embedded hyperlinks | * Use navigation tools and structures<br>e.g. Table of contents, page numbers, glossary |
| | Select and sequence information<br>Higher reader control<br>Multiple sequences of linear reading | Select and sequence information<br>low reader control<br>one sequence of linear reading |
| Aspects: Integrate and interpret | Integrate at a higher level of demand: limited parts of text are simultaneously visible (limited by screen size) | Integrate at a lower level of demand: larger portions of texts are simultaneously visible (one or two pages) |
| | Develop an interpretation | Develop an interpretation |
| | Form a broad understanding | Form a broad understanding |
| Aspects: Reflect and evaluate | Pre-evaluate information<br>e.g. use menus, skim web pages, checking for credibility and usefulness | * Pre-evaluate information<br>e.g. use table of contents, skim passages, checking for credibility and usefulness |
| | Evaluate credibility of source<br>usually more important due to lack of filtering and preselection in open environment | Evaluate credibility of source<br>usually less important due to filtering and preselection in the publishing process |
| | Evaluate plausibility of content | Evaluate plausibility of content |
| | Evaluate coherence and consistency | Evaluate coherence and consistency |
| | Hypothesise | Hypothesise |
| | Reflect in relation to personal experience | Reflect in relation to personal experience |
| Aspects: Complex | The range of sources to be consulted is relatively undefined | * The range of sources to be consulted is relatively undefined |
| | The sequence of steps within the task is undirected<br>e.g. finding, evaluating and integrating information from multiple digital texts | * The sequence of steps within the task is undirected<br>e.g. finding, evaluating and integrating information from multiple printed texts |

4 Table 1.5 in *PISA 2009 Assessment Framework*.

## Further information

Examples of digital reading items from the PISA 2009 assessment can be found at: **http://erasq.acer.edu.au/**.

For more information about the PISA assessment, visit the Australian PISA website: **http://www.acer.edu.au/ozpisa**.

Chapter

# 2

# Australian students' performance in digital reading literacy

This chapter focuses on Australian students' performance in digital reading literacy in PISA 2009. Results are reported by means (average scores) and proficiency levels. Comparisons of student performance in digital reading literacy are provided at an international level, describing Australia's performance relative to the other 18 participating countries, and at a national level, where the focus is on the performance of different groups in Australian society, such as the Australian states, Australian school sectors, males and females, Indigenous students, students attending schools in different geographic locations and students from different socioeconomic backgrounds.

## Key Findings

- Australia was outperformed by one country, Korea, in digital reading literacy. Australia's performance was not significantly different from that of New Zealand. All other countries performed at a level significantly lower than Australia.
- Australia achieved a mean score of 537 score points in digital reading literacy, which was significantly above the OECD average[1] of 499 score points.
- Seventeen per cent of Australian students were highly skilled digital readers (Level 5 or above) compared to eight per cent of students across the OECD.
- Ten per cent of Australian students were low performers in digital reading literacy (below Level 2) compared to 17 per cent of students across the OECD.
- Student performance in print and digital reading literacy was closely related. Generally, countries that were high performers in print reading literacy performed more strongly in digital than print reading literacy. The lower achieving countries in print reading literacy were also the lower performers in digital reading literacy; however, they performed more strongly in print than digital reading literacy. Australian students performed, on average, 22 score points higher on digital than print reading literacy.
- Significant gender differences, in favour of females, were found in all except one country that participated in the digital reading assessment. The gender difference in Australia was 28 score points, on average, while the gender difference across OECD countries was 24 score points, on average.
- Digital reading scores for students in the Australian Capital Territory, Victoria, New South Wales, Western Australia and Queensland were not statistically different to each other. The Australian Capital Territory and Victoria outperformed South Australia, while New South Wales, Western Australia and Queensland performed on par with South Australia. Tasmania and the

1 The average of the 16 OECD countries that participated in the assessment of digital reading literacy

Northern Territory scored significantly lower on average than the other states, but were not statistically different from one another.

- Students in every state performed significantly better in digital than print reading literacy. The mean score difference ranged from 13 score points in Queensland to 28 score points in Victoria.
- The largest gender differences in digital reading literacy were found in Tasmania, with a difference of, on average, 43 score points, while the smallest gender differences were found in Victoria, with an average difference of 24 score points.
- The average digital reading literacy performance of students in the independent school sector was significantly better than that of students in the Catholic school sector, who in turn scored significantly better than students in the government school sector.
- Students attending schools in metropolitan areas performed significantly better than students in provincial or remote schools. Students in provincial schools also performed significantly better than students attending schools in remote areas.
- The average digital reading literacy performance of non-Indigenous students was significantly better than that of Indigenous students.
- Students in the higher socioeconomic quartiles achieved significantly better than students in lower socioeconomic quartiles. The difference between the highest and lowest quartile of socioeconomic quartile is, on average, 84 score points.
- The average digital reading literacy performance of first-generation students was significantly higher than that of Australian-born students, while there were no significant differences between the scores of Australian-born students and foreign-born students.
- Students who spoke English as their main language at home achieved at a significantly higher level than students whose main language at home was a language other than English.
- Across the different reporting groups within Australia, students scored significantly better in digital reading literacy than print reading literacy, except for students who attended schools in remote areas, whose digital and print reading literacy scores were not significantly different.

## Reporting digital reading literacy performance: mean scores and proficiency levels

Students' performance in digital reading literacy is reported on an overall scale. The mean score on the digital reading literacy scale was 499 score points, with a standard deviation of 90[2]. These values establish the benchmark against which each country's digital reading literacy performance in PISA 2009 is compared.

The 29 digital reading literacy items were scaled to produce a continuum of digital reading literacy proficiency. The digital reading literacy scale describes achievement in terms of the skills and knowledge that students with increasing levels of proficiency are able to demonstrate. The number of digital reading literacy items in the PISA 2009 pool allows for four levels – Level 2, Level 3, Level 4 and Level 5 or above – to be described (Figure 2.1). The unbounded area below Level 2 contains too few items to describe this level adequately. This is also the case for describing proficiency at the upper end of the scale. It is anticipated that future cycles of PISA will allow for the development and description at each end of the proficiency scale – those students with very high or low digital reading literacy proficiency.

2 The digital reading scale was set so that the mean and standard deviation of the 16 equally weighted OECD countries was the same as those of the same group of countries' print reading mean and standard deviation.

As has been the case in previous PISA cycles, Level 2 has been defined internationally as a "baseline" proficiency level. This level does not separate reading literacy and illiteracy; rather it defines the level of achievement on the PISA scale at which students begin to demonstrate the reading literacy competencies that will enable them to actively participate in life situations. Students performing below this baseline are at serious risk of not achieving at levels sufficient to allow them to adequately participate in the 21st century work force and contribute as a productive citizen.

| Proficiency level | Characteristics of tasks |
|---|---|
| 5 or above | Tasks at this level typically require the reader to locate, analyse and critically evaluate information, related to an unfamiliar context, in the presence of ambiguity. They require generating criteria to evaluate the text. Tasks may require navigation across multiple sites without explicit direction, and detailed interrogation of texts in a variety of formats. |
| 625.6 score points | |
| 4 | Tasks at this level may require the reader to evaluate information from several sources, navigating across several sites comprising texts in a variety of formats, and generating criteria for evaluation in relation to a familiar, personal or practical context. Other tasks at this level demand that the reader interpret complex information according to well- defined criteria in a scientific or technical context. |
| 552.9 score points | |
| 3 | Tasks at this level require that the reader integrate information, either by navigating across several sites to find well-defined target information, or by generating simple categories when the task is not explicitly stated. Where evaluation is called for, only the information that is most directly accessible or only part of the available information is required. |
| 480.2 score points | |
| 2 | Tasks at this level typically require the reader to locate and interpret information that is well-defined, usually relating to familiar contexts. They may require navigation across a limited number of sites and the application of web-based navigation tools such as drop-down menus, where explicit directions are provided or only low-level inference is called for. Tasks may require integrating information presented in different formats, recognising examples that fit clearly defined categories. |
| 407.5 score points | |

**Figure 2.1** Summary descriptions of the four proficiency levels on the digital reading literacy scale

## Comparing student performance in digital and print reading literacy

The digital reading literacy scale was constructed in a similar way to the print reading literacy scale. This ensured that the 16 OECD countries[3] that participated in the digital reading literacy assessment aligned with the mean and standard deviation for these same 16 OECD countries that participated in the PISA 2009 print reading literacy assessment. This makes it possible to report valid country comparisons.

The proficiency levels for digital reading literacy were also aligned so comparisons could be reported between the proficiency levels in digital reading literacy and proficiency levels in print reading literacy. For the comparisons in this chapter, below Level 1b, Level 1b and Level 1a in the print reading literacy proficiency scale have been combined to reflect the proportion of students below Level 2, and Level 5 and Level 6 in the print reading literacy proficiency scale have been combined to reflect the proportion of students at Level 5 or above (see Figure 2.2).

3 The other countries participating in digital reading literacy were partner countries

## Digital reading literacy performance from an international perspective

Eight OECD countries (Korea, New Zealand, Australia, Japan, Iceland, Sweden, Ireland and Belgium) and one partner economy (Hong Kong-China) scored significantly higher, on average, than the OECD average of 499 score points. The OECD countries Norway and France achieved mean scores that were not statistically significant from the OECD average. The remaining six OECD countries (Denmark, Spain, Hungary, Poland, Austria and Chile), partner country, Colombia, and partner economy, Macao-China, achieved mean scores that were significantly below the OECD average.

Korea was the only country, with a mean score of 568 points, to score significantly higher than Australia. Australia, along with New Zealand, achieved a mean score of 537 points on the digital reading literacy performance scale. All other countries performed at a level significantly lower than Australia.

Table 2.1 provides the mean digital reading literacy scores, along with the standard error, confidence interval around the mean and the difference between the 5th and 95th percentiles for participating countries.

**Table 2.1** Mean digital reading literacy scores, confidence intervals and variations by country

| Country | | Mean score | S.E. | Confidence interval | Difference between 5th - 95th percentile |
|---|---|---|---|---|---|
| Korea | Significantly higher than Australia | 568 | 3.0 | 562 - 574 | 220 |
| New Zealand | Not significantly different from Australia | 537 | 2.3 | 533 - 542 | 323 |
| **Australia** | | 537 | 2.8 | 531 - 542 | 317 |
| Japan | | 519 | 2.4 | 514 -524 | 236 |
| Hong Kong-China | | 515 | 2.6 | 510 - 520 | 262 |
| Iceland | Significantly lower than Australia | 512 | 1.4 | 509 - 515 | 301 |
| Sweden | | 510 | 3.3 | 504 - 517 | 291 |
| Ireland | | 509 | 2.8 | 503 - 514 | 286 |
| Belgium | | 507 | 2.1 | 503 - 512 | 304 |
| Norway | | 500 | 2.8 | 494 - 505 | 273 |
| **OECD average**[4] | | 499 | 0.8 | 497 - 500 | 293 |
| France | | 494 | 5.2 | 484 - 504 | 298 |
| Macao-China | | 492 | 0.7 | 490 - 493 | 219 |
| Denmark | | 489 | 2.6 | 484 - 494 | 276 |
| Spain | | 475 | 3.8 | 468 - 483 | 310 |
| Hungary | | 468 | 4.2 | 460 - 476 | 337 |
| Poland | | 464 | 3.1 | 457 - 470 | 295 |
| Austria | | 459 | 3.9 | 451 - 466 | 323 |
| Chile | | 435 | 3.6 | 428 - 442 | 295 |
| Colombia | | 368 | 3.4 | 362 - 375 | 271 |

The disparity between the highest and lowest performing students is also evidenced by the difference between scores at the 5th and 95th percentile. Although the OECD average between the 5th and 95th percentile was 293 score points, the difference in scores between the 5th and 95th percentile varied considerably across the different countries. The widest differences between the lowest and highest performing students were found in Hungary (337 score points), New Zealand and Austria (323 score points). There was a 317 score point difference between the 5th and 95th percentile in Australia. The narrowest differences between the lowest and highest performing students were found in the Asian countries: Macao-China (219 score points), Korea (220 score points), Japan (236 score points) and Hong Kong-China (262 score points).

4 The OECD average in this chapter corresponds to the 16 OECD countries who participated in the digital reading literacy assessment.

Table 2.2 shows the difference between the two reading assessments graphically. The majority of countries who participated in the digital reading literacy assessment achieved a mean score that was significantly different from their mean score for print reading literacy. Generally, the higher achieving countries in print reading literacy were also the high performers in digital reading literacy, performing more strongly in digital than print reading literacy. The lower achieving countries in print reading literacy were also the lower performers in digital reading literacy, performing more strongly in print than digital reading literacy. The exception was Hong Kong-China, a high performing country in both assessments; however they performed more strongly in print than digital reading literacy.

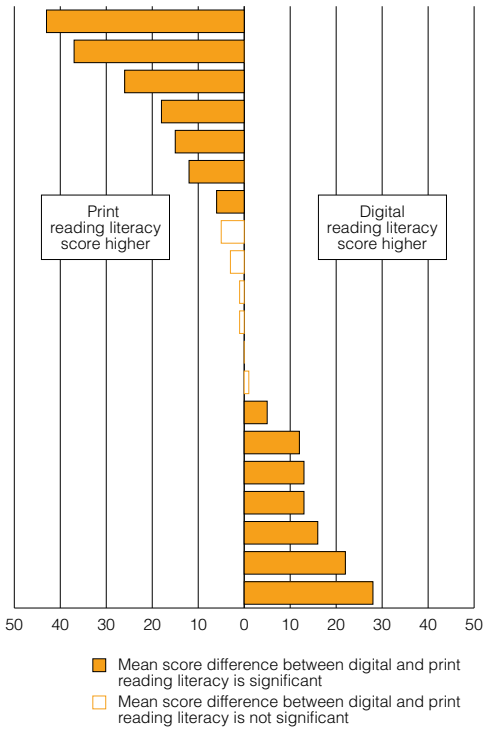
In Korea, Australia, New Zealand, Ireland, Sweden, Iceland and Macao-China, students performed significantly better in digital than in print reading literacy. The average difference between the digital and print reading literacy score ranged from 28 score points in Korea to five score points in Macao-China. Australian students performed, on average, 22 score points higher on digital than print reading literacy.

However, in Colombia, Poland, Hungary, Hong Kong-China, Chile, Austria and Denmark, students performed significantly better in print than in digital reading literacy. Mean score differences between digital and print reading literacy ranged from 43 score points on average in Columbia to six score points on average in Denmark.

In Spain, Norway, France, Japan and Belgium, students recorded mean scores on the digital and print reading literacy that were not statistically different.

**Table 2.2** Mean digital and print reading literacy scores and mean differences by country

| Country | Digital reading literacy | | Print reading literacy | | Difference in mean score |
|---|---|---|---|---|---|
| | Mean score | S.E. | Mean score | S.E. | |
| Colombia | 368 | 3.4 | 412 | (3.6) | |
| Poland | 464 | 3.1 | 500 | (2.6) | |
| Hungary | 468 | 4.2 | 494 | (3.2) | |
| Hong Kong-China | 515 | 2.6 | 533 | (2.1) | |
| Chile | 435 | 3.6 | 449 | (3.1) | |
| Austria | 459 | 3.9 | 470 | (2.9) | |
| Denmark | 489 | 2.6 | 495 | (2.1) | |
| Spain | 475 | 3.8 | 480 | (3.1) | |
| Norway | 500 | 2.8 | 503 | (2.6) | |
| France | 494 | 5.2 | 496 | (3.4) | |
| Japan | 519 | 2.4 | 520 | (3.5) | |
| **OECD average** | 499 | 0.8 | 499 | (0.7) | |
| Belgium | 507 | 2.1 | 506 | (2.3) | |
| Macao-China | 492 | 0.7 | 487 | (0.9) | |
| Iceland | 512 | 1.4 | 500 | (1.4) | |
| Sweden | 510 | 3.3 | 497 | (2.9) | |
| Ireland | 509 | 2.8 | 496 | (3.0) | |
| New Zealand | 537 | 2.3 | 521 | (2.4) | |
| **Australia** | 537 | 2.8 | 515 | (2.3) | |
| Korea | 568 | 3.0 | 539 | (3.5) | |




The digital reading literacy proficiency levels provide further detail about student performance by describing the competencies students have attained at each level. The proportion of students at each digital reading literacy proficiency level, from below Level 2 to Level 5 or above, are presented by country in Figure 2.2. Countries have been ordered by the proportion of students

classified as below Level 2, with the lowest proportions of students below Level 2 placed at the top of the figure and countries with the highest proportion of students below Level 2 at the bottom.

Students at the upper end of the digital reading literacy proficiency scale are classed as top performers, whereas those students located at the lower end of the scale are deemed not likely to have sufficient skills and knowledge in the digital medium for the 21st century.

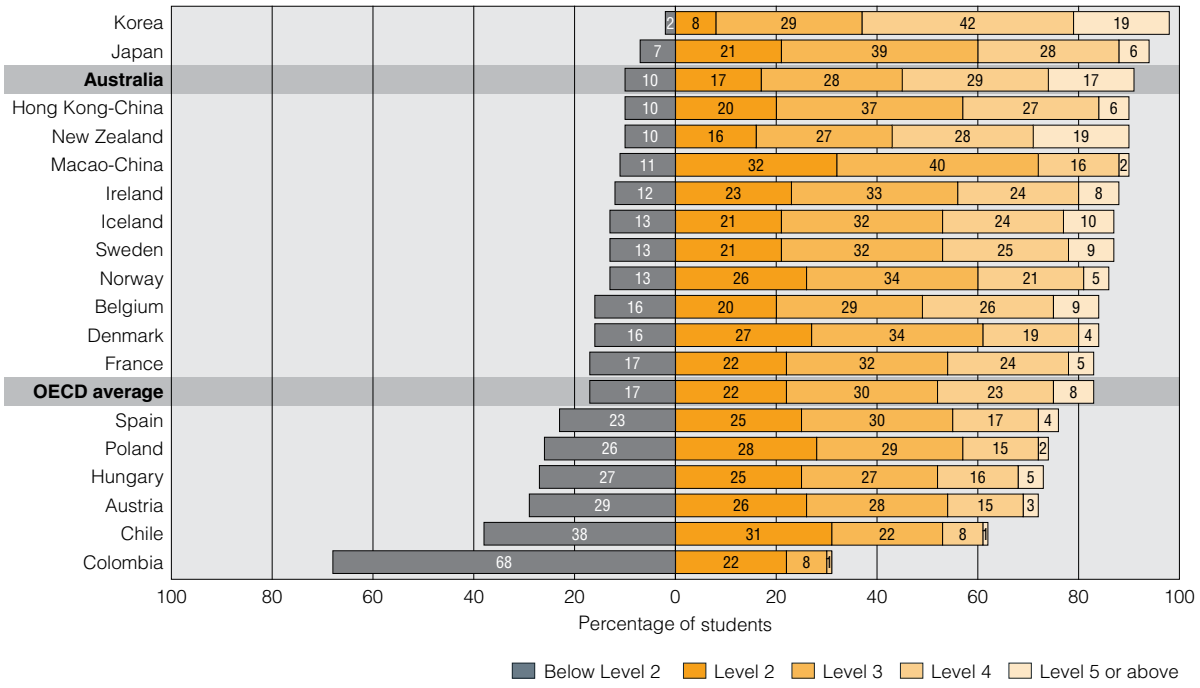



**Figure 2.2** Digital reading literacy proficiency levels by country

Students performing at the highest proficiency level, Level 5 or above, are skilled readers of the digital medium. They are capable of locating information that is relevant across multiple sites without explicit direction, and can analyse or critically evaluate texts in a variety of formats and text types. Students at this level can draw inferences and form plausible hypotheses.

On average, eight per cent of students across OECD countries performed at this level. This is around the same proportion as in print literacy. Korea, New Zealand and Australia had more than twice the proportion of students as the OECD average performing at Level 5 or above, with 19 per cent in Korea and New Zealand and 17 per cent of students in Australia. For New Zealand this was comparable with the proportion of students achieving at this high level in print literacy, however the proportion of Australian students performing at proficiency Level 5 (or above) was greater in digital literacy than in print literacy. Macao-China, Poland and Chile had a very small percentage of students (2% or less) who were placed at Level 5 or above. Almost no students from Colombia (0.1%) achieved at this high proficiency level on the digital reading literacy scale

Students proficient at Level 4 are able to perform challenging tasks in the digital medium. Students who achieved Level 5 or above can also successfully complete Level 4 tasks.

On average, around 30 per cent of students across OECD countries performed at Level 4 or above. In Korea approximately 60 per cent of students achieved Level 4 or above, while in Australia and New Zealand, around half the students achieved Level 4 or above.

Students performing at Level 3 are able to deal with moderate complexity in the digital medium. Under explicit guidance, they are able to navigate across several sites to find well-defined information, and compare and contrast information from a number of web-based texts when the

criteria for comparison or contrast are clearly stated. They evaluate information in terms of its usefulness for a specified purpose or in terms of personal preference.

On average, 61 per cent of students across OECD countries are proficient at Level 3 or above. The majority of students from Korea (90%) and approximately 75 per cent of students from Australia, New Zealand and Japan achieved at Level 3 or above. Around half the students from Spain and Hungary achieved Level 3 or above while only 31 per cent of students in Chile and nine per cent of students in Colombia were placed at Level 3 or above.

Students achieving Level 2 have acquired only basic skills in the digital medium. On average, 83 per cent of students across OECD countries are proficient at Level 2 or above. Almost all students from Korea (98%) and the majority of students from Japan (93%), Australia (90%), New Zealand (90%), Hong Kong-China (90%) and Macao-China (79%) achieved Level 2 or above. More than half of the students in all other countries achieved at this level except for Colombia, in which just 31% achieved Level 2 or above.

It is possible to summarise the average level of proficiency for the countries that participated in the digital reading literacy assessment. On average, 15-year-old students in Korea perform at proficiency Level 4 in digital reading literacy. On average, 15-year-old students in New Zealand, Australia, Japan, Hong Kong-China, Iceland, Sweden, Ireland, Belgium, Norway, France, Macao-China and Denmark perform at proficiency Level 3, while 15-year-old students from Spain, Hungary, Poland, Austria and Chile perform at proficiency Level 2, on average. Colombia's mean score is well below those of the other participating countries, and on average, Colombian 15-year-old students perform below Level 2 in digital reading literacy.

The relationship between print reading literacy and digital reading literacy was evident in most countries, with similar proportions of students in most countries achieving at level 5 or above. Some notable exceptions to this were France, Hong Kong-China and Japan, where more students achieved at this high level in print literacy, and New Zealand, where a higher proportion achieved at the higher levels in digital reading literacy. Over the OECD, and in the five countries (Korea, Japan, Australia, New Zealand and Hong Kong-China) who had the lowest proportion of students not achieving Level 2 in print reading literacy, the proportion of students not achieving at this level in digital reading literacy was similar (ten per cent of Australian students failed to reach Level 2 on the digital reading literacy proficiency scale compared to 14 per cent of students on the print reading literacy proficiency scale) (Figure 2.3).

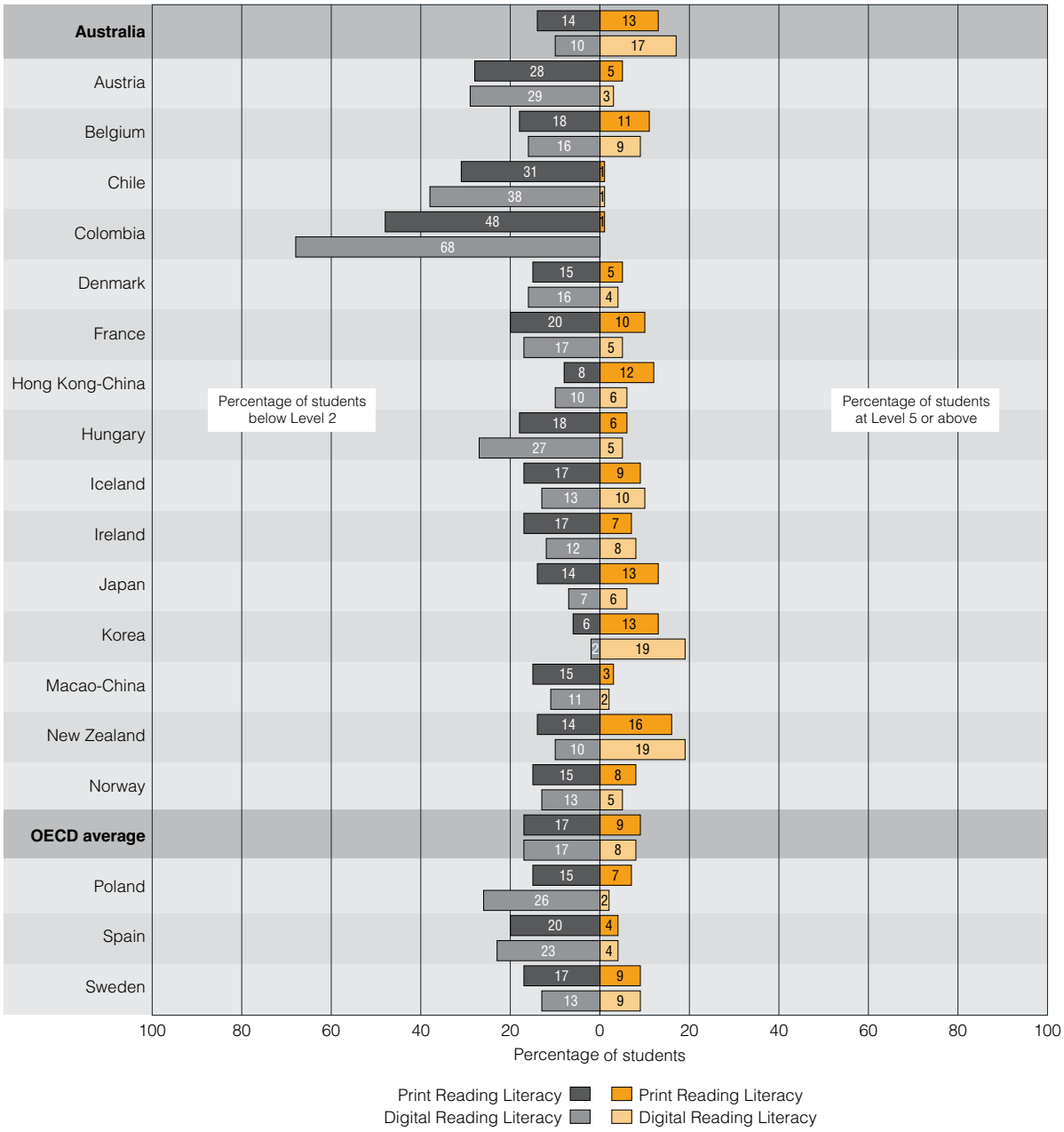



**Figure 2.3** Percentage of students below Level 2 and at Level 5 or above on the digital and print reading literacy proficiency scale by country

## Digital reading literacy performance and gender from an international perspective

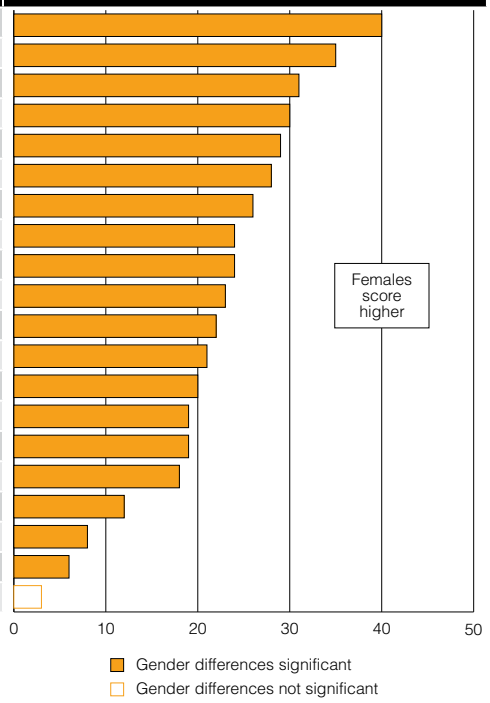
In PISA 2009, females significantly outperformed males in print reading literacy in every participating country. Significant gender differences, all in favour of females, were also found in digital reading literacy for all but one country, Colombia.

Table 2.3 provides the mean scores and standard errors for females and males and shows the difference between average female and male performance graphically. Across OECD countries, females significantly outperformed males by an average of 24 score points. The widest gender differences were found in New Zealand (40 score points), Norway (35 score points), Ireland

(31 score points), Iceland (30 score points), Poland (29 score points) and Australia (28 score points), while Denmark and Hong Kong-China had the narrowest significant gender gap with six and eight score point differences respectively.

**Table 2.3** Mean digital reading literacy scores by gender and gender differences by country

| Country | Gender differences | | | | |
|---|---|---|---|---|---|
| | Females | | Males | | Difference in mean score |
| | Mean score | S.E. | Mean score | S.E. | |
| New Zealand | 558 | 2.7 | 518 | 3.5 | |
| Norway | 518 | 3.0 | 483 | 3.2 | |
| Ireland | 525 | 2.9 | 494 | 3.7 | |
| Iceland | 527 | 1.8 | 497 | 2.1 | |
| Poland | 478 | 3.3 | 449 | 3.4 | |
| **Australia** | 550 | 2.9 | 522 | 3.6 | |
| Sweden | 524 | 3.5 | 497 | 3.5 | |
| **OECD average** | 511 | 0.9 | 487 | 1.0 | |
| Belgium | 520 | 2.4 | 496 | 3.0 | |
| Japan | 531 | 2.9 | 508 | 3.2 | |
| Austria | 469 | 5.1 | 447 | 4.6 | |
| Hungary | 479 | 4.8 | 458 | 5.0 | |
| France | 504 | 5.7 | 484 | 5.2 | |
| Spain | 485 | 3.8 | 466 | 4.3 | |
| Chile | 444 | 3.8 | 425 | 4.3 | |
| Korea | 577 | 3.5 | 559 | 4.3 | |
| Macao-China | 498 | 1.1 | 486 | 1.0 | |
| Hong Kong-China | 519 | 3.2 | 511 | 3.2 | |
| Denmark | 492 | 2.9 | 486 | 3.1 | |
| Colombia | 370 | 3.8 | 367 | 4.5 | |




The proportions of females and males at each of the digital reading literacy proficiency levels in Australia and across the OECD countries are shown in Figure 2.4. In Australia, 20 per cent of females and 15 per cent of males reached Level 5 or above, compared to nine per cent of females and six per cent of males across OECD countries. At the lower end of the digital reading literacy scale there were greater proportions of males than females. Across OECD countries, there were almost twice as many males (21%) as females (13%) who failed to reach Level 2. In Australia, there was a similar pattern with 13 per cent of males not reaching Level 2 compared to six per cent of females.

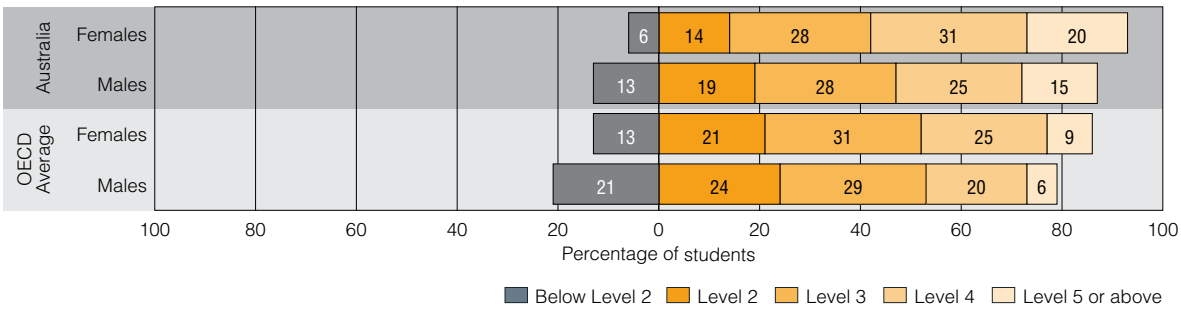
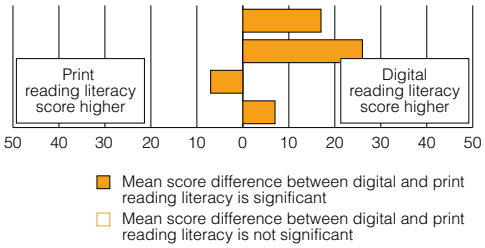



**Figure 2.4** Digital reading literacy proficiency levels for students in Australia and the OECD average by gender

Table 2.4 shows the mean digital and print reading literacy scores and associated standard errors by gender for Australia and across the OECD, as well as the mean score difference between digital and print reading literacy by gender. Australian females scored on average 17 score points higher in digital than print reading literacy, while Australian males scored on average 26 score points higher.

**Table 2.4** Mean digital and print reading literacy scores and mean differences by gender for Australia and OECD average

| Country | Gender | Digital reading literacy | | Print reading literacy | | Mean score difference |
|---|---|---|---|---|---|---|
| | | Mean score | S.E. | Mean score | S.E. | |
| Australia | Females | 550 | 2.9 | 533 | 2.6 | |
| | Males | 522 | 3.6 | 496 | 2.9 | |
| OECD average | Females | 511 | 0.9 | 518 | 0.8 | |
| | Males | 487 | 1.0 | 480 | 0.9 | |




Although females outperformed males in digital reading literacy, as in print reading literacy, the gender gap in performance was smaller than for print literacy. The gender difference across the OECD in print reading literacy was 38 score points, on average, whereas the average gender difference in digital reading literacy was 24 score points. In Australia, the gender difference in digital reading literacy was 28 score points, on average, compared to 37 score points, on average, in print reading literacy.

The reason that the gap in achievement is narrower in digital literacy than print literacy can be seen in the proportions of male and female students at either end of the distribution. In the print literacy assessment, 16 per cent of females and 10 per cent of males achieved at proficiency level 5 or above, compared with 20 per cent and 15 per cent respectively for the digital reading assessment. Just as importantly, 20 per cent of males and nine per cent of females failed to achieve proficiency level 2 in print reading, compared to 13 per cent and six percent respectively in digital reading. There is anecdotal evidence from test administrators and schools that students found the novel form of the digital assessment more engaging than the print literacy assessment, and that the shorter assessment time may have enabled the engagement with the tasks to be more sustained, and these results may reflect this. The narrower gender gap in digital reading literacy may also be a manifestation of a more general higher level of engagement of males with digital media than print media.

## Digital reading literacy performance across Australian states and territories

The digital reading literacy performance for students in each of the Australian states is presented in Table 2.5, together with the standard error, confidence interval, the spread of scores between the 5th and 95th percentile, as well as the mean scores for Australia, Korea and the OECD average for comparison. Students in the Australian Capital Territory achieved the highest mean score in digital reading literacy performance with 547 points, while students in the Northern Territory achieved the lowest mean score with 502 points.

The gap between the highest and lowest performing students varied between states. Victoria had the narrowest spread of scores with 283 points, lower than the OECD average (of 293 score points). The difference between students at the 5th and 95th percentile for other states were larger than the OECD average, ranging from 311 score points in the Australian Capital Territory to the widest spread of scores in the Northern Territory with 366 points.

**Table 2.5** Mean digital reading literacy scores, confidence intervals and variations by state

| State | Mean score | S.E. | Confidence interval | Difference between 5th - 95th percentile |
|---|---|---|---|---|
| ACT | 547 | 5.7 | 536 - 558 | 311 |
| NSW | 541 | 6.3 | 529 - 553 | 321 |
| VIC | 541 | 5.3 | 531 - 552 | 283 |
| QLD | 532 | 6.8 | 518 - 545 | 334 |
| SA | 525 | 6.2 | 512 - 537 | 315 |
| WA | 540 | 6.1 | 528 - 552 | 335 |
| TAS | 504 | 8.6 | 487 - 521 | 349 |
| NT | 502 | 5.6 | 491 - 513 | 366 |
| Australia | 537 | 2.8 | 531 - 542 | 317 |
| Korea | 568 | 3.0 | 562 - 574 | 220 |
| OECD average | 499 | 0.8 | 497 - 500 | 293 |

Table 2.6 provides a comparison of digital reading literacy performance between each of the states. The scores for the Australian Capital Territory, Victoria, New South Wales, Western Australia and Queensland were statistically similar to each other. The Australian Capital Territory and Victoria outperformed South Australia, while New South Wales, Western Australia and Queensland scored on par with South Australia. Tasmania and the Northern Territory scored significantly lower on average than the other states, but were not statistically different from one another.

**Table 2.6** Multiple comparisons of mean performance in digital reading by state

| State | | | ACT | VIC | NSW | WA | QLD | SA | TAS | NT | OECD |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean | | 547 | 541 | 541 | 540 | 532 | 525 | 504 | 502 | 499 |
| | | SE | 5.7 | 5.3 | 6.3 | 6.1 | 6.8 | 6.2 | 8.6 | 5.6 | 0.8 |
| **ACT** | 547 | 5.7 | | ● | ● | ● | ● | ▲ | ▲ | ▲ | ▲ |
| **VIC** | 541 | 5.3 | ● | | ● | ● | ● | ▲ | ▲ | ▲ | ▲ |
| **NSW** | 541 | 6.3 | ● | ● | | ● | ● | ● | ▲ | ▲ | ▲ |
| **WA** | 540 | 6.1 | ● | ● | ● | | ● | ● | ▲ | ▲ | ▲ |
| **QLD** | 532 | 6.8 | ● | ● | ● | ● | | ● | ▲ | ▲ | ▲ |
| **SA** | 525 | 6.2 | ▼ | ▼ | ● | ● | ● | | ▲ | ▲ | ▲ |
| **TAS** | 504 | 8.6 | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ | | ● | ● |
| **NT** | 502 | 5.6 | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ | ● | | ● |

Note: Read across the row to compare a state's performance with the performance of each state listed in the column heading.
▲ Average performance statistically significantly higher than in comparison state
● No statistically significant difference from comparison state
▼ Average performance statistically significantly lower than in comparison state

Figure 2.5 shows the proportion of students at each of the digital reading literacy proficiency levels in each state. States have been ordered from the lowest proportion of students below proficiency Level 2, at the top of the figure, to the highest proportion of students below Level 2 at the bottom of the figure.

Twenty-one per cent of students from the Australian Capital Territory and 20 per cent of students from Western Australia achieved proficiency Level 5 or above in digital reading literacy, which was greater than the proportion of students who performed at this level in Korea. Eighteen per cent of students from New South Wales and Queensland, and 16 per cent of students from Victoria also achieved Level 5 or above, twice the proportion of students across the OECD. The proportion of students from South Australia, Tasmania and the Northern Territory who also achieved Level 5 or above was also greater than the OECD average.

Students at the lower end of the digital literacy proficiency scale are identified as having less developed digital reading literacy skills. Across the OECD, 17 per cent of students failed to reach Level 2, a similar proportion to students in the Northern Territory and Tasmania. In other states, the percentage of students who failed to reach Level 2 ranged from seven per cent in Victoria to 12 per cent in Queensland.

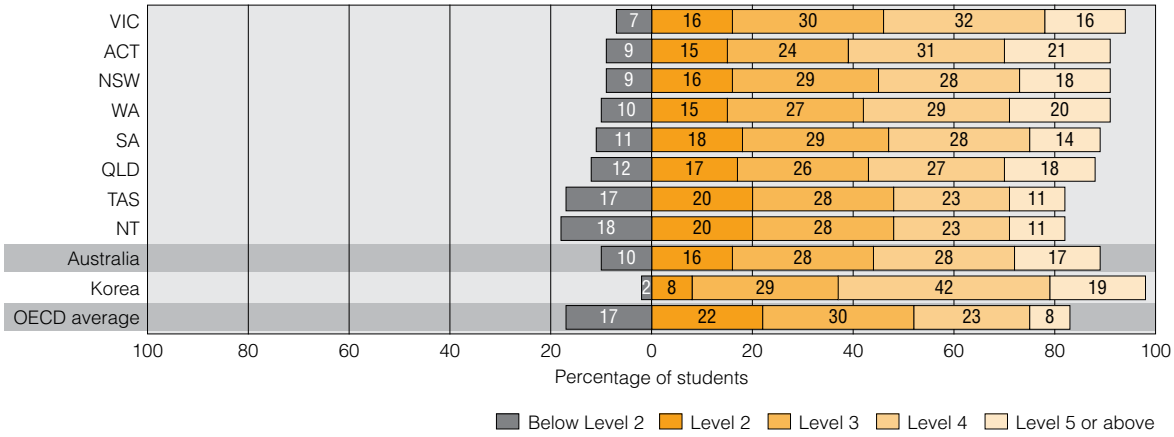



**Figure 2.5** Digital reading literacy proficiency levels by state

Table 2.7 provides the scores for digital and print reading literacy by state. Every state performed significantly higher in digital than print reading literacy. The mean score difference ranged from 13 score points in Queensland to 28 score points in Victoria. The ranking observed in digital literacy scores is similar to that seen in the print literacy scores.

**Table 2.7** Mean digital and print reading literacy scores and mean differences by state

| State | Digital reading literacy | | Print reading literacy | | Difference in mean score |
|---|---|---|---|---|---|
| | Mean score | S.E. | Mean score | S.E. | |
| VIC | 541 | 5.3 | 513 | 4.7 | |
| NSW | 541 | 6.3 | 516 | 5.6 | |
| NT | 502 | 5.6 | 481 | 5.6 | |
| TAS | 504 | 8.6 | 483 | 5.8 | |
| SA | 525 | 6.2 | 506 | 4.8 | |
| WA | 540 | 6.1 | 522 | 6.3 | |
| ACT | 547 | 5.7 | 531 | 6.0 | |
| QLD | 532 | 6.8 | 519 | 7.0 | |

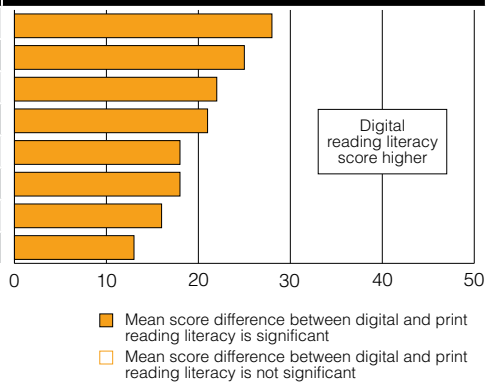



Table 2.8 shows the mean digital reading literacy scores and associated standard errors for females and males, along with the graphical representation of the gender difference for each state. The largest gender difference of 43 score points was found in Tasmania, followed by Western Australia (36 score points) and the Northern Territory (34 score points). Victoria reported the narrowest gender gap of 24 score points.

**Table 2.8** Mean digital reading literacy scores by state by gender, including gender differences

| State | Gender differences | | | | |
|---|---|---|---|---|---|
| | Females | | Males | | Difference in mean score |
| | Mean score | S.E. | Mean score | S.E. | |
| TAS | 526 | 12.1 | 483 | 10.2 | |
| WA | 557 | 6.4 | 521 | 8.8 | |
| NT | 519 | 8.8 | 485 | 5.6 | |
| SA | 540 | 6.0 | 511 | 8.3 | |
| ACT | 561 | 8.8 | 533 | 6.6 | |
| QLD | 545 | 7.0 | 518 | 7.4 | |
| NSW | 554 | 6.0 | 527 | 8.6 | |
| VIC | 553 | 6.0 | 529 | 6.3 | |

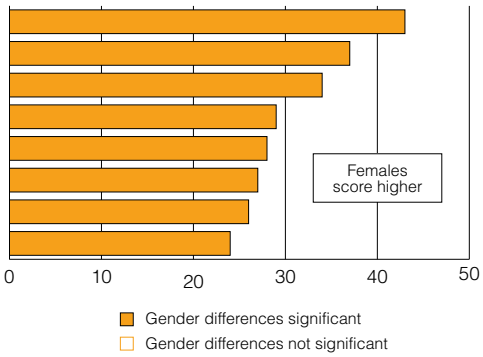



Figure 2.6 shows the proportion of students at each of the digital reading literacy proficiency levels in each state by gender. There was a higher proportion of females who achieved Level 5 or above on the digital reading literacy proficiency scale. This ranged from 25 per cent in the Australian Capital Territory to 14 per cent in the Northern Territory, all above the OECD average of nine per cent.

All states had a higher proportion of males who had achieved Level 5 or above than the OECD average of six per cent. The Australian Capital Territory and Queensland (with 17%) and New South Wales (with 16%) had the highest proportion of males who reached Level 5 or above. Other states ranged from 15 per cent in Western Australia to eight per cent in Tasmania and the Northern Territory.

There was a higher proportion of males than females at the lower end of the digital reading literacy proficiency scale. The proportion of females who were placed at below Level 2 ranged from four per cent in Victoria to 14 per cent in the Northern Territory. All states except the Northern Territory had a lower proportion of females who failed to reach Level 2 than the OECD average of 13 per cent. Approximately one-fifth of males from Tasmania and the Northern Territory failed to reach Level 2. The proportion of males in other states ranged from 10 per cent in Victoria to 16 per cent in Queensland. All states, except Tasmania and the Northern Territory, had a lower proportion of males placed at below Level 2 than the OECD average for males (21%).

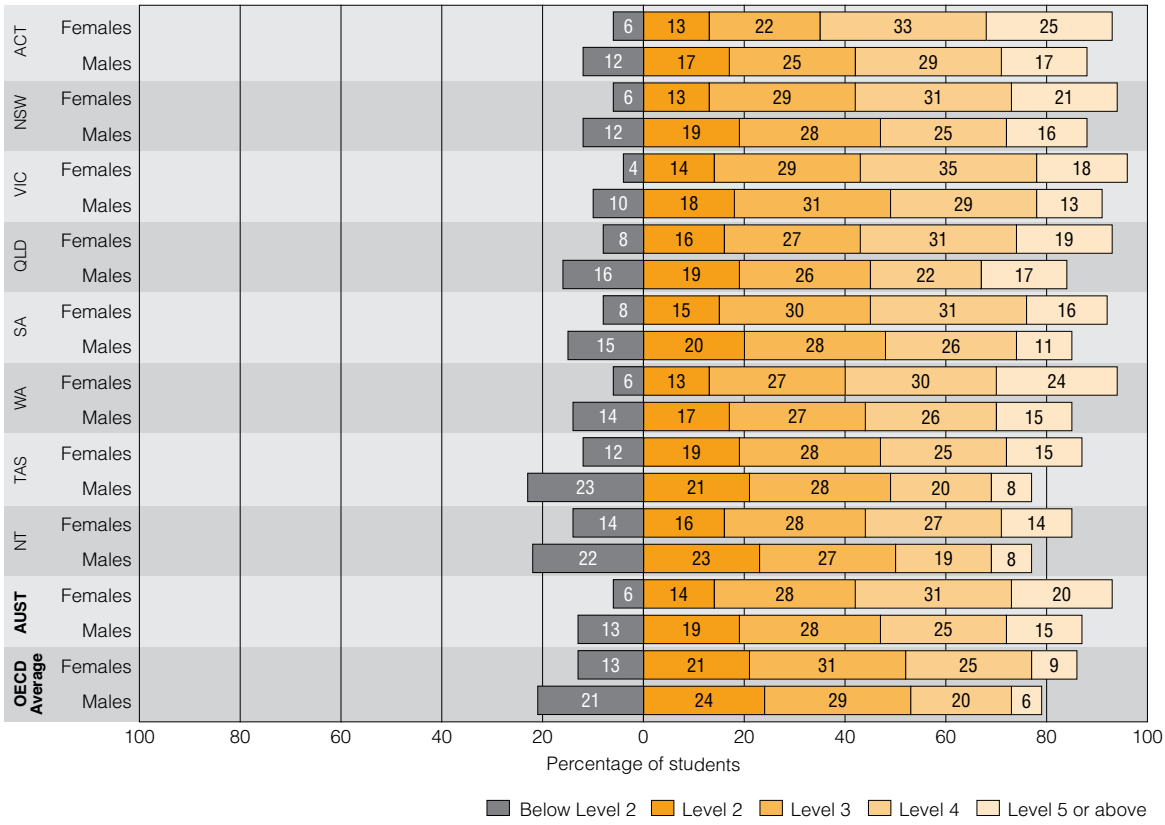



**Figure 2.6** Digital reading literacy proficiency levels by state and gender

## Digital reading literacy performance and school sector

The digital reading literacy performance for students in each school sector is shown in Table 2.9, together with the standard error, confidence interval, and the spread of scores between the 5th and 95th percentile. Students in the government school sector achieved a mean score of 517 points which was significantly lower than students in the Catholic school sector (who recorded a mean score of 558 points) and students in the independent school sector (who recorded a mean score of 575 score points). All mean scores were significantly higher than the OECD average of 499 score points.

**Table 2.9** Mean digital reading literacy scores (unadjusted for student and school socioeconomic background) by school sector

| Sector | Mean score | S.E. | Confidence interval | Difference between 5th - 95th percentile |
|---|---|---|---|---|
| Government | 517 | 4.1 | 509 - 525 | 330 |
| Catholic | 558 | 5.4 | 548 - 569 | 266 |
| Independent | 575 | 5.4 | 564 - 585 | 277 |

The spread of scores between the highest and lowest performing students was widest in the government school sector, with 330 score points, while the difference between the highest and lowest performing students in the Catholic and independent schools sectors were substantially narrower, with 266 and 277 score points respectively. This goes part of the way of explaining sector differences – clearly government schools cater for a more diverse clientele.

Figure 2.7 shows the proportion of students at each digital reading proficiency level by school sector. Thirteen per cent of students from government schools achieved Level 5 or above compared to 20 per cent of students from Catholic schools and 28 per cent of students from independent schools. Thirteen per cent of students from government schools failed to reach Level 2 compared to four per cent of students from Catholic or independent schools.

Socioeconomic background was found to be strongly related to achievement. In the initial PISA report, student-level and school-level socioeconomic background were found to account for the differences in print literacy scores, and as access to digital resources is also strongly related to socioeconomic background, and socioeconomic background varies across sectors, the same finding would be expected for digital literacy.

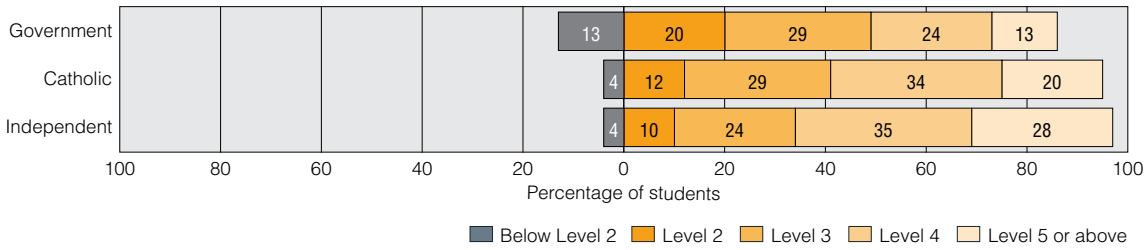
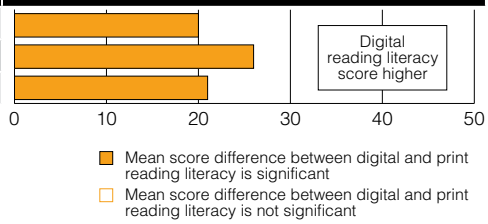



**Figure 2.7** Digital reading literacy proficiency levels by school sector

Table 2.10 provides the mean scores for digital and print literacy. The difference between scores on these assessments was 20 score points for students in government schools. This was similar to the mean score difference for students in independent schools, while the mean score difference for Catholic schools was larger, at 26 score points.

**Table 2.10** Mean digital and print reading literacy scores and mean differences by sector

| Sector | Digital reading literacy | | Print reading literacy | | Difference in mean score |
|---|---|---|---|---|---|
| | Mean score | S.E. | Mean score | S.E. | |
| Government | 517 | 4.1 | 497 | 3.9 | |
| Catholic | 558 | 5.4 | 532 | 4.3 | |
| Independent | 575 | 5.4 | 553 | 3.9 | |




## Digital reading literacy performance and geographic location of school

The geographic location of schools was classified using the broad categories from the MCEECDYA Schools Location Classification[5]. The findings show that students in more populated areas performed at a higher level than students in less populated areas. Students attending schools in metropolitan areas performed at a significantly higher level than students in schools from provincial areas, who in turn performed at a significantly higher level than students attending schools in remote areas (Table 2.11).

5 For more information about the MCEECDYA Schools Location Classification refer to the Reader's Guide.

The difference between the average performance of students in metropolitan and provincial schools was 23 score points, or a third of a proficiency level. Between provincial and remote schools, the difference was 41 score points or more than half a proficiency level, and between metropolitan and remote schools the difference was 64 score points, or almost one proficiency level.

The spread of scores between the highest and lowest performing students in remote schools was 378 points, while the spread of scores for metropolitan and provincial schools was narrower at 313 and 318 points respectively.

**Table 2.11** Mean digital reading literacy scores, confidence intervals and variations by geographic location

| Geographic location | Mean score | S.E. | Confidence interval | Difference between 5th - 95th percentile |
|---|---|---|---|---|
| Metropolitan | 543 | 3.4 | 536 - 550 | 313 |
| Provincial | 520 | 4.9 | 510 - 529 | 318 |
| Remote | 479 | 17.2 | 445 - 513 | 378 |

There was a higher proportion of students from metropolitan schools who achieved the highest digital reading literacy proficiency level. Nine per cent of students from remote schools compared to 13 per cent of students in provincial schools and 19 per cent of students in metropolitan schools achieved Level 5 or above (Figure 2.8).

A higher proportion of students from remote schools compared to students in more populated areas did not achieve Level 2. Twenty-five per cent of students from remote schools were below Level 2 compared to 13 per cent of students from provincial schools and eight per cent of students in metropolitan schools.

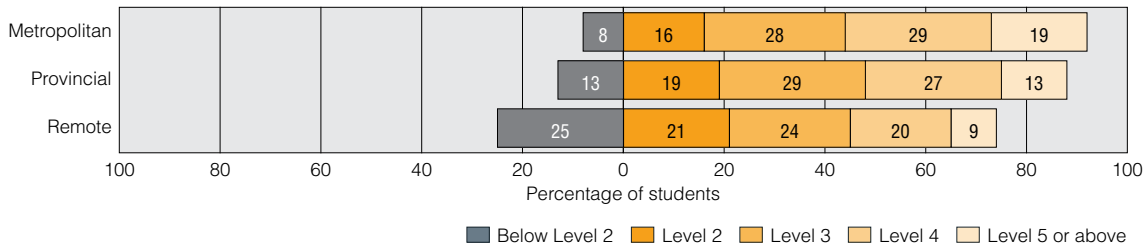
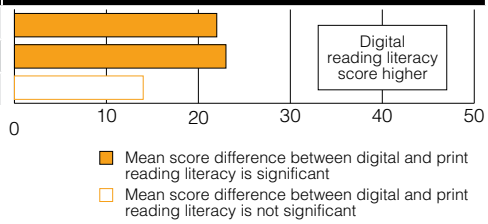



**Figure 2.8** Digital reading literacy proficiency levels by geographic location

Table 2.12 provides the comparison between digital and print reading literacy. Students in metropolitan schools scored 22 points higher, on average, in digital reading literacy than print reading literacy. The mean score difference for students in provincial schools was similar at 23 score points. However, the digital and print reading literacy performance for students in remote schools was significantly comparable.

**Table 2.12** Mean digital and print reading literacy scores and mean differences by geographic location

| Geographic location | Digital reading literacy | | Print reading literacy | | Difference in mean score |
|---|---|---|---|---|---|
| | Mean score | S.E. | Mean score | S.E | |
| Metropolitan | 543 | 3.4 | 521 | 2.9 | |
| Provincial | 520 | 4.9 | 497 | 4.0 | |
| Remote | 479 | 17.2 | 465 | 9.8 | |



## Digital reading literacy performance and Indigenous background

On average, Indigenous students achieved a score of 458 points, which was significantly lower than the mean performance for non-Indigenous students of 539 score points. The mean score difference of 81 points equates to more than one proficiency level on the digital reading literacy scale. There were 339 score points between the highest and lowest performing Indigenous students, which was a wider spread than that found for non-Indigenous students (Table 2.13).

**Table 2.13** Mean digital reading literacy scores, confidence intervals and variations by Indigenous background

| Indigenous background | Mean score | S.E. | Confidence interval | Difference between 5th - 95th percentile |
|---|---|---|---|---|
| Indigenous | 458 | 5.8 | 447 - 469 | 339 |
| Non-Indigenous | 539 | 2.7 | 534 - 545 | 313 |

Only four per cent of Indigenous students achieved the highest proficiency on the digital reading literacy scale compared to 18 per cent of non-Indigenous students and eight per cent of students across the OECD. Almost 30 per cent of Indigenous students failed to reach Level 2 compared to nine per cent of non-Indigenous students and 17 per cent of students across the OECD (Figure 2.9).

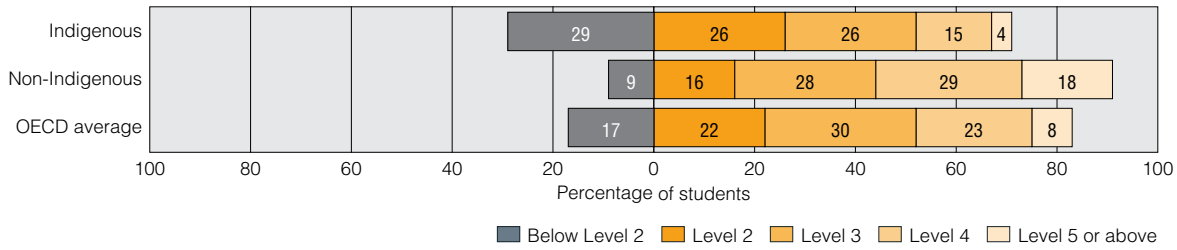



**Figure 2.9** Digital reading literacy proficiency levels by Indigenous background

Indigenous females performed at a significantly higher level on digital reading literacy than Indigenous males. Indigenous females achieved a mean score of 477 points, which was 40 points higher than the mean performance for Indigenous males. This difference equates to more than half a proficiency level and more than one full year of schooling. Indigenous females' performance was 76 score points lower than that of non-Indigenous females, more than one proficiency level and more than two years of schooling. The difference between Indigenous and non-Indigenous males was even larger - 88 score points (Table 2.14).

**Table 2.14** Mean digital reading literacy scores by Indigenous background and gender, including gender differences

| Indigenous background | Females | | Males | | Difference in mean score | |
|---|---|---|---|---|---|---|
| | Mean score | S.E. | Mean score | S.E. | Score dif. | S.E. |
| Indigenous | 477 | 6.4 | 437 | 7.1 | **40** | 6.6 |
| Non-Indigenous | 553 | 2.9 | 525 | 3.5 | **28** | 3.5 |

Note: Values that are statistically significant are indicated in bold.

Figure 2.10 shows the proportion of Indigenous and non-Indigenous students at each of the proficiency levels by gender. At the higher end of the proficiency scale, only five per cent of Indigenous females achieved Level 5 or above compared to 20 per cent of non-Indigenous females, and only three per cent of Indigenous males achieved Level 5 or above compared to 15 per cent of non-Indigenous males.

At the lower end of the proficiency scale, 23 per cent of Indigenous females failed to reach Level 2 compared to 36 per cent of non-Indigenous females. The differences were even greater for males, with 36 per cent of Indigenous males compared to 12 percent of non-Indigenous males not reaching Level 2.

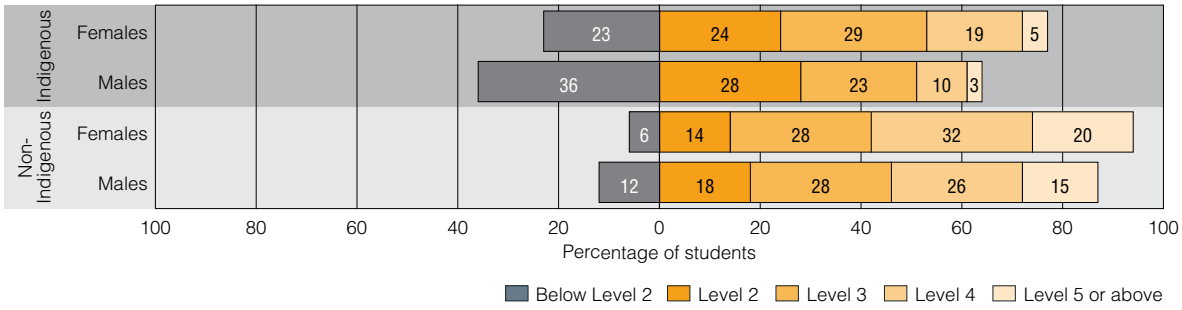
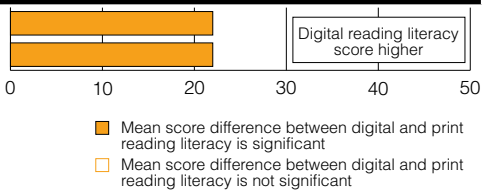



**Figure 2.10** Digital reading literacy proficiency levels by Indigenous background and gender

Table 2.15 shows the digital and print reading means for Indigenous and non-Indigenous students. The mean score difference between digital and print reading literacy performance for both Indigenous and non-Indigenous students was 22 score points, in favour of digital reading literacy.

**Table 2.15** Mean digital and print reading literacy scores and mean differences by Indigenous background

| Indigenous background | Digital reading literacy | | Print reading literacy | | Difference in mean score |
|---|---|---|---|---|---|
| | Mean score | S.E. | Mean score | S.E. | |
| Indigenous | 458 | 5.8 | 436 | 6.3 | |
| Non-Indigenous | 539 | 2.7 | 518 | 2.2 | |




## Digital reading literacy performance and socioeconomic background

Socioeconomic background in PISA is measured by an index of economic, social and cultural status (ESCS), which is based on student responses to several questions about a student's family and home background[6]. Table 2.16 shows the mean scores for digital reading literacy performance by quartile of socioeconomic background. Generally, the higher the level of socioeconomic background, the higher the performance in digital reading literacy.

6 For more information about the economic, social and cultural status index refer to the Reader's Guide.

Students in the highest socioeconomic quartile achieved a mean score of 581 points, which was significantly higher than the mean performance for students in the other quartiles. Students in the highest quartile scored 84 points on average higher than students in the lower socioeconomic quartile. This difference equates to more than one proficiency level, or about two and a half years of schooling.

The difference in performance between each quartile is approximately half a proficiency level. There was 29 score points difference between the highest and the third quartile, 25 score points between the third and second quartile, and 30 score points between the second and lowest quartile of socioeconomic background.

**Table 2.16** Mean digital reading literacy scores, confidence intervals and variations by socioeconomic background

| Socioeconomic background | Mean score | S.E. | Confidence interval | Difference between 5th - 95th percentile |
|---|---|---|---|---|
| Lowest quartile | 497 | 3.0 | 491 - 503 | 308 |
| Second quartile | 527 | 3.0 | 521 - 533 | 295 |
| Third quartile | 552 | 3.1 | 546 - 558 | 293 |
| Highest quartile | 581 | 3.6 | 574 - 588 | 284 |

At the higher end of the proficiency scale, 30 per cent of students in the highest socioeconomic quartile achieved Level 5 or above, while 20 per cent in the third quartile, 13 per cent in the second quartile and eight percent of students in the lowest quartile of socioeconomic background achieved Level 5 or above. Only three per cent of students in the highest socioeconomic quartile were placed at below Level 2, compared to six per cent of students in the third quartile, 10 per cent in the third quartile and 17 per cent in the lowest quartile (Figure 2.11).

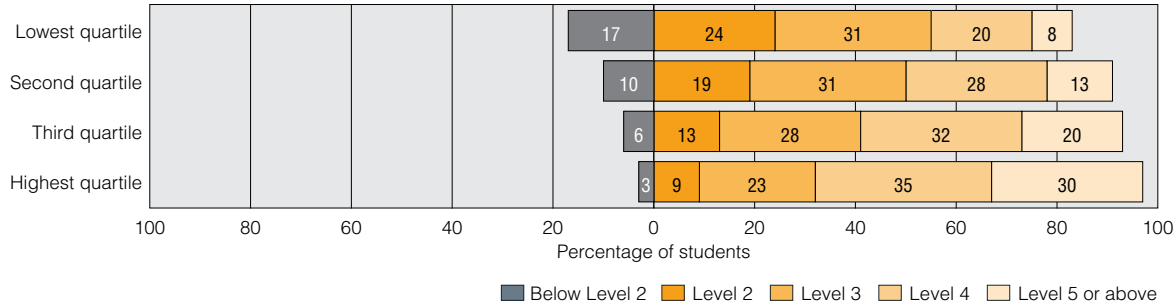
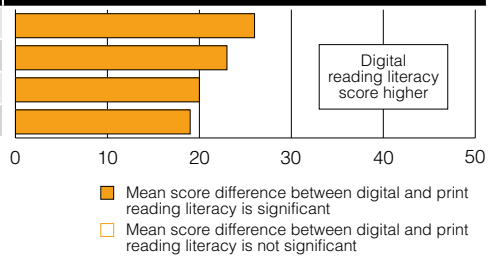



**Figure 2.11** Digital reading literacy proficiency levels by socioeconomic background

Table 2.17 provides the comparison of digital and print literacy means for these groups of students. The mean score difference for students in the lowest quartile of socioeconomic background was 26 score points, while the mean score difference for students in the highest quartile was smaller, at 19 score points.

**Table 2.17** Mean digital and print reading literacy scores and mean differences by socioeconomic quartile

| Socioeconomic background | Digital reading literacy | | Print reading literacy | | Difference in mean score |
|---|---|---|---|---|---|
| | Mean score | S.E. | Mean score | S.E. | |
| Lowest quartile | 497 | 3.0 | 471 | 1.7 | |
| Second quartile | 527 | 3.0 | 504 | 1.5 | |
| Third quartile | 552 | 3.1 | 532 | 1.9 | |
| Highest quartile | 581 | 3.6 | 562 | 2.1 | |




## Digital reading literacy performance and immigrant status

Three categories of immigrant status were defined based on students' responses to questions regarding where they and their parents were born[7]. Table 2.18 shows first-generation students achieved a mean score of 550 points which was significantly higher than Australian-born students (with a mean score of 536 points) and foreign-born students (with a mean score of 524 points). The difference between Australian-born students and foreign-born students was not statistically significant.

The spread of scores between the highest and lowest performing Australian-born and first-generation students was 305 score points, while the spread of scores for foreign-born students was wider at 352 score points.

**Table 2.18** Mean digital reading literacy scores, confidence intervals and variations by immigrant status

| Immigrant status | Mean score | S.E. | Confidence interval | Difference between 5th - 95th percentile |
|---|---|---|---|---|
| Australian-born | 536 | 2.8 | 531 - 541 | 305 |
| First-generation | 550 | 3.6 | 543 - 557 | 305 |
| Foreign-born | 524 | 6.8 | 510 - 537 | 352 |

Figure 2.12 shows the proportions of students at each of the proficiency levels by immigrant status. Twenty per cent of first-generation students achieved Level 5 or above compared to 16 per cent of Australian-born students and 15 per cent of foreign-born students. At the lower end of the proficiency scale, seven per cent of first-generation students, nine per cent of Australian-born students and 14 per cent of foreign-born students failed to reach Level 2.

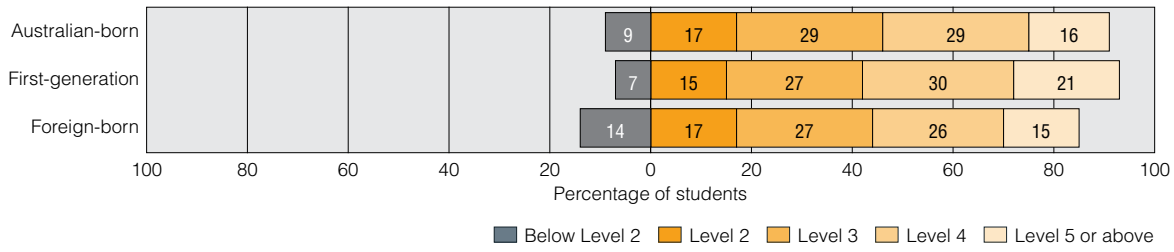


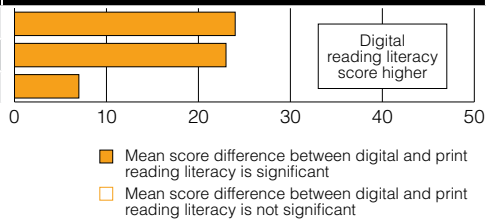

**Figure 2.12** Digital reading literacy proficiency levels by immigrant status

7 For more information about Immigrant Status refer to the Reader's Guide.

Australian-born and first-generation students performed 23 and 24 score points, respectively, higher on the digital reading literacy than print reading literacy, while the difference between average digital and print reading scores for foreign-born students was only 7 score points (Table 2.19).

**Table 2.19** Mean digital and print reading literacy scores and mean differences by immigrant status

| Immigrant status | Digital reading literacy | | Print reading literacy | | Difference in mean score |
|---|---|---|---|---|---|
| | Mean score | S.E. | Mean score | S.E. | |
| Australian-born | 536 | 2.8 | 512 | 2.4 | |
| First-generation | 550 | 3.6 | 527 | 3.0 | |
| Foreign-born | 524 | 6.8 | 517 | 6.4 | |




## Digital reading literacy performance and language background

Students who spoke English as their main language at home recorded a mean score of 541 points, which was significantly higher than the average score of students whose main language at home was a language other than English, 520 score points. The spread of scores for students who spoke a language other than English was much wider compared to students who spoke English at home (Table 2.20).

**Table 2.20** Mean digital reading literacy scores, confidence intervals and variations by language background

| Language background | Mean score | S.E. | Confidence interval | Difference between 5th - 95th percentile |
|---|---|---|---|---|
| Speak English at home | 541 | 2.5 | 537 - 546 | 305 |
| Language other than English spoken at home | 520 | 9.8 | 501 - 539 | 374 |

The proportions of students from English and non-English speaking homes who achieved Level 5 or above were similar, 18 per cent of students who spoke English at home and 15 per cent of students who spoke a language other than English. There were twice as many students who spoke a language other than English at home than students who spoke English at home who failed to reach Level 2 (Figure 2.13).

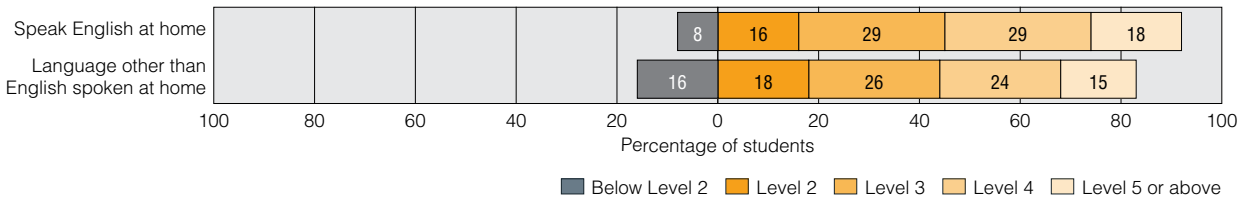
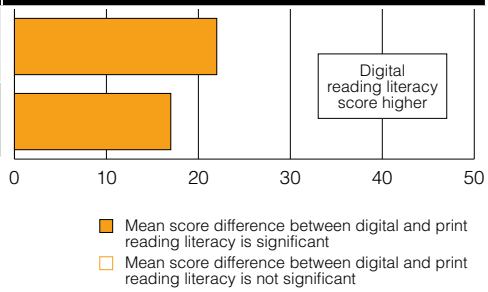



**Figure 2.13** Digital reading literacy proficiency levels by language background

There was a 22 score point difference between digital and print reading literacy performance for students who spoke English at home, while there was a 17 score point difference for students who spoke a language other than English at home (Table 2.21).

**Table 2.21** Mean digital and print reading literacy scores and mean differences by language background

| Language background | Digital reading literacy | | Print reading literacy | | Difference in mean score |
|---|---|---|---|---|---|
| | Mean score | S.E. | Mean score | S.E. | |
| Speak English at home | 541 | 2.5 | 519 | 2.0 | |
| Language other than English spoken at home | 520 | 9.8 | 503 | 8.8 | |




## Summary

Australian students scored at a level significantly higher than the average of the participating OECD countries, and higher than all other participants other than Korea and New Zealand. This score was also substantially higher than that achieved on the print reading assessment, and this was a result of a larger proportion of students achieving at higher proficiency levels and a smaller proportion of students failing to achieve the minimum proficiency levels.

There is anecdotal evidence from test administrators and schools that students found the novel form of the digital assessment more engaging than the print literacy assessment, and that the shorter assessment time may have enabled a higher level of engagement with the tasks to be more sustained, however this is not quantifiable at present.

This chapter has shown lower levels of achievement in digital reading literacy for students in Tasmania and the Northern Territory, in the government school sector, in remote areas, Indigenous students, students from a low socioeconomic background, and, to a lesser extent, foreign-born students and students with a language background other than English. Later chapters of this report will examine access to technology for each of these groups both at home and at school.

The next chapter of this report will focus on students' use of information and communication technologies at home.

Chapter

3

# Students' access and use of information and communication technologies at home

The Information and Communication Technologies (ICT) familiarity questionnaire was an optional component of the PISA student questionnaire. Students provided information on how often they used a computer, and what type of computer they used at home and at school. Students also reported on their attitudes towards using a computer and their self-confidence in computer use and technical proficiency.

PISA provides comparable information in an international context. In this chapter and in Chapters 4 and 5, nine countries were chosen for comparison with Australia. Finland was selected for its strong academic reputation, particularly in reading. Canada, Ireland and New Zealand were chosen for the purpose of making comparisons with other English-speaking OECD countries, and Hong Kong- China, Japan, Korea, Macao-China and Singapore were selected as fellow countries in the Asia-Pacific region. All results were also compared with the OECD average.

## Key Findings

- Ninety-nine per cent of Australian students reported having a computer in their home, with 95 per cent of these computers connected to the Internet. These proportions were higher than the OECD average.
- The number of computers in the home was positively related to digital reading literacy, with students having three or more computers in the home having significantly higher scores than students with one computer in the home.
- Availability and usage of a computer in the home were significantly higher for students in Catholic or independent schools; students in metropolitan schools than provincial schools, who were significantly higher than students in remote schools; non-Indigenous students and students from higher socioeconomic backgrounds.
- The most popular leisure-related computer activities for students at home are browsing the Internet for fun, chatting online and using email, while the most common school-related activities for students at home are using the Internet for school work and doing homework.
- Generally, the frequency of computer use at home for leisure-related activities was highest in Victoria and lowest in Tasmania, whereas the frequency of computer use at home for school-related activities was higher in the Australian Capital Territory and lowest in Tasmania. The frequency of online reading activities was highest in the Australian Capital Territory and lowest in Tasmania.
- Females reported significantly more frequent use of computers at home for school-related activities while males reported significantly more frequent use of computers at home for leisure-related activities.

- Students from government schools reported significantly less frequent use of computers at home for school-related activities than students from Catholic schools, who reported significantly less frequent use of computers at home for school-related activities than students from independent schools. Students from government schools reported significantly less frequent use of performing online reading activities than students in Catholic or independent schools.
- Students from metropolitan schools reported significantly more frequent use of computers at home for leisure-related activities than students in provincial or remote schools. Students from metropolitan schools also reported significantly more frequent use of computers for school-related activities and performing online reading activities than students in provincial schools, who in turn reported significantly more frequent use of computers for school-related activities and performing online reading activities than students in remote schools.
- Indigenous students reported significantly less frequent use of computers at home for leisure-related activities and school-related activities, and performing online reading activities compared to non-Indigenous students.
- Students from lower socioeconomic backgrounds reported less frequent use of computers at home for leisure-related activities, for school-related activities and performing online reading activities than students from higher socioeconomic backgrounds.

# ICT resources in the home

## Computers in the home

In the PISA 2009 Student Questionnaire, students were asked whether they had a computer at home, how many computers were in their home and whether or not they had used a computer.

Only a very small proportion of students, 0.8% on average across OECD countries[1], indicated they had never used a computer. In Finland, Korea, Australia, New Zealand, Hong Kong-China, Singapore, Ireland and Canada the proportion of students who reported never using a computer at home was even lower than the OECD average.

Figure 3.1 lists the percentage of students for selected countries who reported having one or more computers in the home, along with the percentage of students in the lowest and highest quartile of socioeconomic background[2] (ESCS) indicating the same. Countries have been ordered by the percentage of students who reported having a computer at home, with the lowest percentage of students placed at the left hand side of the figure and the countries with the highest percentage of students placed at the right hand side of the figure.

Almost all students in Finland, Hong Kong-China, Macao-China, Korea, Australia and Canada, 97 per cent of students in Ireland and Singapore and 96 per cent of students in New Zealand reported having a computer in their home. Across the OECD countries[3], 94 per cent of students, on average, reported that they had a computer in their home. This was slightly lower in Japan, where 89 per cent of students reported having a computer in their home.

As would be expected, students in the highest socioeconomic background quartile showed significantly higher access to a computer in the home than students in the lowest socioeconomic background quartile. In Australia, the gap in home access to a computer between the proportion of students in the lowest and highest socioeconomic background quartile was small (4%). It would seem, then, that access to a computer at home would not explain the socioeconomic differences in performance. This small gap in access was also the case in Canada, Korea, Macao-China, Hong

1 Based on 27 OECD countries. For more information about the OECD average refer to the Reader's Guide.
2 For more information about the economic, social and cultural status index refer to the Reader's Guide.
3 Based on 34 OECD countries.

Kong-China and Finland. On the other hand, there were wider differences reported in Ireland, Singapore, New Zealand and Japan. The difference between students in the lowest and highest socioeconomic background quartile was under ten per cent for Ireland and Singapore, 12 per cent in New Zealand, and 31 per cent in Japan, which was more than twice the proportion of students across OECD countries (at 14%).

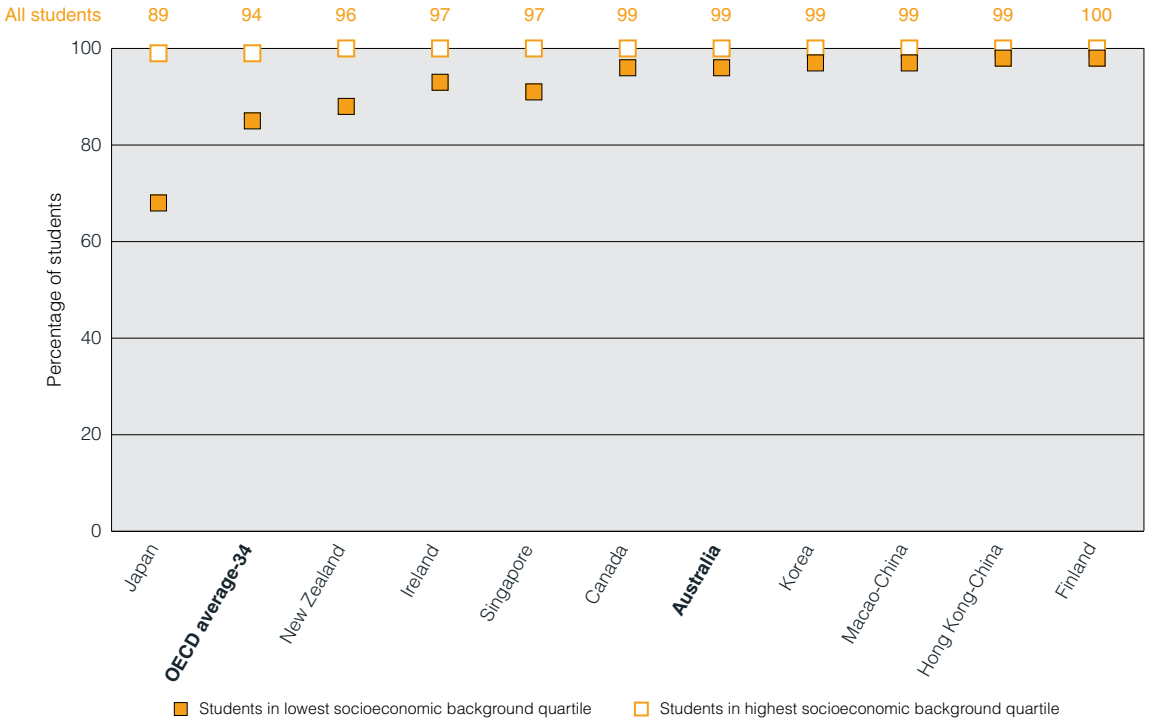



**Figure 3.1** Percentage of students and students from the lowest and the highest quartiles of socioeconomic background who reported having a computer at home for selected countries

Almost all students in each state indicated they had a computer in their home. For most states this was statistically higher than the OECD average of 94 per cent, with the proportion of students in the Northern Territory similar to the OECD average at 95 per cent.

Students' access to computers in the home was also examined by geographic location and Indigenous background. The proportion of students attending metropolitan and provincial schools who reported access to a computer was the same at 99 per cent, while this rate was lower for students attending schools in remote areas access at 93 per cent. Non-Indigenous students reported higher access to a computer at home (99%) than Indigenous students (92%).

Having at least one computer at home may not provide an explanation for socioeconomic differences in digital reading performance, but we are able to unpack this a little more. Students in families with a single computer may have to compete for access to the computer, and their time using it might be quite limited, whilst students in families with multiple computers are likely to have greater access and thus more experience with computers. Across Australia, 22 per cent of students reported having just one computer in their home, 31 per cent reported having two computers and 46 per cent reported having three or more computers. Figure 3.2 shows that there is a direct relationship between the number of computers in the home and achievement on the digital reading literacy scale.

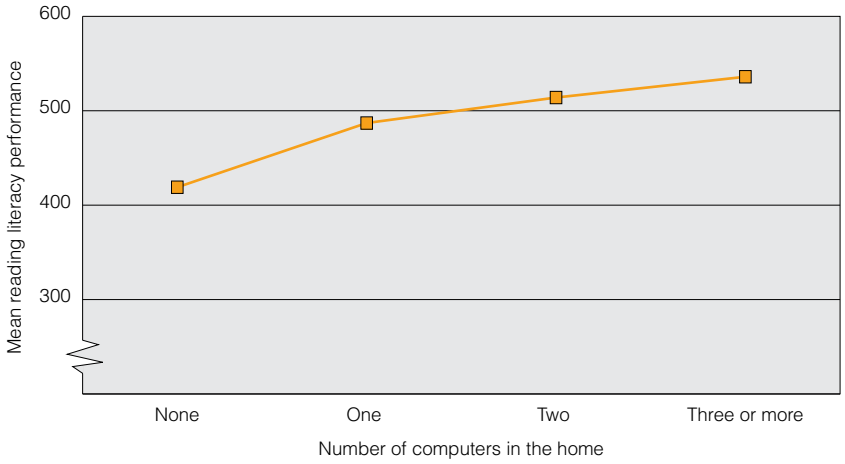



**Figure 3.2** Digital reading literacy performance by number of computers in the home

In the PISA 2009 Student Questionnaire, students were also asked about the availability of eight electronic devices (including a desktop computer, a portable laptop or notebook and an Internet connection) for use at home. In this section, data are presented showing the proportion of students reporting no computers, one computer, two computers or three or more computers in the home, along with the proportion of students who answered that they used a computer that they had at home.

Although the questionnaire asked students about the availability of desktop computers and a portable laptop or notebook separately, the data reported in this section have been combined to reflect access and usage of a computer at home, regardless of whether it is a desktop computer, or a laptop or notebook.

In Australia, 97 per cent of students indicated they used a computer at home while two per cent of students reported having a computer in the home they did not use, and one per cent of students reported not having a computer at home. Access and usage of a computer at home was found to be almost identical between Australian females and males.

Table 3.1 shows that in almost all states at least 95 per cent of students reported having and using a computer at home. In all states, if there was at least one computer in the home, the majority of students reported using it. Tasmania and the Northern Territory had the highest proportion of students who reported not having a computer at home, and significantly higher proportions of students only having one computer in the home. More than half of the students in the Australian Capital Territory reported having three or more computers in the home, and slightly fewer than half of the students in New South Wales, Victoria, Queensland and Western Australia reported the same.

**Table 3.1** Computer availability and usage at home by state

| State | How many computers do you have at home? | | | | | | | | Do you use the computer at home? | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | None | | One | | Two | | Three or more | | Yes | | No | |
| | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. |
| ACT | 0 | 0.2 | 17 | 1.3 | 30 | 1.6 | 53 | 1.7 | 98 | 0.4 | 1 | 0.4 |
| NSW | 1 | 1.2 | 23 | 0.9 | 31 | 0.8 | 46 | 1.2 | 97 | 0.3 | 1 | 0.2 |
| VIC | 1 | 0.2 | 21 | 1.2 | 31 | 1.2 | 47 | 1.5 | 97 | 0.4 | 2 | 0.3 |
| QLD | 2 | 0.3 | 20 | 1.5 | 30 | 1.3 | 48 | 2.3 | 96 | 0.5 | 2 | 0.3 |
| SA | 1 | 0.3 | 23 | 1.3 | 35 | 1.3 | 41 | 1.7 | 97 | 0.5 | 2 | 0.4 |
| WA | 2 | 0.5 | 20 | 1.8 | 32 | 1.1 | 46 | 2.2 | 95 | 0.9 | 3 | 0.8 |
| TAS | 3 | 0.5 | 30 | 1.7 | 34 | 1.4 | 35 | 2.0 | 95 | 0.7 | 3 | 0.5 |
| NT | 4 | 0.8 | 27 | 2.1 | 32 | 1.8 | 36 | 1.7 | 93 | 1.2 | 3 | 0.7 |

The availability and usage of computers in the home by school sector is shown in Table 3.2. Ninety-five per cent of students in government schools reported having and using a computer at home, which was significantly lower than the 99 per cent of students in Catholic and independent schools. The distribution of number of computers again tells an interesting story. Twenty-six per cent of students in government schools report having one computer in the home, compared to about 10 per sent of students in independent schools. At the other end of the scale, it is evident that students attending independent schools have much greater access to a computer, with almost two-thirds reporting three or more computers in their home.

**Table 3.2** Computer availability and usage at home by school sector

| Sector | How many computers do you have at home? | | | | | | | | Do you use the computer at home? | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | None | | One | | Two | | Three or more | | Yes | | No | |
| | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. |
| Government | 2 | 0.2 | 26 | 0.8 | 32 | 0.6 | 40 | 1.1 | 95 | 0.3 | 3 | 0.2 |
| Catholic | 0 | 0.2 | 20 | 0.9 | 33 | 1.0 | 47 | 1.2 | 99 | 0.3 | 1 | 0.2 |
| Independent | 0 | 0.1 | 11 | 1.0 | 25 | 1.6 | 64 | 2.1 | 99 | 0.4 | 1 | 0.2 |

Table 3.3 provides information that may help to explain the relatively lower achievement levels of students in remote areas in digital literacy. Seven per cent of these students reported not having a computer at home, a significantly higher proportion than in metropolitan or provincial areas. In addition, a further six per cent reported having a computer at home but not using it, again a significantly higher proportion than in other geographic areas. Finally, less than one-third reported access to three or more computers at home, compared to half of the students in metropolitan areas. Students in provincial areas sit somewhere between the two – but closer to the remote areas than the metropolitan students in terms of access.

**Table 3.3** Computer availability and usage at home by geographic location

| Geographic location | How many computers do you have at home? | | | | | | | | Do you use the computer at home? | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | None | | One | | Two | | Three or more | | Yes (%) | | No (%) | |
| | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. |
| Metropolitan | 1 | 0.1 | 19 | 0.7 | 30 | 0.6 | 50 | 1.0 | 97 | 0.2 | 2 | 0.2 |
| Provincial | 2 | 0.3 | 28 | 0.9 | 35 | 0.8 | 35 | 0.9 | 95 | 0.5 | 2 | 0.3 |
| Remote | 7 | 1.5 | 29 | 2.9 | 33 | 2.6 | 31 | 2.0 | 90 | 0.9 | 6 | 1.1 |

Availability and usage of a computer was significantly higher in the homes of non-Indigenous than Indigenous students. Ninety-seven per cent of non-Indigenous students reported having a computer, and using a computer at home, compared to 85 per cent of Indigenous students. The proportion of Indigenous students who reported not having a computer in the home, or who reported not using a computer even though there was one available in the home, was significantly higher than that of non-Indigenous students (Table 3.4). In addition, while almost half of the non-Indigenous students reported having three or more computers in the home, this was the case for only a little over 22 per cent of the Indigenous students.

**Table 3.4** Computer availability and usage at home by Indigenous background

| Indigenous background | How many computers do you have at home? | | | | | | | | Do you use the computer at home? | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | None | | One | | Two | | Three or more | | Yes (%) | | No (%) | |
| | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. |
| Indigenous | 9 | 1.1 | 38 | 1.8 | 32 | 1.5 | 22 | 1.6 | 85 | 1.5 | 6 | 1.1 |
| Non-Indigenous | 1 | 0.1 | 21 | 0.6 | 31 | 0.5 | 47 | 0.8 | 97 | 0.2 | 2 | 0.2 |

The availability and usage of computers in the home by quartiles of socioeconomic background is shown in Table 3.5. As would be expected, students from higher socioeconomic backgrounds reported higher levels of access and usage of a computer at home than students from lower socioeconomic backgrounds. The proportion of students having three or more computers in the home is telling – almost three-quarters of students from the highest quartile of socioeconomic background compared with less than one quarter of students from the lowest quartile of socioeconomic background reported this level of access.

**Table 3.5** Computer availability and usage at home by quartiles of socioeconomic background

| Socioeconomic background | How many computers do you have at home? | | | | | | | | Do you use the computer at home? | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | None | | One | | Two | | Three or more | | Yes (%) | | No (%) | |
| | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. |
| Lowest quartile | 4 | 0.3 | 40 | 1.0 | 34 | 1.0 | 22 | 0.8 | 92 | 0.6 | 4 | 0.4 |
| Second quartile | 1 | 0.2 | 25 | 0.9 | 37 | 1.0 | 38 | 0.9 | 98 | 0.3 | 2 | 0.2 |
| Third quartile | 0 | 0.1 | 16 | 0.7 | 32 | 0.9 | 51 | 1.2 | 98 | 0.2 | 1 | 0.2 |
| Highest quartile | 0 | 0.0 | 5 | 0.5 | 22 | 1.0 | 72 | 1.1 | 99 | 0.1 | 0 | 0.1 |

## Internet in the home

Students were also asked about whether they had access to an Internet connection at home. On average, 89 per cent of students across OECD countries[4] reported they had access to the Internet at home. Students from Finland and Hong Kong-China were well-equipped to connect with the Internet, with 98 and 99 per cent of students respectively reporting an Internet connection at home. In Macao-China, Korea, Canada, Australia, Singapore, Ireland and New Zealand, the proportions of students who indicated they had an Internet connection was also high, ranging from 92 to 97 per cent of students, all higher than the OECD average. Of the selected countries, Japan reported the lowest percentage of students (81%) who reported having access to the Internet at home.

Figure 3.3 shows the proportion of students who have access to the Internet at home for selected countries. Countries have been ordered by the percentage of students who reported having an Internet connection at home, with the lowest percentage of students placed at the left hand side of the figure and the countries with the highest percentage of students placed at the right hand side of the figure.

The countries who recorded the widest gap between the proportion of students in the highest and lowest quartile of socioeconomic background who had a computer at home (in Figure 3.1) were also the countries who reported the widest gap between students in the lowest socioeconomic background quartile and students in the highest socioeconomic background quartile who had access to the Internet at home. Students from higher socioeconomic backgrounds were more likely to have a computer and access to the Internet at home.

4 The OECD average is based on the 34 countries who responded to this item.

In Japan, there was a 41 per cent difference between students in the lowest and highest socioeconomic background quartile that had an Internet connection at home. The gap for New Zealand was narrower at 23 per cent, which was similar to the percentage difference across the OECD countries at 22 per cent. Ireland and Singapore had a gap of 13 per cent and for Australia there was a 10 per cent difference between students in the lowest and highest socioeconomic background quartiles. Canada, Korea, Macao-China, Hong Kong-China and Finland reported a nine per cent difference or less between students in the lowest and highest quartile of socioeconomic background who had an Internet connection at home.

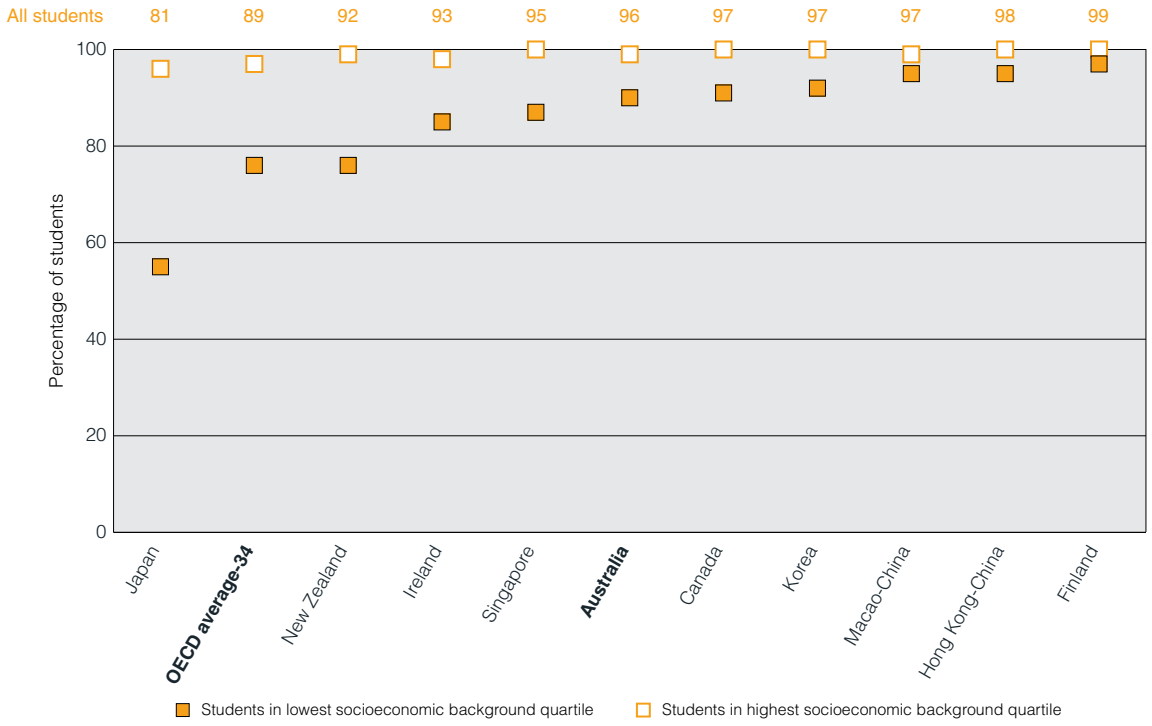



**Figure 3.3** Access to the Internet at home for selected countries

No gender differences were found for access to the Internet at home. The same proportion of females and males (95%) reported having access to and using the Internet at home. One per cent of females and two per cent of males indicated they had access to the Internet at home, but do not use it, while three per cent of females and four per cent of males reported not having access to the Internet at home.

At least 94 per cent of students from Queensland, Western Australia, South Australia, Victoria, New South Wales and the Australian Capital Territory reported having an Internet connection at home. Students from Tasmania and the Northern Territory reported lower proportions at 90 and 88 per cent respectively. Only a small proportion of students reported not having an Internet connection at home, ranging from two per cent in the Australian Capital Territory to eight per cent in the Northern Territory (Table 3.6).

**Table 3.6** Access to the Internet at home by state

| State | Yes, and I use it | | Yes, but I don't use it | | No | |
|---|---|---|---|---|---|---|
| | % | S.E. | % | S.E. | % | S.E. |
| ACT | 97 | 0.6 | 1 | 0.3 | 2 | 0.5 |
| NSW | 96 | 0.5 | 1 | 0.2 | 3 | 0.4 |
| VIC | 96 | 0.5 | 1 | 0.3 | 3 | 0.5 |
| QLD | 94 | 0.7 | 2 | 0.3 | 5 | 0.5 |
| SA | 95 | 0.8 | 2 | 0.3 | 4 | 0.6 |
| WA | 94 | 0.7 | 2 | 0.3 | 4 | 0.6 |
| TAS | 90 | 0.8 | 3 | 0.5 | 7 | 0.7 |
| NT | 88 | 1.9 | 3 | 0.6 | 8 | 1.7 |

Ninety-five per cent of students in government schools reported having access to the Internet at home, which was significantly lower than the proportion of students in Catholic or independent schools, at 98 per cent (Table 3.7).

**Table 3.7** Access to the Internet at home by school sector

| Sector | Yes, and I use it | | Yes, but I don't use it | | No | |
|---|---|---|---|---|---|---|
| | % | S.E. | % | S.E. | % | S.E. |
| Government | 93 | 0.4 | 2 | 0.2 | 5 | 0.3 |
| Catholic | 98 | 0.4 | 1 | 0.2 | 1 | 0.3 |
| Independent | 98 | 0.3 | 1 | 0.2 | 2 | 0.2 |

Table 3.8 shows that 97 per cent of students in metropolitan schools reported having access to the Internet at home compared to 94 per cent of students in provincial schools and 90 per cent of students in remote schools. These differences were statistically significant. Ten per cent of students in remote schools did not have an Internet connection at home compared to three per cent of students in metropolitan schools and six per cent of students in provincial schools.

**Table 3.8** Access to the Internet at home by geographic location

| Geographic location | Yes, and I use it | | Yes, but I don't use it | | No | |
|---|---|---|---|---|---|---|
| | % | S.E. | % | S.E. | % | S.E. |
| Metropolitan | 96 | 0.3 | 1 | 0.1 | 3 | 0.2 |
| Provincial | 92 | 0.6 | 2 | 0.3 | 6 | 0.5 |
| Remote | 84 | 1.4 | 6 | 0.7 | 10 | 1.9 |

Ninety-seven per cent of non-Indigenous students had access to the Internet at home compared to just 83 per cent of Indigenous students (Table 3.9).

**Table 3.9** Access to the Internet at home by Indigenous background

| Indigenous background | Yes, and I use it | | Yes, but I don't use it | | No | |
|---|---|---|---|---|---|---|
| | % | S.E. | % | S.E. | % | S.E. |
| Indigenous | 79 | 1.8 | 4 | 0.7 | 17 | 1.6 |
| Non-Indigenous | 95 | 0.2 | 2 | 0.1 | 3 | 0.2 |

Table 3.10 shows the higher the socioeconomic background, the more likely is access to the Internet at home. Almost all students in the highest quartile of socioeconomic background indicated they had an Internet connection at home, compared to 88 per cent of students in the lowest quartile. Significant differences were found between each of the socioeconomic quartiles.

**Table 3.10** Access to the Internet at home by quartiles of socioeconomic background

| Socioeconomic background | Yes, and I use it | | Yes, but I don't use it | | No | |
|---|---|---|---|---|---|---|
| | % | S.E. | % | S.E. | % | S.E. |
| Lowest quartile | 88 | 0.6 | 3 | 0.3 | 9 | 0.5 |
| Second quartile | 96 | 0.4 | 2 | 0.3 | 2 | 0.3 |
| Third quartile | 97 | 0.3 | 1 | 0.2 | 2 | 0.2 |
| Highest quartile | 99 | 0.2 | 1 | 0.2 | 1 | 0.1 |

## Students' use of ICT in the home

In PISA 2009, data was collected on students' use of ICT in the home. Students were asked about 14 different activities. Eight of these activities were related to leisure:

- play one-player games;
- play collaborative online games;
- use email;
- chat online (e.g. MSN);
- browse the Internet for fun (such as watching videos, e.g. YouTube);
- download music, films, games or software from the Internet;
- publish and maintain a personal website, weblog or blog; and
- participate in online forums, virtual communities or spaces (e.g. Second Life or MySpace).

Six of these activities were related to school:

- do homework on the computer[5];
- use the Internet for school work (e.g. preparing an essay or presentation);
- use email for communication with other students about schoolwork;
- use email for communication with teachers and submission of homework or other schoolwork;
- download, upload or browse material from your school's website (e.g. timetable or course materials); and
- check the school's website for announcements (e.g. absence of teachers).

Students rated the frequency they performed each activity on a four point scale—*never or hardly ever, once or twice a month, once or twice a week and every day or almost every day*. Students who performed an activity *every day or almost every day*, or *once or twice a week* were considered frequent users, and students who performed an activity *once or twice a month* or *never or hardly ever* performed an activity were considered infrequent users.

Two indices—computer use at home for leisure index and the computer use at home for school work index—were created. The indices were standardised so that the mean of zero represented the mean of the OECD student population. Higher scores on the index indicated more frequent use than on average across the OECD.

5 This item was not used in the computer use at home for school work index.

## ICT for leisure-related activities

Figure 3.4 shows the mean index scores for selected countries on the computer use at home for leisure index. Countries have been ordered from the lowest mean index score (at the left hand side of the figure) to countries with the highest mean index score (at the right hand side of the figure). Students in Australia, Finland, Macao-China, Hong Kong-China, Canada and Singapore reported using computers at home for leisure more frequently than across the OECD, while students in Japan, Ireland, New Zealand and Korea use computers for leisure less frequently than across the OECD. Students in Australia recorded a mean index score of 0.06 that was statistically higher than the OECD average of 0.00.

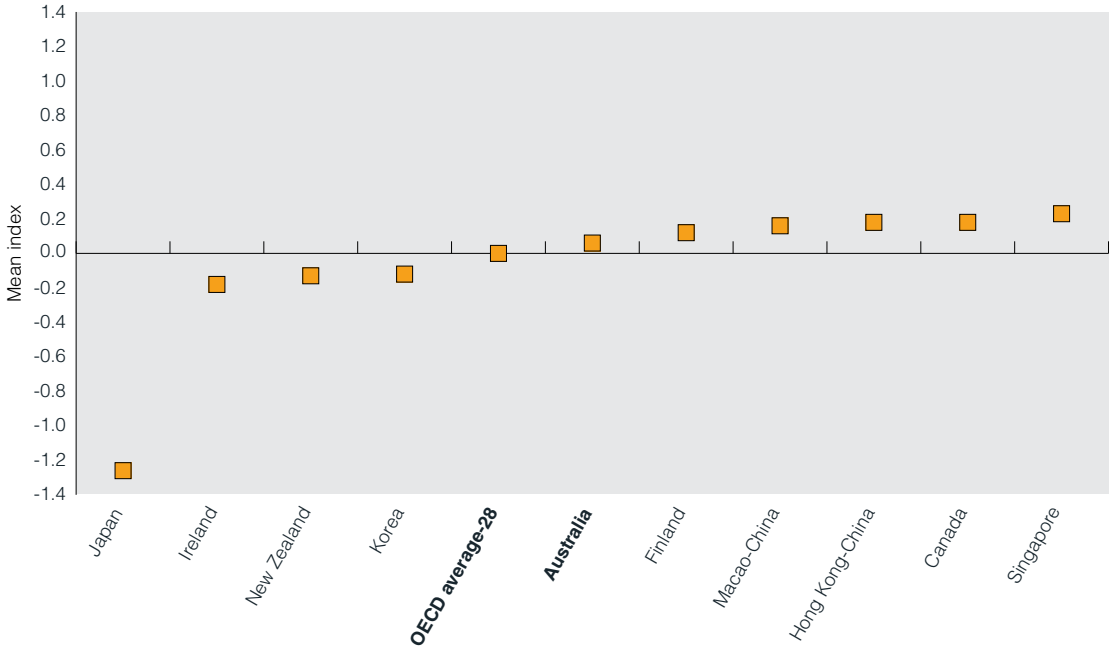



**Figure 3.4** Computer use at home for leisure, for selected countries

Figure 3.5 shows the percentage of students who reported doing each of the leisure-related activities at home, frequently (*everyday or almost every day* or *once or twice a week*) for Australia and across the OECD[6].

The most popular activities for Australian 15-year-old students at home are browsing the Internet for fun, chatting online and using email. Approximately 80 per cent of Australian students reported frequently chatting online and browsing the Internet for fun, which was similar to the proportion across the OECD. Seventy-six per cent of the Australian students indicated they used email frequently, which was higher than the OECD average. The proportion of Australian students who frequently downloaded music, films, games or software from the Internet was the same as the proportion for the OECD average, at 66 per cent. Around 60 per cent of Australian students reported participating in online forums, virtual communities or spaces on a frequent basis. This activity was more popular for Australian students than students across the OECD (45 per cent of students reported participating in this activity).

The activities that students spent the least time doing were playing one-player games, playing collaborative online games, and publishing and maintaining a personal website, weblog or blog. Almost 30 per cent of Australian students indicated they played collaborative online games and 40 per cent of Australian students indicated they played one-player games on a frequent basis.

6 The OECD average is based on the 28 countries who responded to this item.

These proportions were lower than the OECD average of 35 and 45 per cent respectively. Thirty-four per cent of Australian students reported they frequently use the computer at home to publish and maintain a personal website, weblog or blog, which was similar to the 30 per cent of students across the OECD who also reported participating in this activity.

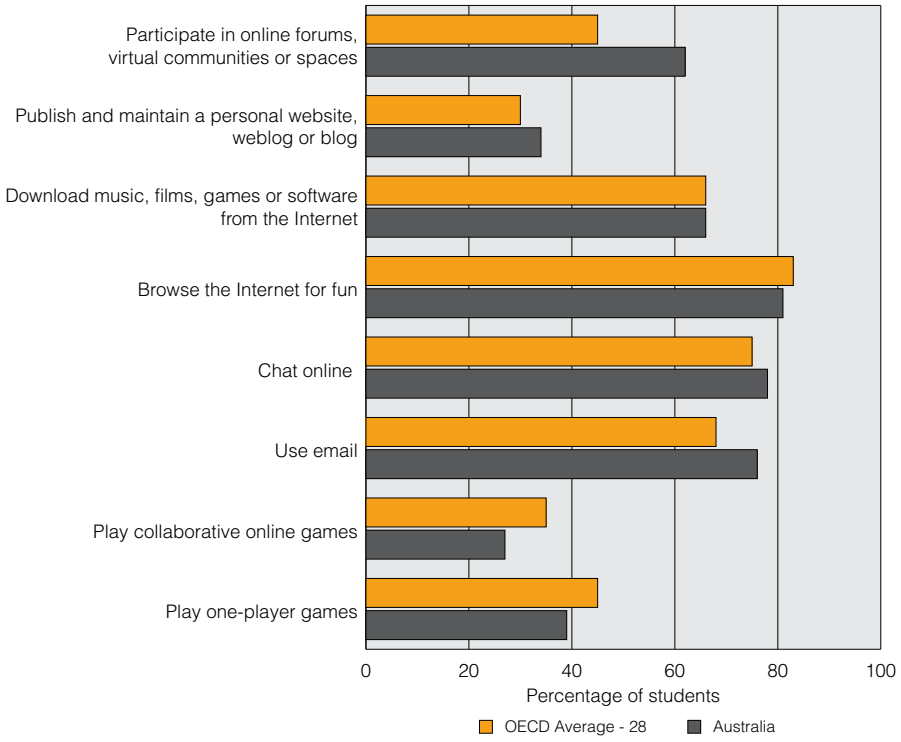



**Figure 3.5** Percentage of students who reported participating in leisure-related activities at home frequently, for Australia and the OECD average

Table 3.11 provides the mean score indices for females and males, and the gender difference on the computer use at home for leisure index. Generally, females across the OECD (with a mean index score of -0.16) reported using the computer at home less frequently for leisure compared to males across the OECD (with a mean index score of 0.16). Similarly, Australian males reported significantly more frequent use of computer for leisure-related activities than Australian females.

However, Australian females reported more frequent usage of computers at home for leisure, with a mean index score of 0.01, than on average for other females across the OECD (-0.16). Females from Macao-China, Canada, Hong Kong-China and Singapore also reported more frequent use of the computer at home for leisure than Australian females, whereas females in Japan, Ireland, New Zealand and Korea reported less frequent use than Australian females.

The mean index score for Australian males on the computer use at home for leisure index was 0.14, which was similar to OECD average for males at 0.16. Males from Singapore, Finland, Canada, Macao-China and Hong Kong-China reported more frequent use of computers for leisure compared to the mean index score for males across the OECD, while Japan, Ireland, New Zealand and Korea reported less frequent use compared to the mean index score for males for OECD countries.

The mean score gender difference on the computer use at home for leisure index, across the OECD countries was 0.32. Australia's mean score gender difference on the index was 0.15, which was similar to those of Canada, Korea, New Zealand and Macao-China.

**Table 3.11** Computer use at home for leisure index by gender

| Country | Females | | Males | | Difference | |
|---|---|---|---|---|---|---|
| | Mean index | S.E. | Mean index | S.E. | Diff. (F - M) | S.E. |
| **Australia** | -0.01 | 0.01 | 0.14 | 0.02 | **-0.15** | 0.02 |
| Canada | 0.11 | 0.01 | 0.25 | 0.01 | **-0.14** | 0.02 |
| Finland | -0.03 | 0.01 | 0.27 | 0.02 | **-0.29** | 0.02 |
| Ireland | -0.23 | 0.03 | -0.14 | 0.03 | **-0.09** | 0.04 |
| Japan | -1.30 | 0.02 | -1.22 | 0.02 | **-0.08** | 0.03 |
| Korea | -0.20 | 0.03 | -0.05 | 0.03 | **-0.16** | 0.04 |
| New Zealand | -0.21 | 0.02 | -0.06 | 0.03 | **-0.15** | 0.03 |
| Hong Kong-China | 0.14 | 0.02 | 0.21 | 0.02 | **-0.07** | 0.02 |
| Macao-China | 0.08 | 0.01 | 0.25 | 0.01 | **-0.16** | 0.02 |
| Singapore | 0.17 | 0.02 | 0.29 | 0.02 | **-0.12** | 0.02 |
| **OECD average-28** | -0.16 | 0.00 | 0.16 | 0.00 | **-0.32** | 0.01 |

Note: Values that are statistically significant are indicated in bold.

The percentage of Australian females and males who reported frequently using the computer at home for each of the leisure activities is shown in Figure 3.6. The differences are along the lines of what might be expected in terms of gender division – significantly more males reported playing one-player games, playing collaborative online games, browsing the Internet for fun and downloading music, films, games or software from the Internet than females. On the other hand, significantly more females reported using email, chatting online, publishing and maintaining a personal website, weblog or blog, or participating in online forums, virtual communities or spaces than males.

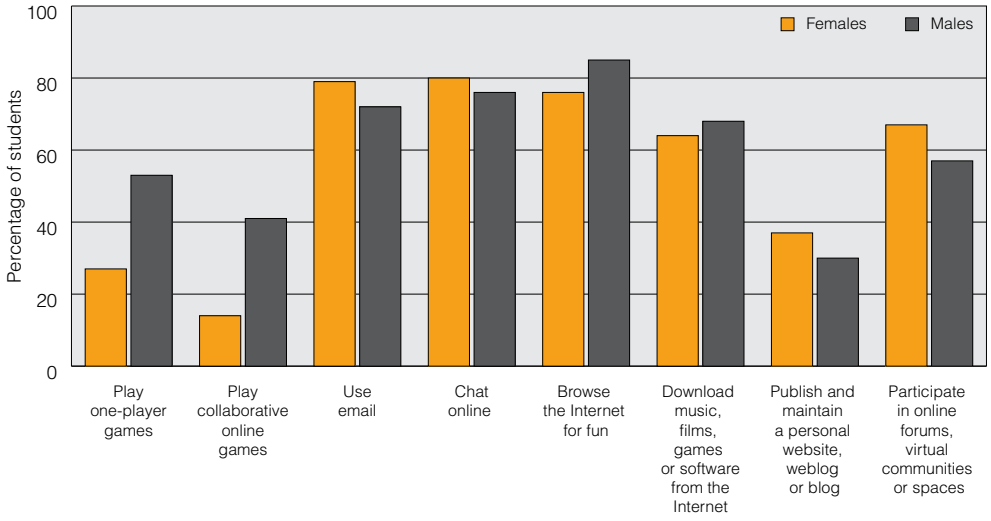



**Figure 3.6** Percentage of students who reported doing the following activities at home frequently, for Australia, by gender

The mean scores on the computer use at home for leisure index ranged from -0.11 in Tasmania to 0.11 in Victoria. Students in the Australian Capital Territory, New South Wales, Victoria, Queensland, South Australia and Western Australia reported significantly more frequent usage of the computer for leisure-related tasks than students in Tasmania. Students in New South Wales and Victoria reported significantly more frequent usage of the computer for leisure-related tasks than students in Queensland. Students in the Australian Capital Territory, New South Wales, Victoria and South Australian reported more frequent usage of computers at home for leisure than students in the Northern Territory (Table 3.12). Evidence reported earlier in this chapter provides some

explanation for this lower level of participation in the Northern Territory and Tasmania, as these two states had the highest proportion of students with no computer or just one computer in the home, and lower levels of access to the internet. With limited resources, it would be expected that the amount of time spent on leisure-related activities would be lower.

The percentage of students who reported doing each of the leisure-related activities at home frequently by state is shown in Table 3.12. Generally, students from the Northern Territory reported playing one player games (along with students in Victoria) and playing collaborative online games more frequently than students in other states. Students from the Australian Capital Territory reported using email, browsing the Internet for fun and downloading music, films, games or software from the Internet more frequently at home than students in other states. Students in Victoria reported more involvement in chatting online (along with students in New South Wales), publishing and maintaining a personal website, weblog or blog and participating in online forums, virtual communities or spaces.

**Table 3.12** Computer use at home for leisure-related activities index and percentage of students who reported doing leisure-related activities frequently at home by state

| State | Computer use at home for leisure | | Play one-player games | | Play collaborative online games | | Use e-mail | | Chat online | | Browse the Internet for fun | | Download music, films, games or software from the Internet | | Publish and maintain a personal website, weblog or blog | | Participate in online forums, virtual communities or spaces | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean index | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. |
| ACT | 0.05 | 0.03 | 41 | 1.8 | 25 | 2.1 | 83 | 1.5 | 77 | 1.5 | 83 | 1.0 | 67 | 1.2 | 33 | 1.5 | 47 | 1.6 |
| NSW | 0.09 | 0.02 | 37 | 1.1 | 27 | 1.1 | 77 | 1.2 | 81 | 0.7 | 81 | 0.8 | 66 | 0.8 | 33 | 1.2 | 63 | 1.0 |
| VIC | 0.11 | 0.03 | 43 | 1.2 | 29 | 1.4 | 76 | 0.9 | 80 | 1.2 | 80 | 1.1 | 68 | 1.1 | 35 | 1.3 | 66 | 1.4 |
| QLD | 0.01 | 0.02 | 37 | 1.3 | 25 | 1.0 | 78 | 1.1 | 76 | 1.0 | 81 | 0.8 | 65 | 1.7 | 35 | 1.4 | 57 | 1.6 |
| SA | 0.05 | 0.02 | 42 | 1.3 | 27 | 1.3 | 73 | 1.1 | 78 | 1.5 | 79 | 1.4 | 65 | 1.6 | 34 | 1.5 | 62 | 1.5 |
| WA | 0.02 | 0.04 | 39 | 1.4 | 27 | 1.5 | 72 | 1.7 | 76 | 2.0 | 80 | 1.5 | 66 | 1.9 | 30 | 1.2 | 64 | 2.2 |
| TAS | -0.11 | 0.04 | 42 | 1.6 | 29 | 1.6 | 65 | 1.7 | 67 | 2.2 | 72 | 1.2 | 60 | 1.5 | 32 | 1.6 | 63 | 1.9 |
| NT | -0.04 | 0.04 | 43 | 2.1 | 31 | 1.7 | 78 | 1.7 | 72 | 2.3 | 72 | 1.2 | 64 | 2.2 | 34 | 2.4 | 47 | 2.1 |

The mean scores on the computer use at home for leisure-related activities index by school sector were statistically similar and are shown in Table 3.13. However, some significant differences were found for individual leisure-related activities by school sector. Students in government schools reported playing games (one-player games and collaborative online games) at home more frequently than students in Catholic or independent schools. This is at some odds with the earlier finding that students in government schools were more likely than those in Catholic or independent schools to have access to at most one computer in the home, and more limited access to the internet, and thus have more limited access to leisure activities. This evidence could mean that government schools students, when they do have access to a computer and the internet, are more likely than students in Catholic or independent schools to use the computer for leisure-related activities.

In independent schools, a significantly higher proportion of students reported more frequent use of emailing than students in government or Catholic schools, and a significantly higher proportion of students in independent schools than students in government schools reported browsing the Internet for fun.

In Catholic schools, a significantly higher proportion of students reported downloading music, films, games or software from the Internet than students in government or independent schools, and also participated in online forums, virtual communities or spaces more frequently than students in government schools. A significantly higher proportion of students in Catholic schools reported publishing and maintaining a personal website than students in independent schools.

**Table 3.13** Computer use at home for leisure-related activities index and percentage of students who reported doing leisure-related activities frequently at home by school sector

| Sector | Computer use at home for leisure | | Play one-player games | | Play collaborative online games | | Use e-mail | | Chat online | | Browse the Internet for fun | | Download music, films, games or software from the Internet | | Publish and maintain a personal website, weblog or blog | | Participate in online forums, virtual communities or spaces | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean index | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. |
| Government | 0.05 | 0.01 | 41 | 0.6 | 29 | 0.7 | 74 | 0.7 | 78 | 0.6 | 79 | 0.6 | 66 | 0.7 | 34 | 0.8 | 61 | 0.8 |
| Catholic | 0.09 | 0.02 | 36 | 1.3 | 25 | 1.3 | 75 | 1.3 | 79 | 1.2 | 81 | 0.9 | 70 | 0.7 | 36 | 1.2 | 65 | 1.3 |
| Independent | 0.05 | 0.03 | 37 | 1.5 | 24 | 1.6 | 84 | 1.2 | 78 | 1.2 | 83 | 1.0 | 63 | 1.6 | 30 | 1.1 | 63 | 1.8 |

Students attending schools in metropolitan areas were more frequent users of computers for leisure-related activities than students attending schools in provincial or remote areas. These differences were found to be significant (Table 3.14). Students attending schools in metropolitan areas reported using computers at home for leisure more frequently than across the OECD, while students attending schools in provincial or remote areas use computers for leisure less frequently than the OECD average. This reflects the previous finding that students in remote areas, and to a lesser extent those in provincial areas, are more likely to have no access or more limited access to computers and the internet at home than students in metropolitan schools.

In all leisure activities, except playing one-player games, a significantly higher proportion of students from schools located in metropolitan areas reported doing these activities frequently compared to students who attended schools in provincial areas. There was a significantly higher proportion of students from schools in metropolitan areas who reported using emails, chatting online, browsing the Internet for fun and participating in online forums, virtual communities or spaces more frequently than students from schools in remote areas. The proportion of students who played one-player games was significantly higher among students attending schools in remote areas compared to students attending schools in provincial areas, while a significantly higher proportion of students attending schools in provincial areas chatted online more frequently compared to students attending schools in remote areas.

**Table 3.14** Computer use at home for leisure-related activities index and percentage of students who reported doing leisure-related activities frequently at home by geographic location

| Geographic location | Computer use at home for leisure | | Play one-player games | | Play collaborative online games | | Use e-mail | | Chat online | | Browse the Internet for fun | | Download music, films, games or software from the Internet | | Publish and maintain a personal website, weblog or blog | | Participate in online forums, virtual communities or spaces | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean index | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. |
| Metropolitan | 0.11 | 0.01 | 40 | 0.7 | 28 | 0.7 | 78 | 0.7 | 81 | 0.5 | 83 | 0.5 | 68 | 0.6 | 34 | 0.7 | 63 | 0.7 |
| Provincial | -0.10 | 0.02 | 38 | 0.9 | 25 | 0.9 | 68 | 1.2 | 72 | 1.2 | 74 | 1.0 | 61 | 1.2 | 32 | 0.9 | 58 | 1.6 |
| Remote | -0.17 | 0.08 | 45 | 3.1 | 28 | 3.6 | 65 | 4.1 | 61 | 2.7 | 74 | 2.6 | 63 | 3.4 | 29 | 3.1 | 51 | 5.8 |

Indigenous students reported significantly less frequent use of computers for leisure-related activities compared to students across the OECD and non-Indigenous students (Table 3.15). Significant differences were found between the proportion of Indigenous and non-Indigenous students who reported doing five of the leisure-related activities on their computer at home frequently. Again, this finding is consistent with the previous evidence about Indigenous students having more limited access to computers and the internet at home than non-Indigenous students.

There were significantly more non-Indigenous students who used email, chatted online, browsed the Internet for fun and downloaded music, films, games or software from the Internet more frequently than Indigenous students, while there were significantly more Indigenous students who indicated they played one-player games more frequently than non-Indigenous students.

**Table 3.15** Computer use at home for leisure-related activities index and percentage of students who reported doing leisure-related activities frequently at home by Indigenous background

| Indigenous background | Computer use at home for leisure | | Play one-player games | | Play collaborative online games | | Use e-mail | | Chat online | | Browse the Internet for fun | | Download music, films, games or software from the Internet | | Publish and maintain a personal website, weblog or blog | | Participate in online forums, virtual communities or spaces | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean index | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. |
| Indigenous | -0.06 | 0.06 | 45 | 2.4 | 29 | 2.2 | 64 | 1.8 | 71 | 2.4 | 74 | 1.7 | 62 | 1.7 | 35 | 2.0 | 60 | 2.2 |
| Non-Indigenous | 0.06 | 0.01 | 39 | 0.6 | 27 | 0.6 | 76 | 0.6 | 79 | 0.5 | 81 | 0.5 | 66 | 0.5 | 34 | 0.6 | 62 | 0.6 |

Table 3.16 shows that the mean score on the computer use at home for leisure index increases with each quartile of socioeconomic background. Students in the lowest quartile of socioeconomic background reported using computers at home for leisure less frequently than students across the OECD and students, whereas students in the other three quartiles of socioeconomic background reported using computers for leisure more frequently than across the OECD countries. As was seen earlier in this chapter, students from lower levels of socioeconomic background are likely to have only one computer in the home and less likely to have internet access, and thus have much less opportunity for leisure-related computer activities.

There were a significantly higher proportion of students in the highest socioeconomic quartile who reported using email, chatting online, browsing the Internet for fun and participating in online forums, virtual communities or spaces frequently compared to students in the lowest socioeconomic background quartile.

**Table 3.16** Computer use at home for leisure-related activities index and percentage of students who reported doing leisure-related activities frequently at home by socioeconomic background

| Socioeconomic background | Computer use at home for leisure | | Play one-player games | | Play collaborative online games | | Use e-mail | | Chat online | | Browse the Internet for fun | | Download music, films, games or software from the Internet | | Publish and maintain a personal website, weblog or blog | | Participate in online forums, virtual communities or spaces | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean index | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. |
| Lowest quartile | -0.06 | 0.02 | 38 | 1.1 | 26 | 1.0 | 69 | 1.0 | 75 | 0.9 | 76 | 0.9 | 64 | 1.0 | 32 | 0.9 | 59 | 1.0 |
| Second quartile | 0.06 | 0.02 | 40 | 1.1 | 27 | 0.9 | 74 | 0.9 | 78 | 0.9 | 80 | 0.9 | 68 | 0.9 | 33 | 1.0 | 61 | 1.0 |
| Third quartile | 0.11 | 0.01 | 39 | 1.0 | 27 | 1.0 | 77 | 0.9 | 80 | 0.8 | 82 | 0.7 | 67 | 1.0 | 36 | 0.8 | 64 | 0.9 |
| Fourth quartile | 0.14 | 0.02 | 40 | 1.1 | 28 | 1.0 | 83 | 0.9 | 81 | 0.8 | 84 | 0.8 | 66 | 1.0 | 34 | 1.0 | 65 | 1.1 |

## ICT for school-related activities

Table 3.17 shows the mean scores and associated standard errors on the index of computer use at home for school work for selected countries. A high mean score on the index indicates more frequent use of the computer for school work, while a low mean score indicates less frequent use of the computer at home for school work. Students in Singapore, Hong Kong-China, Australia and Canada reported using computers at home for school work more frequently than across the OECD, while students in Japan, Ireland, Finland, New Zealand, Macao-China and Korea used computers less frequently compared to the OECD average. Australia's mean score on the index for computer use at home for school work was 0.11, which was significantly higher than the OECD average and statistically similar to the mean score for Canada and Hong Kong-China.

**Table 3.17** Computer use at home for school work index, for selected countries

| Country | All students | |
|---|---|---|
| | Mean index | S.E. |
| **Australia** | 0.11 | 0.02 |
| Canada | 0.09 | 0.02 |
| Finland | -0.55 | 0.02 |
| Ireland | -0.62 | 0.02 |
| Japan | -1.02 | 0.02 |
| Korea | -0.06 | 0.02 |
| New Zealand | -0.16 | 0.02 |
| Hong Kong-China | 0.12 | 0.02 |
| Macao-China | -0.15 | 0.01 |
| Singapore | 0.25 | 0.02 |
| **OECD average-29** | 0.00 | 0.00 |

The percentage of students who reported frequent use (*everyday or almost every day* or *once or twice a week*) of the computer at home for school work for Australia and across the OECD[7] is shown in Figure 3.7. The school-related activities Australian students perform most frequently are doing homework on the computer and using the Internet for school work. Almost 70 per cent of students reported doing homework on the computer and 75 per cent of students indicated they use the Internet for school work on a frequent basis. These proportions were higher than the OECD average.

The proportions of Australian students and students in all participating OECD countries who reported using email to communicate with other students about school work on a frequent basis were quite similar, whereas a lower proportion of Australian students, compared to the OECD average, frequently used email communication with teachers or for the submission of homework.

Approximately 20 per cent of Australian students indicated they downloaded, uploaded or browsed material from their school's website and about 10 per cent of Australian students frequently checked the school's website for announcements. These proportions were lower than the OECD average.

7 The OECD average is based on the 29 countries who responded to this item.

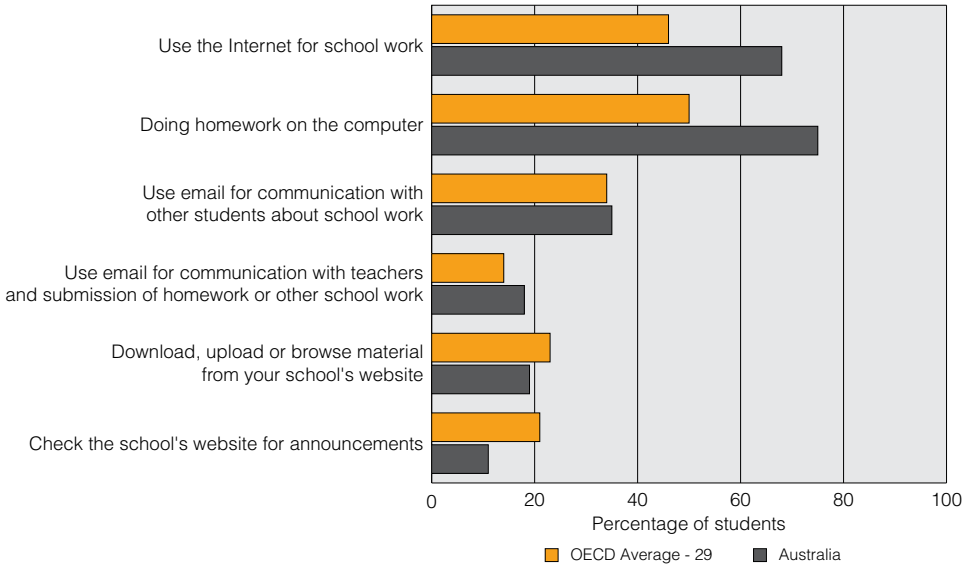



**Figure 3.7** Percentage of students who reported doing the following school-related activities at home frequently, for Australia and the OECD average

In all countries listed in Table 3.18, other than Ireland, females used computers at home for school work more frequently than males at a significantly higher level. In Australia, the average scores for males and females were higher than the OECD average for males and females. The gender gap on the computer use at home for school work index was small across the OECD, with a mean score of 0.03. In Australia the gender gap was wider at 0.11.

**Table 3.18** Computer use at home for school work index for selected countries by gender

| Country | Females | | Males | | Difference | |
|---|---|---|---|---|---|---|
| | Mean index | S.E. | Mean index | S.E. | Diff. (F - M) | S.E. |
| **Australia** | 0.16 | 0.03 | 0.05 | 0.03 | **0.11** | 0.03 |
| Canada | 0.15 | 0.02 | 0.03 | 0.03 | **0.12** | 0.03 |
| Finland | -0.52 | 0.02 | -0.58 | 0.02 | **0.05** | 0.03 |
| Ireland | -0.60 | 0.03 | -0.65 | 0.03 | 0.05 | 0.04 |
| Japan | -0.97 | 0.02 | -1.07 | 0.02 | **0.11** | 0.03 |
| Korea | 0.04 | 0.03 | -0.15 | 0.03 | **0.19** | 0.04 |
| New Zealand | -0.10 | 0.02 | -0.22 | 0.02 | **0.12** | 0.03 |
| Hong Kong-China | 0.16 | 0.03 | 0.08 | 0.03 | **0.08** | 0.04 |
| Macao-China | -0.10 | 0.01 | -0.20 | 0.02 | **0.11** | 0.02 |
| Singapore | 0.30 | 0.02 | 0.19 | 0.02 | **0.11** | 0.03 |
| **OECD average-29** | 0.01 | 0.00 | -0.02 | 0.01 | **0.03** | 0.01 |

Note: Values that are statistically significant are indicated in bold.

There were significantly more females who reported doing homework on the computer, using the Internet for school work and using email for communicating with other students about school work on a frequent basis compared to males. On the other hand, there were significantly more males who downloaded, uploaded or browsed material from their school's website compared to females (Figure 3.8).

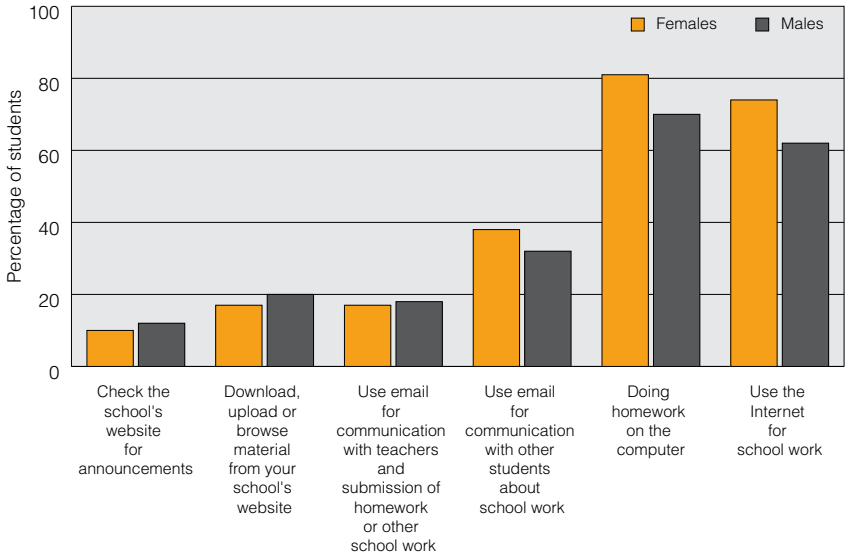



**Figure 3.8** Percentage of students who reported doing the following school-related activities at home frequently by gender

The mean scores on the computer use at home for school work index for each state are shown in Table 3.19. Students in Tasmania and Western Australia reported using the computer for school work less frequently than the OECD average, while students in other states indicated using computers for school-related activities more frequently than the OECD average. The mean index scores on this index ranged from -0.26 in Tasmania to 0.37 in the Australian Capital Territory.

Students from the Australian Capital Territory reported using the computer at home for school-related activities more frequently than students from New South Wales, Victoria, South Australia, Western Australia, Tasmania and the Northern Territory. Students from Victoria indicated they used computers at home for school-related activities more frequently than students from South Australia and Western Australia while students from Queensland reported using the computer at home for school-related activities more frequently than students from Western Australia. Students from Tasmania reported using the computer at home for school-related activities significantly less frequently than students in other states. These differences were statistically significant.

Generally, students from the Australian Capital Territory reported doing each of the school-related activities on a computer at home more frequently than students from other states, while students in Tasmania reported doing each of the school-related activities on a computer at home less frequently than students from other states.

Of interest are the index scores for Western Australia and the Northern Territory. A substantially higher proportion of the students in Western Australia than the Northern Territory have access to multiple computers and the internet in the home, and yet students in the Northern Territory report a higher level of using these limited resources for school-related activities. The index score for Tasmania is substantially lower on most school-related activities, even accounting for the proportion of students with limited access to computers and the internet at home in that state.

**Table 3.19** Computer use at home for school work index and percentage of students who reported doing activities related to school work frequently at home by state

| State | Computer use at home for school work | | Use the Internet for school work | | Doing homework on the computer | | Use email for communication with other students about school work | | Use email for communication with teachers and submission of homework or other schoolwork | | Download, upload or browse material from your school's website | | Check the school's website for announcements | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean index | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. |
| ACT | 0.37 | 0.04 | 77 | 1.7 | 84 | 1.0 | 38 | 2.2 | 19 | 1.1 | 26 | 1.8 | 19 | 2.2 |
| NSW | 0.07 | 0.03 | 66 | 1.6 | 73 | 1.5 | 35 | 1.7 | 13 | 1.1 | 16 | 1.0 | 10 | 0.8 |
| VIC | 0.17 | 0.03 | 69 | 1.8 | 78 | 1.6 | 34 | 1.4 | 21 | 1.8 | 22 | 1.4 | 13 | 1.3 |
| QLD | 0.21 | 0.08 | 71 | 1.6 | 76 | 1.5 | 39 | 2.7 | 23 | 3.4 | 23 | 3.5 | 14 | 2.7 |
| SA | 0.07 | 0.03 | 74 | 1.5 | 82 | 1.1 | 33 | 1.4 | 19 | 1.4 | 15 | 1.2 | 8 | 0.9 |
| WA | -0.04 | 0.05 | 65 | 2.6 | 73 | 2.2 | 30 | 1.9 | 12 | 1.1 | 13 | 1.5 | 7 | 1.3 |
| TAS | -0.26 | 0.05 | 49 | 2.8 | 58 | 2.8 | 22 | 1.3 | 14 | 1.0 | 12 | 1.3 | 8 | 1.1 |
| NT | 0.06 | 0.05 | 69 | 2.5 | 77 | 2.0 | 33 | 1.9 | 20 | 1.9 | 16 | 1.8 | 11 | 1.5 |

The mean index scores on the computer use at home for school work index shows that students in government schools used computers for school-related activities less frequently than the average for students across the OECD, and students in Catholic or independent schools used computers for school-related activities more frequently than students across the OECD. The mean score on the computer use at home for school work index for students in government schools was significantly lower than the mean score for students in Catholic schools, who in turn had a mean score that was significantly lower than the mean score for students in independent schools (Table 3.20). This is consistent with the previous finding that students attending independent schools were more likely to have access to three or more computers in the home, and the internet, whereas a higher proportion of government school students had more limited access to computers and fewer had access to the internet.

For each of the school-related activities, there were a significantly higher proportion of students in independent schools who reported frequently doing school-related activities on their computer at home compared to students in Catholic or government schools. Significant differences were also found between students in government and Catholic schools, with higher proportions of students in Catholic schools using computers at home for school work more frequently, in all except one activity (using email for communicating with teachers and submission of homework or other school work was found to be statistically similar between students in government and Catholic schools).

**Table 3.20** Computer use at home for school work index and percentage of students who reported doing activities related to school work frequently at home by school sector

| Sector | Computer use at home for school work | | Use the Internet for school work | | Doing homework on the computer | | Use email for communication with other students about school work | | Use email for communication with teachers and submission of homework or other schoolwork | | Download, upload or browse material from your school's website | | Check the school's website for announcements | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean index | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. |
| Government | -0.07 | 0.03 | 60 | 1.1 | 68 | 1.0 | 30 | 1.1 | 14 | 1.2 | 14 | 1.3 | 9 | 1.0 |
| Catholic | 0.27 | 0.03 | 77 | 1.3 | 83 | 1.0 | 36 | 1.7 | 17 | 1.3 | 20 | 1.6 | 12 | 1.3 |
| Independent | 0.50 | 0.05 | 84 | 1.8 | 90 | 1.5 | 48 | 2.1 | 31 | 2.9 | 32 | 2.3 | 18 | 1.7 |

The frequency with which students used the computer at home for school-related activities was significantly different across the geographic locations of schools. The mean score for students attending schools in metropolitan areas was 0.19, which was significantly higher than the mean score for students attending schools in provincial areas (-0.13), who had a mean score significantly higher than students attending schools in remote areas (-0.29). Students in metropolitan schools used computers for school work more frequently than students across the OECD, whereas students in provincial or remote schools used computers for school-related activities less frequently than the OECD average (Table 3.21). Again, this is consistent with previous findings showing that students attending schools in metropolitan areas were more likely to have access to multiple computers in their home, and have access to the internet, than students in remote areas, and also to some extent to students in provincial areas.

There was a significantly higher proportion of students in metropolitan schools who indicated they used computers on a frequent basis for each of the school-related activities than students in provincial schools. Significant differences were also found between students attending schools in metropolitan areas and students attending schools in remote areas, and the frequency with which they used computers for school-related activities.

**Table 3.21** Computer use at home for school work index and percentage of students who reported doing activities related to school work frequently at home by geographic location

| Geographic location | Computer use at home for school work | | Use the Internet for school work | | Doing homework on the computer | | Use email for communication with other students about school work | | Use email for communication with teachers and submission of homework or other schoolwork | | Download, upload or browse material from your school's website | | Check the school's website for announcements | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean index | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. |
| Metropolitan | 0.19 | 0.03 | 71 | 0.9 | 78 | 0.9 | 38 | 1.2 | 19 | 1.2 | 21 | 1.2 | 13 | 0.9 |
| Provincial | -0.13 | 0.03 | 60 | 1.5 | 69 | 1.5 | 25 | 1.1 | 12 | 0.9 | 12 | 0.9 | 7 | 0.7 |
| Remote | -0.29 | 0.04 | 57 | 2.7 | 65 | 2.5 | 24 | 4.7 | 11 | 1.9 | 13 | 1.1 | 5 | 1.3 |

The mean score on the computer use at home for school work index for Indigenous students was -0.28, which was significantly lower than the mean score for non-Indigenous students of 0.12. Indigenous students used the computer for school-related activities less frequently compared to the OECD average (Table 3.22). As reported previously, Indigenous students have much lower levels of access to computers and the internet at home than non-Indigenous students, and thus clearly less time to spend on school-related activities.

Indigenous students reported using the Internet for school work, doing homework on the computer, using email for communication with other students about school work, and downloading, uploading or browsing material from their school's website less frequently compared to non-Indigenous students. These differences were significant.

**Table 3.22** Computer use at home for school work index and percentage of students who reported doing activities related to school work frequently at home by Indigenous background

| Indigenous background | Computer use at home for school work | | Use the Internet for school work | | Doing homework on the computer | | Use email for communication with other students about school work | | Use email for communication with teachers and submission of homework or other schoolwork | | Download, upload or browse material from your school's website | | Check the school's website for announcements | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean index | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. |
| Indigenous | -0.28 | 0.04 | 48 | 2.1 | 57 | 1.8 | 26 | 1.6 | 15 | 1.4 | 14 | 1.4 | 10 | 1.2 |
| Non-Indigenous | 0.12 | 0.02 | 69 | 0.8 | 76 | 0.7 | 35 | 1.0 | 18 | 1.0 | 19 | 1.0 | 11 | 0.8 |

The mean score on the computer use at home for school work index for students in the lowest socioeconomic background quartile was -0.19, which was significantly lower than the OECD average. Students in the second socioeconomic background quartile had a mean index score similar to the OECD average, while students in the third and fourth socioeconomic background quartile both had mean index scores that were higher than the OECD average. Significant differences were found between students in each of the socioeconomic background quartiles, that is, with each quartile increase in socioeconomic background, students reported using the computer at home for school work more frequently (Table 3.23). This mirrors the findings related to the number of computers and access to the internet in the home, with students from a low socioeconomic background less likely to have multiple computers in the home and also less likely to have access to the internet.

**Table 3.23** Computer use at home for school work index and percentage of students who reported doing activities related to school work frequently at home by socioeconomic background

| Socioeconomic background | Computer use at home for school work | | Use the Internet for school work | | Doing homework on the computer | | Use email for communication with other students about school work | | Use email for communication with teachers and submission of homework or other schoolwork | | Download, upload or browse material from your school's website | | Check the school's website for announcements | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean index | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. |
| Lowest quartile | -0.19 | 0.02 | 53 | 1.1 | 62 | 1.3 | 28 | 0.9 | 13 | 0.8 | 14 | 0.8 | 8 | 0.8 |
| Second quartile | 0.01 | 0.03 | 65 | 1.1 | 73 | 0.9 | 30 | 1.2 | 14 | 1.0 | 14 | 0.9 | 8 | 0.8 |
| Third quartile | 0.2 | 0.03 | 72 | 1.1 | 79 | 0.9 | 37 | 1.6 | 18 | 1.4 | 20 | 1.3 | 12 | 0.9 |
| Highest quartile | 0.43 | 0.03 | 83 | 0.9 | 89 | 0.8 | 44 | 1.6 | 25 | 1.7 | 27 | 1.8 | 12 | 0.9 |

## Online reading activities

PISA 2009 examined students' online reading practices by asking them how often they were involved in the following reading activities:

- reading emails;
- chatting online;
- reading online news;
- using an online dictionary or encyclopedia (e.g. Wikipedia);
- searching online information to learn about a particular topic;
- taking part in online discussions or forums; and
- searching for practical information online (e.g. schedules, events, tips, recipes).

Students rated the frequency they performed each activity on a five point scale—*I don't know what it is, never or almost never, several times a month, several times a week and several times a day*. Students who performed an activity *several times a week or several times a day* were considered frequent readers of online materials. An index of online reading activities was created using the above statements. Higher scores on the index indicated more frequent online reading activities.

The mean index scores and associated standard errors on the index of online reading activities for selected countries are shown in Table 3.24 Students in Hong Kong-China and Singapore reported more frequent online reading activities than the OECD average[8] whereas students in Macao-China, Finland, Canada, Australia, Korea, New Zealand, Japan and Ireland were less involved with online reading activities compared to the OECD average. Australia's mean score on the online reading activities index was -0.08.

8 The OECD average is based on the 34 countries who responded to this item.

**Table 3.24** Online reading activities for selected countries

| | All students | |
|---|---|---|
| | Mean index | S.E. |
| **Australia** | -0.08 | 0.01 |
| Canada | -0.04 | 0.01 |
| Finland | -0.04 | 0.01 |
| Ireland | -0.50 | 0.02 |
| Japan | -0.49 | 0.02 |
| Korea | -0.21 | 0.02 |
| New Zealand | -0.29 | 0.02 |
| Hong Kong-China | 0.38 | 0.02 |
| Macao-China | -0.02 | 0.01 |
| Singapore | 0.13 | 0.02 |
| **OECD average-29** | 0.00 | 0.00 |

The online reading activities can be separated into two distinct kinds of online reading activities: searching for information activities (reading online news, using an online dictionary or encyclopedia, searching online information and search for practical information) and social activities (reading emails, chatting online taking part in online discussions or forums). Australian students were more frequently involved in online social activities (with a mean score of 0.03) than online searching for information (with a mean index of -0.08).

On average across Australia, the most common types of online reading activities reported by students were related to social activities, with 75 per cent of students reporting that they chat on line frequently and 67 per cent of students reporting that they read emails frequently. Taking part in online discussion groups or forums was the online reading activity in which there was least participation, with 20 per cent of students reporting frequently participating in this activity.

In terms of information searches, the most common activity for Australian students was searching online information to learn about a practical topic with 56 per cent of students reporting frequent participation in this activity. This was followed by using an online dictionary or encyclopedia (34% of students), searching for practical information online (32% of students) and reading online news (32% of students). Reading online news was a more common type of online reading activity reported for students across the OECD, (46% of students) (Figure 3.9).

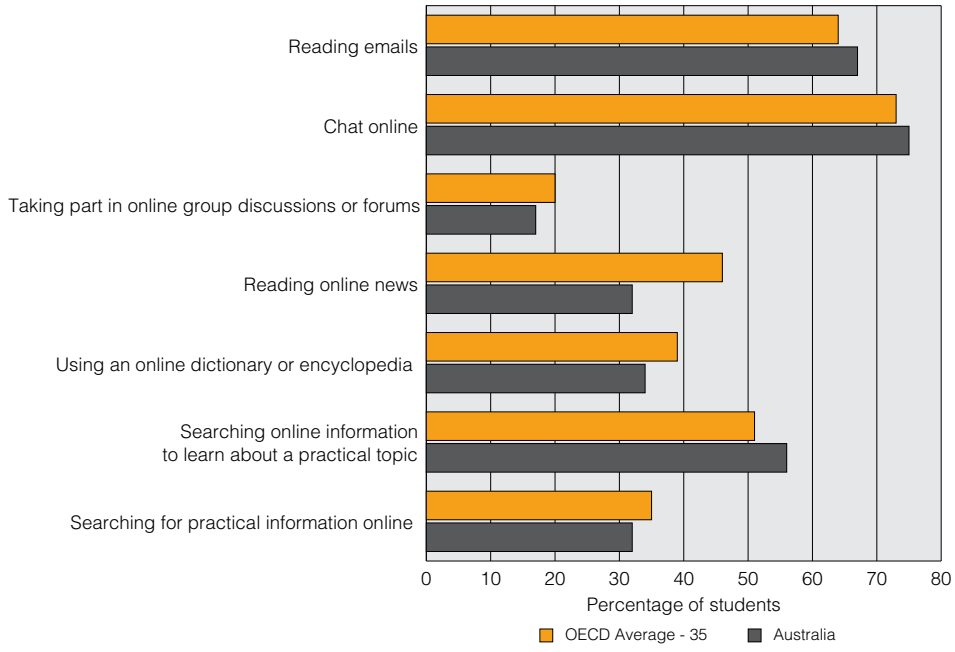



**Figure 3.9** Percentage of students who reported doing the following online reading activities frequently, for Australia and the OECD average

Across the OECD, there was a significant gender gap in favour of males on the online reading activities index. This was also the case for Singapore, Finland and Hong Kong-China, where males were more frequently involved in online reading activities than females. On the other hand, significant gender differences in favour of females were found in Korea, Japan and New Zealand. No gender differences were found in Australia, Canada, Ireland and Macao-China (Table 3.25).

**Table 3.25** Online reading activities index for selected countries by gender

| Country | Females | | Males | | Difference | |
|---|---|---|---|---|---|---|
| | Mean index | S.E. | Mean index | S.E. | Diff. (F - M) | S.E. |
| **Australia** | -0.07 | 0.02 | -0.09 | 0.02 | 0.02 | 0.02 |
| Canada | -0.04 | 0.02 | -0.03 | 0.02 | 0.00 | 0.02 |
| Finland | -0.08 | 0.02 | 0.01 | 0.02 | **0.10** | 0.03 |
| Ireland | -0.48 | 0.03 | -0.52 | 0.03 | -0.04 | 0.04 |
| Japan | -0.43 | 0.02 | -0.56 | 0.03 | **-0.13** | 0.03 |
| Korea | -0.13 | 0.02 | -0.27 | 0.03 | **-0.14** | 0.03 |
| New Zealand | -0.24 | 0.02 | -0.33 | 0.02 | **-0.09** | 0.03 |
| Hong Kong-China | 0.33 | 0.02 | 0.42 | 0.03 | **0.10** | 0.03 |
| Macao-China | -0.01 | 0.01 | -0.02 | 0.02 | -0.01 | 0.02 |
| Singapore | 0.07 | 0.02 | 0.20 | 0.02 | **0.13** | 0.02 |
| **OECD average-34** | -0.03 | 0.00 | 0.03 | 0.00 | **0.07** | 0.01 |

Note: Values that are statistically significant are indicated in bold

The percentage of Australian females and males who reported being involved in online reading activities frequently is shown in Figure 3.10. There were a significantly higher proportion of females who read emails, chatted online and searched online information to learn about a practical topic more frequently than males, whereas a significantly higher proportion of males took part in online group discussions or forums and searched for practical information online.

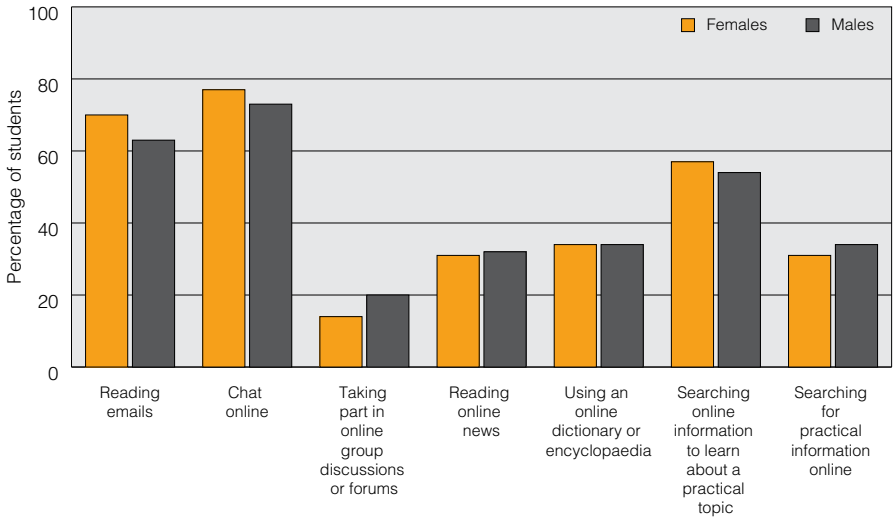



**Figure 3.10** Percentage of students who reported frequently participating in online reading activities by gender

For the remainder of the analysis on this section, the reader is cautioned to keep in mind issues of access. It is unlikely that participation could be equal when access is not.

The mean scores on the online reading activities index ranged from 0.04 in the Australian Capital Territory to -0.37 in Tasmania. Students in the Australian Capital Territory and New South Wales participated in online reading activities in a statistically similar way to students across the OECD. Students in other states reported participating in online reading activities less frequently than the OECD average (Table 3.26).

Students in Tasmania and the Northern Territory were involved in online reading activities significantly less frequently than students in all other states, except for students in Western Australian who reported performing online reading activities at a level similar to students in the Northern Territory. Students in the Australian Capital Territory were involved in online reading activities significantly more frequently than students in all states except New South Wales.

There was a higher proportion of students from the Australian Capital Territory who reported reading emails, reading online news, using an online dictionary or encyclopedia, searching online information to learn about a practical topic and searching for practical information online frequently than students in other states. A higher proportion of students in New South Wales reported chatting online frequently compared to students in other states.

**Table 3.26** Online reading activities index and percentage of students who reported frequently participating in online reading activities at school

| State | Online reading activities | | Reading emails | | Chat online | | Reading online news | | Using an online dictionary or encyclopedia | | Searching online information to learn about a practical topic | | Taking part in online group discussions or forums | | Searching for practical information online | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean index | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. |
| ACT | 0.04 | 0.03 | 75 | 1.7 | 73 | 1.4 | 34 | 1.3 | 41 | 2.1 | 65 | 1.7 | 16 | 1.5 | 36 | 1.9 |
| NSW | -0.03 | 0.03 | 67 | 1.2 | 77 | 0.9 | 33 | 1.2 | 34 | 1.4 | 55 | 1.4 | 18 | 0.9 | 34 | 1.2 |
| VIC | -0.07 | 0.03 | 67 | 1.4 | 75 | 1.3 | 32 | 1 | 35 | 1.4 | 55 | 1.6 | 17 | 1.1 | 32 | 1.1 |
| QLD | -0.09 | 0.04 | 68 | 1.6 | 73 | 1.4 | 32 | 1.2 | 31 | 2.5 | 57 | 1.6 | 16 | 0.8 | 32 | 1.1 |
| SA | -0.08 | 0.02 | 63 | 1.1 | 74 | 1.2 | 30 | 1.2 | 35 | 1.4 | 60 | 1.7 | 18 | 1.2 | 32 | 1.7 |
| WA | -0.13 | 0.04 | 64 | 1.5 | 73 | 2.2 | 30 | 1.5 | 35 | 1.5 | 55 | 2.1 | 17 | 0.8 | 28 | 1.5 |
| TAS | -0.37 | 0.03 | 59 | 1.7 | 61 | 1.9 | 21 | 1.1 | 24 | 1.3 | 50 | 2.4 | 13 | 1.4 | 25 | 1.5 |
| NT | -0.22 | 0.04 | 65 | 1.6 | 68 | 1.9 | 30 | 1.7 | 29 | 1.6 | 55 | 2.3 | 13 | 1.4 | 28 | 1.8 |

Students in government schools reported being involved in online reading activities significantly less frequently than students in Catholic or independent schools, while students in Catholic schools reported being involved significantly less frequently than students in independent schools (Table 3.27).

The proportion of students who reported searching for practical information online and reading online news was statistically similar for students in Catholic and independent schools, and significantly higher than students in government schools. Students in independent schools reported using an online dictionary or encyclopedia and searching online information to learn about a practical topic significantly more frequently than students in Catholic schools, who in turn reported doing these activities significantly more frequently than students in government schools. Students in independent schools also reported reading emails significantly more frequently than students in government or Catholic schools.

**Table 3.27** Online reading activities index and percentage of students who reported frequently participating in online reading activities by school sector

| Sector | Online reading activities | | Reading emails | | Chat online | | Reading online news | | Using an online dictionary or encyclopedia | | Searching online information to learn about a practical topic | | Taking part in online group discussions or forums | | Searching for practical information online | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean index | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. |
| Government | -0.14 | 0.02 | 64 | 0.8 | 75 | 0.7 | 30 | 0.7 | 31 | 1.1 | 51 | 1.0 | 17 | 0.6 | 30 | 0.8 |
| Catholic | -0.03 | 0.02 | 67 | 1.3 | 76 | 1.5 | 34 | 1.1 | 35 | 1.0 | 60 | 1.7 | 16 | 0.8 | 34 | 1.3 |
| Independent | 0.07 | 0.03 | 74 | 1.4 | 74 | 1.4 | 34 | 1.3 | 42 | 1.3 | 66 | 1.2 | 18 | 1.1 | 36 | 1.1 |

Students attending schools in metropolitan areas reported participating in online reading activities significantly less frequently than students in provincial or remote schools (Table 3.28).

There were significantly more students in metropolitan schools who reported being involved in online reading activities frequently compared to students in provincial schools. Students in metropolitan schools also reported reading emails, chatting online, using an online dictionary or encyclopedia and searching online information to learn about a practical topic more frequently than students in remote schools.

**Table 3.28** Online reading activities index and percentage of students who reported frequently participating in online reading activities by geographic location

| Geographic location | Online reading activities | | Reading emails | | Chat online | | Reading online news | | Using an online dictionary or encyclopedia | | Searching online information to learn about a practical topic | | Taking part in online group discussions or forums | | Searching for practical information online | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean index | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. |
| Metropolitan | 0.01 | 0.02 | 69 | 0.7 | 78 | 0.5 | 34 | 0.7 | 37 | 0.8 | 58 | 0.8 | 18 | 0.6 | 34 | 0.7 |
| Provincial | -0.32 | 0.02 | 59 | 1.2 | 66 | 1.4 | 24 | 0.8 | 25 | 0.9 | 48 | 1.2 | 13 | 0.6 | 26 | 0.9 |
| Remote | -0.38 | 0.08 | 56 | 4.5 | 61 | 4.6 | 29 | 3.3 | 24 | 1.8 | 51 | 1.8 | 18 | 3.1 | 31 | 2.1 |

Indigenous students participated in all forms of online reading activities less frequently than non-Indigenous students, and these differences were statistically significant (Table 3.29).

**Table 3.29** Online reading activities index and percentage of students who reported frequently participating in online reading activities by Indigenous background

| Indigenous background | Online reading activities | | Reading emails | | Chat online | | Reading online news | | Using an online dictionary or encyclopedia | | Searching online information to learn about a practical topic | | Taking part in online group discussions or forums | | Searching for practical information online | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean index | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. |
| Indigenous | -0.42 | 0.04 | 54 | 1.8 | 66 | 2.6 | 23 | 1.8 | 23 | 1.9 | 42 | 2.1 | 14 | 1.2 | 25 | 1.6 |
| Non-Indigenous | -0.07 | 0.01 | 67 | 0.6 | 75 | 0.5 | 32 | 0.5 | 34 | 0.7 | 56 | 0.6 | 17 | 0.5 | 32 | 0.6 |

With each increase in quartile of socioeconomic background, the proportion of students who participated frequently in online reading activities also increased (Table 3.30). The proportion of students in the highest socioeconomic quartile who reported being involved in each of the online reading activities was significantly higher than students in the lowest socioeconomic quartile.

**Table 3.30** Online reading activities index and percentage of students who reported frequently participating in online reading activities by Indigenous background by socioeconomic background

| Socioeconomic background | Online reading activities | | Reading emails | | Chat online | | Reading online news | | Using an online dictionary or encyclopedia | | Searching online information to learn about a practical topic | | Taking part in online group discussions or forums | | Searching for practical information online | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean index | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. |
| Lowest quartile | -0.32 | 0.02 | 59 | 1.1 | 72 | 1.0 | 23 | 0.8 | 24 | 1.0 | 45 | 1.2 | 15 | 0.6 | 25 | 0.9 |
| Second quartile | -0.16 | 0.02 | 64 | 0.9 | 74 | 0.9 | 29 | 0.8 | 29 | 1.0 | 52 | 1.2 | 15 | 0.7 | 28 | 1.1 |
| Third quartile | 0.01 | 0.02 | 69 | 1.0 | 76 | 0.8 | 34 | 1.0 | 37 | 0.9 | 59 | 1.2 | 18 | 0.8 | 35 | 1.1 |
| Highest quartile | 0.17 | 0.02 | 75 | 1.1 | 78 | 0.9 | 40 | 1.1 | 46 | 1.2 | 69 | 1.2 | 21 | 0.9 | 41 | 1.0 |

## Summary

Students' access to ICT at home has continued to grow. On average across OECD countries, the proportion of students who reported having access to a computer at home increased from 72 per cent in 2000 to 94 per cent in 2009. During the same period, internet access almost doubled, from 45 per cent to 89 per cent, on average, across OECD countries. In Australia, the proportion of students having access to a computer at home has risen from about 91 per cent in 2000 to over 99 per cent in 2009, and access to the internet has grown from 67 per cent in 2000 to 95 per cent in 2009.

In many countries, and for many groups of students, access to computers and the internet is almost universal; however there are a number of OECD countries in which this is not the case. Even in this report, which focuses on the digital reading assessment, students in Japan had less access to computers and the internet at home than students in other countries, for example.

Within Australia, access to computers and the Internet is linked to students' socioeconomic background. Students from advantaged backgrounds reported higher levels of home computer access and use, both for leisure and schoolwork than students from disadvantaged backgrounds. This is reflected in the proportions reported by school sector, where a higher proportion of disadvantaged students attend government schools, and in the proportions of Indigenous and non-Indigenous students who have access to computers and the Internet, which also reflects socioeconomic background.

The next chapter of this report examines students' access and use of digital technologies at school.

Chapter

4

# Students' access and use of information and communication technologies at school

The previous chapter described students' access and use of computers in the home. This chapter also uses the data collected in the Information and Communication Technologies familiarity questionnaire to examine students' access and use of computers at school.

## Key Findings

- Ninety-nine per cent of students reported having access to a computer and the Internet at their school, which was significantly higher than the 93 per cent of students across the OECD.
- Access to the Internet at school was significantly higher for students in Catholic and independent schools; students in provincial schools, non-Indigenous students and students from higher socioeconomic backgrounds.
- The most common computer activity for students at school is browsing the Internet for school work.
- Generally, the frequency of computer use at school was highest in Tasmania and the Northern Territory and lowest in Western Australia.
- Students from government schools reported significantly less frequent use of computers at school than students in Catholic or independent schools.
- Students in remote schools reported significantly more frequent use of computers at school than students attending schools in metropolitan or provincial areas.

## ICT resources at school

In the PISA 2009 Student Questionnaire, students were asked about whether they had access to computers and the Internet[1] at school. Figure 4.1 shows the proportion of students who reported access to and use of a computer and the Internet at school. Countries have been ordered by the percentage of students who reported using a computer at school – countries with the lowest percentage of students are placed at the left hand side of the figure and countries with the highest percentage of students are placed at the right hand side of the figure.

On average, 93 per cent of students across OECD countries[2] reported having access to a computer at school. In Japan and Korea, the proportion of students with access to a computer at school was lower than the OECD average, while for the other selected countries shown in Figure 4.1, the proportion of students accessing a computer at school was higher than the OECD average. This ranged from 96 per cent in Ireland to 99 per cent in Australia.

1 These questions were asked in the same way students were asked about computers at home.

2 Based on 29 OECD countries. For more information about the OECD average refer to the Reader's Guide.

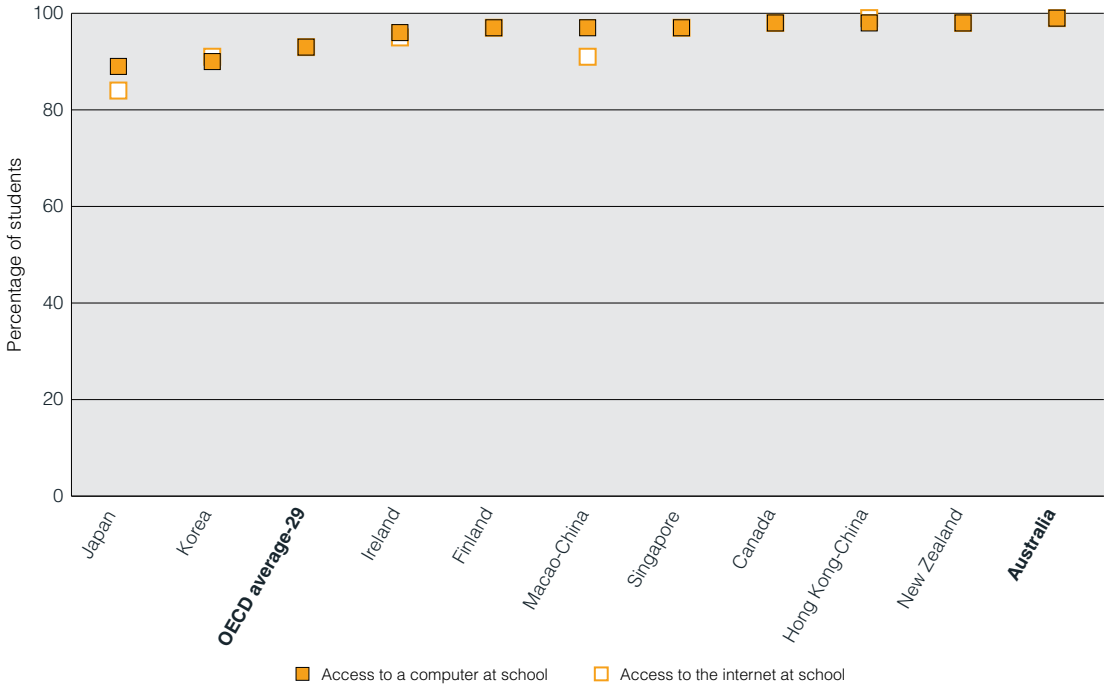



**Figure 4.1** Access to a computer and the Internet at school for selected countries

Most students who reported access to computers at their school also reported having access to the Internet. On average, 93 per cent of students across OECD countries[3] reported having access to the Internet at school. Finland, Canada, New Zealand and Australia reported the same proportion of students who had access to a computer at school as those who had access the Internet at school, whereas in Ireland, Singapore and Hong-Kong China, the difference between students who had access to a computer at school and were able to access the Internet at school was negligible (no more than one per cent difference). In Japan and Macao-China, the proportions of students who had Internet access at school was slightly lower than the proportion who had computer access, by about 5 percentage points.

In Australia, the majority of 15-year-old students reported access to computers and the Internet at school. This reported access ranged from 91 per cent of students in New South Wales to 98 per cent of students in Tasmania. As was the case internationally, most students who reported access to computers at school also reported having access to the Internet. Four per cent of students in Western Australia reported having access to a computer at school but not being able to access the Internet at school. For other states, this difference was two per cent or less (Table 4.1).

**Table 4.1** Access to a computer and the Internet at school by state

| State | Access to a computer at school | | Access to the Internet at school | |
|---|---|---|---|---|
| | % | S.E. | % | S.E. |
| ACT | 95 | 1.8 | 94 | 1.8 |
| NSW | 91 | 0.9 | 89 | 0.9 |
| VIC | 97 | 0.7 | 95 | 0.8 |
| QLD | 94 | 0.6 | 93 | 0.8 |
| SA | 97 | 0.6 | 97 | 0.6 |
| WA | 95 | 1.1 | 91 | 3.7 |
| TAS | 98 | 0.5 | 98 | 0.5 |
| NT | 95 | 1.0 | 95 | 0.9 |

3 The OECD average is based on the 29 countries who responded to this item.

Ninety-two per cent of students in government schools reported having access to a computer at school which was significantly lower than the 98 per cent of students in Catholic schools or 97 per cent of students in independent schools. Access to the Internet in government schools was also significantly lower compared to Catholic or independent schools (Table 4.2).

**Table 4.2** Access to a computer and the Internet at school by school sector

| Sector | Access to a computer at school | | Access to the Internet at school | |
|---|---|---|---|---|
| | % | S.E. | % | S.E. |
| Government | 92 | 0.5 | 90 | 0.6 |
| Catholic | 98 | 0.5 | 97 | 0.4 |
| Independent | 97 | 0.6 | 95 | 2.1 |

At least 94 per cent of students were able to access a computer at school, and at least 92 per cent of students were able to access the Internet at school, regardless of the schools' geographic location. The differences between access to a computer at school and geographical location were not statistically significant; however, there were significantly more students in provincial schools who reported having access to the Internet at school compared to students in metropolitan or remote schools.

All students from provincial schools reported that the computers they access at school also have access to the Internet, while for students in metropolitan and remote schools, there were two per cent fewer students who indicated they had access to the Internet, compared to those who had access to a computer (Table 4.3).

**Table 4.3** Access to a computer and the Internet at school by geographic location

| Geographic location | Access to a computer at school | | Access to the Internet at school | |
|---|---|---|---|---|
| | % | S.E. | % | S.E. |
| Metropolitan | 94 | 0.4 | 92 | 0.6 |
| Provincial | 95 | 0.6 | 95 | 0.5 |
| Remote | 96 | 2.5 | 94 | 1.6 |

Although the majority of students have access to the computer and Internet at school, there were significantly fewer Indigenous students who reported having access to a computer and the Internet at school compared to non-Indigenous students. Ninety-one percent of Indigenous students reported having access to a computer at school compared to 94 per cent of non-Indigenous students. Eighty-eight percent of Indigenous students reported having access to the Internet at school compared to 93 per cent of non-Indigenous students (Table 4.4).

**Table 4.4** Access to a computer and the Internet at school by Indigenous background

| Indigenous background | Access to a computer at school | | Access to the Internet at school | |
|---|---|---|---|---|
| | % | S.E. | % | S.E. |
| Indigenous | 91 | 1.3 | 88 | 1.3 |
| Non-Indigenous | 94 | 0.3 | 93 | 0.5 |

Table 4.5 shows that students from higher socioeconomic backgrounds were more likely to have access to a computer and access to the Internet at school compared to students from lower socioeconomic backgrounds. Although the proportions of students in the lowest and second quartiles of socioeconomic background who had access to a computer at school were not significantly different, there were significant differences between students in the second and third quartile, and the third and highest quartile of socioeconomic background. Significant differences were found in the proportions of students in the third and highest socioeconomic background quartiles who had access to the Internet at school.

**Table 4.5** Access to a computer and the Internet at school by socioeconomic background

| Socioeconomic background | Access to a computer at school | | Access to the Internet at school | |
|---|---|---|---|---|
| | % | S.E. | % | S.E. |
| Lowest quartile | 92 | 0.7 | 90 | 0.9 |
| Second quartile | 93 | 0.6 | 91 | 0.7 |
| Third quartile | 95 | 0.5 | 93 | 0.8 |
| Highest quartile | 97 | 0.3 | 96 | 0.4 |

## Students' use of ICT at school

In PISA 2009, data was collected on students' use of ICT at school. Students were asked about the frequency they performed each of the following nine activities at school:

- chat online at school;
- use email at school;
- browse the Internet for school work;
- download, upload or browse material from the school's website (e.g. intranet);
- post work on the school's website;
- play simulation games at school;
- practice and drilling, such as foreign language learning or mathematics;
- do individual homework on a school computer; and
- use school computers for group work and communicating with other students.

Students rated the frequency they performed each activity on a four point scale—*never or hardly ever, once or twice a month, once or twice a week and every day or almost every day*. Students who performed an activity *every day or almost every day*, or *once or twice a week* were considered frequent users. An index of computer use at school was constructed using the nine activities. Higher scores on the index indicated more frequent use than on average across the OECD.

The mean scores and associated standard errors on the index of computer use at school for selected countries are shown in Table 4.6. Students in Australia, Canada, New Zealand, Hong Kong-China, Finland and Macao-China reported using computers at home for school work more frequently than across the OECD, while students in Japan, Korea, Ireland and Singapore used computers less frequently compared to the OECD average. Australia's mean score on the index for computer use at school was 0.40, which was higher than the OECD average.

**Table 4.6** Computer use at school for selected countries

| Country | All students | |
|---|---|---|
| | Mean index | S.E. |
| **Australia** | 0.40 | 0.02 |
| Canada | 0.22 | 0.02 |
| Finland | 0.11 | 0.02 |
| Ireland | -0.37 | 0.03 |
| Japan | -1.05 | 0.03 |
| Korea | -0.91 | 0.03 |
| New Zealand | 0.15 | 0.02 |
| Hong Kong-China | 0.13 | 0.03 |
| Macao-China | 0.02 | 0.01 |
| Singapore | -0.13 | 0.01 |
| **OECD average-29** | 0.00 | 0.00 |

Figure 4.2 shows the percentage of Australian students and students across the OECD who reported frequently using computers at school for various activities. In Australia, 65 per cent of students reported they frequently browse the Internet for school work compared to 39 per cent of students across the OECD. Almost 40 per cent of Australian students reported they frequently do individual homework on a school computer compared to the OECD average of 18 per cent. Almost 30 per cent of Australian students reported they frequently use email at school and use school computers for group work and communication with other students, while the corresponding proportions for students across the OECD were lower at 19 and 22 per cent respectively. About 20 per cent of Australian students compared to 15 per cent of students across the OECD reported frequently downloading, uploading or browsing material from the school's website.

Fourteen per cent of Australian students reported that they frequently play simulation games at school compared to the OECD average of 10 per cent. Fewer Australian students reported that they frequently use the computer at school for practice and drilling, such as for foreign language learning or mathematics (9%), chat on line at school (8%) and post their work on the school's website (6%), whereas across the OECD, the proportion of students performing these activities frequently was higher.

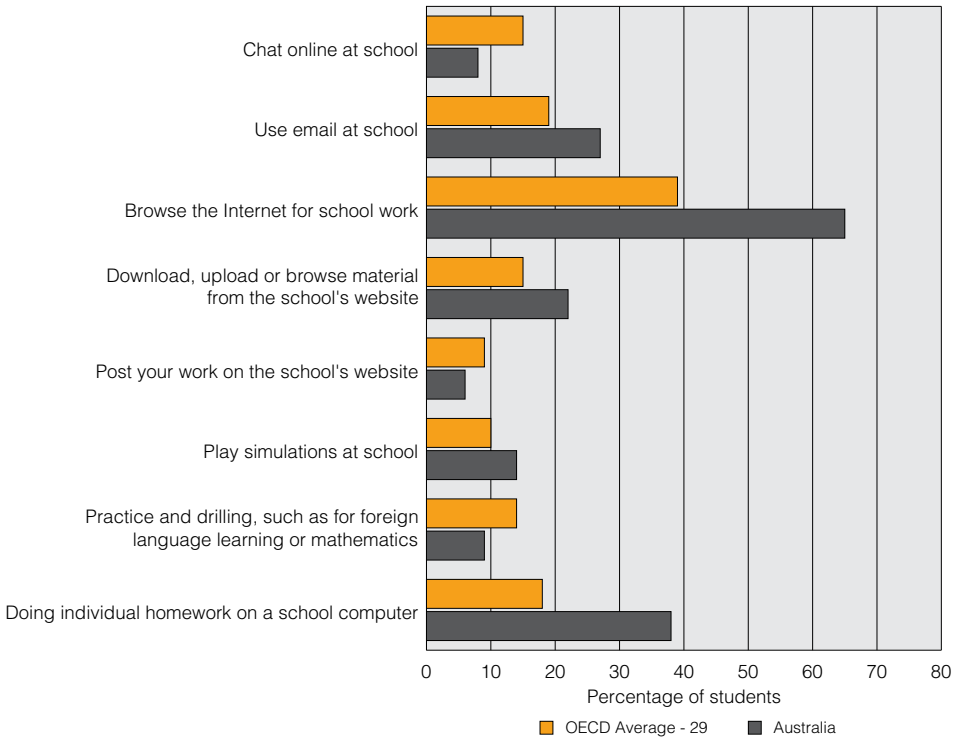



**Figure 4.2** Percentage of students who reported doing the following activities at school frequently, for Australia and the OECD average

Among the selected countries in Table 4.7, the mean score on the computer use index for males in Canada and Finland was significantly higher than that for females, while in New Zealand, the mean score for females was significantly higher than for males. Across the OECD countries[4], there was a significant gender gap, of 0.09, in favour of males. No gender differences were found on the average index scores in Australia. However, significant differences were found between Australian females and males in the way they reported using computers at school for some activities.
A significantly higher proportion of females reported frequently browsing the Internet for school work and using school computers for group work and communication with other students than males. A significantly higher proportion of males than females reported chatting online at school, posting their work on the school's website, doing practice and drilling, and playing simulation games at school (Figure 4.3).

**Table 4.7** Computer use at school for selected countries by gender

| Country | Females | | Males | | Difference | |
|---|---|---|---|---|---|---|
| | Mean index | S.E. | Mean index | S.E. | Diff. (F - M) | S.E. |
| **Australia** | 0.40 | 0.02 | 0.40 | 0.02 | 0.00 | 0.02 |
| Canada | 0.20 | 0.02 | 0.25 | 0.02 | **-0.06** | 0.02 |
| Finland | 0.05 | 0.02 | 0.17 | 0.03 | **-0.12** | 0.02 |
| Ireland | -0.37 | 0.04 | -0.37 | 0.05 | 0.00 | 0.06 |
| Japan | -1.03 | 0.03 | -1.06 | 0.03 | 0.03 | 0.03 |
| Korea | -0.91 | 0.04 | -0.90 | 0.04 | -0.01 | 0.05 |
| New Zealand | 0.20 | 0.02 | 0.10 | 0.02 | **0.10** | 0.03 |
| Hong Kong-China | 0.11 | 0.03 | 0.16 | 0.03 | -0.05 | 0.03 |
| Macao-China | 0.02 | 0.01 | 0.03 | 0.01 | -0.01 | 0.02 |
| Singapore | -0.13 | 0.02 | -0.12 | 0.02 | -0.01 | 0.02 |
| **OECD average-29** | -0.05 | 0.01 | 0.04 | 0.01 | **-0.09** | 0.01 |

Note: Values that are statistically significant are indicated in bold.

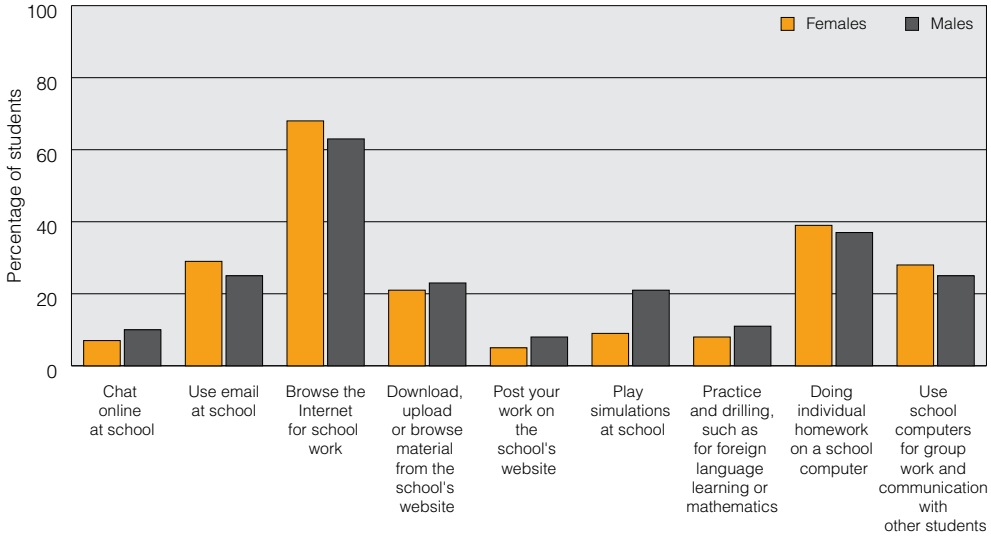



**Figure 4.3** Percentage of students who reported doing the following activities at school frequently by gender

4 The OECD average is based on the 29 countries who responded to this item.

The mean scores on the computer use at school index for each state are shown in Table 4.8. Mean index scores for all states were all higher than the OECD average (of 0.00), indicating that students from each state reported using computers at school more frequently than students across the OECD countries. The mean index scores on the computer use at school index ranged from 0.27 in New South Wales to 0.62 in the Northern Territory.

Although students in Tasmania and the Northern Territory reported using computers at school with similar frequency, students from these two states used computers at school significantly more frequently than students in New South Wales, Victoria, Queensland, South Australia and Western Australia. Students in the Australian Capital Territory reported using computers at school significantly more frequently than students in New South Wales, Queensland and Western Australia. Students in New South Wales used computers at school significantly more frequently than students in Victoria, Queensland and South Australia. There were also significant differences between students in Victoria and Western Australia, and students in South Australia and Western Australia, in the way they used computers at school.

There were higher proportions of students from Tasmania and the Northern Territory who reported chatting online at school and using email and browsing the Internet for school work than in the other states. Tasmania also had the highest proportion of students who played simulation games at school on a frequent basis, while the Northern Territory had the highest proportion of students frequently doing practice and drill work, and individual homework on a school computer. This could possibly go some way to make up for the lower proportions of students in these states with access to computers and the Internet at home. Students from the Australian Capital Territory and Victoria had the highest proportion of students who downloaded, uploaded or browsed material from the school's website.

**Table 4.8** Computer use at school index and percentage of students who reported doing school-related activities frequently at school by state

| State | Computer use at school | | Chat online at school | | Use email at school | | Browse the Internet for school work | | Download, upload or browse material from the school's website | | Post your work on the school's website | | Play simulation games at school | | Practice and drilling | | Doing individual homework on a school computer | | Use school computers for group work and communication with other students | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean index | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. |
| ACT | 0.58 | 0.03 | 9 | 0.9 | 36 | 1.5 | 69 | 2.9 | 27 | 1.9 | 8 | 1.0 | 18 | 1.1 | 13 | 1.3 | 45 | 1.6 | 31 | 1.5 |
| NSW | 0.27 | 0.03 | 7 | 0.8 | 19 | 1.7 | 55 | 1.7 | 18 | 1.1 | 6 | 0.6 | 14 | 0.9 | 9 | 0.8 | 28 | 1.2 | 23 | 1.3 |
| VIC | 0.53 | 0.03 | 9 | 1.3 | 35 | 2.9 | 70 | 1.9 | 27 | 2.2 | 8 | 1.1 | 16 | 1.3 | 10 | 0.9 | 43 | 1.3 | 31 | 1.5 |
| QLD | 0.41 | 0.06 | 8 | 1.2 | 32 | 4.4 | 69 | 2.0 | 24 | 3.7 | 7 | 1.9 | 11 | 0.8 | 10 | 2.1 | 41 | 1.8 | 28 | 2.1 |
| SA | 0.5 | 0.03 | 7 | 1.0 | 25 | 3.1 | 79 | 1.6 | 20 | 1.2 | 6 | 0.7 | 13 | 1.4 | 9 | 1.4 | 53 | 1.8 | 29 | 1.5 |
| WA | 0.33 | 0.07 | 11 | 2.0 | 21 | 2.9 | 63 | 3.3 | 17 | 2.0 | 4 | 0.7 | 17 | 2.2 | 8 | 1.0 | 38 | 2.7 | 23 | 1.9 |
| TAS | 0.61 | 0.02 | 18 | 1.2 | 44 | 1.8 | 76 | 1.3 | 19 | 1.0 | 6 | 1.0 | 25 | 1.4 | 9 | 1.0 | 43 | 1.9 | 34 | 1.6 |
| NT | 0.62 | 0.03 | 15 | 1.4 | 45 | 2.4 | 77 | 2.0 | 18 | 2.0 | 7 | 1.0 | 18 | 1.6 | 17 | 1.6 | 56 | 2.0 | 32 | 2.4 |

Students in government schools reported using computers at school significantly less frequently than students in Catholic or independent schools, who used computers at school at similar rates (Table 4.9).

There was a significantly higher proportion of students in independent schools who used email at school, downloaded, uploaded or browsed material from the school's website, and used the school computers for group work and communication with other students compared to students in Catholic or government schools. There was also a significantly higher proportion of students in Catholic schools who performed these activities at school on a frequent basis compared to students in government schools.

There were significantly higher proportions of students in Catholic or independent schools who reported browsing the Internet for school work or doing individual homework on a school computer frequently compared to students in government schools. The proportion of students who posted their work on the school's website or played simulation games at school was significantly higher in independent schools than in government schools.

**Table 4.9** Computer use at school index and percentage of students who reported doing school-related activities frequently at school by school sector

| Sector | Computer use at school | | Chat online at school | | Use email at school | | Browse the Internet for school work | | Download, upload or browse material from the school's website | | Post your work on the school's website | | Play simulation games at school | | Practice and drilling | | Doing individual homework on a school computer | | Use school computers for group work and communication with other students | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean index | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. |
| Government | 0.29 | 0.02 | 7 | 0.5 | 20 | 1.6 | 59 | 1.2 | 16 | 1.4 | 6 | 0.7 | 16 | 0.7 | 9 | 0.8 | 33 | 0.9 | 23 | 0.9 |
| Catholic | 0.54 | 0.03 | 10 | 1.5 | 32 | 3.0 | 72 | 1.4 | 27 | 2.0 | 6 | 0.8 | 14 | 1.0 | 9 | 0.9 | 43 | 1.5 | 30 | 1.5 |
| Independent | 0.61 | 0.05 | 10 | 1.4 | 45 | 4.0 | 76 | 2.4 | 35 | 2.8 | 9 | 1.5 | 11 | 1.3 | 11 | 1.1 | 48 | 1.9 | 36 | 2.4 |

The mean scores on the computer use at school index for schools in different geographic locations are shown in Table 4.10. Students in provincial schools achieved a mean score of 0.36, which was significantly lower than students in remote schools with a mean score of 0.47.

A significantly higher proportion of students from remote schools reported doing individual homework on a school computer on a frequent basis compared to students in provincial schools, and significantly more students from remote schools reported browsing the Internet for school work or using practice and drill software compared to students in metropolitan or provincial schools.

Students in provincial schools reported doing homework on a school computer and playing simulation games at school more frequently than students in metropolitan areas.

A significantly higher proportion of students in metropolitan schools used email at school more frequently than students in provincial schools. There was also a significantly higher proportion of students in metropolitan schools who reported frequently downloading, uploading or browsing material from the school's website than students in provincial or remote schools. Significantly higher proportions of students in metropolitan and remote schools reported frequently using school computers for group work and communication with other students than students in provincial areas.

**Table 4.10** Computer use at school index and percentage of students who reported doing school-related activities frequently at school by geographic location

| Geographic location | Computer use at school | | Chat online at school | | Use email at school | | Browse the Internet for school work | | Download, upload or browse material from the school's website | | Post your work on the school's website | | Play simulations at school | | Practice and drilling | | Doing individual homework on a school computer | | Use school computers for group work and communication with other students | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean index | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. |
| Metropolitan | 0.42 | 0.03 | 8 | 0.7 | 30 | 1.8 | 65 | 1.1 | 24 | 1.3 | 7 | 0.6 | 13 | 0.6 | 9 | 0.8 | 39 | 0.8 | 28 | 0.9 |
| Provincial | 0.36 | 0.02 | 8 | 0.8 | 20 | 1.9 | 66 | 1.4 | 17 | 1.2 | 5 | 0.7 | 17 | 0.9 | 9 | 0.8 | 35 | 1.1 | 24 | 1.2 |
| Remote | 0.47 | 0.02 | 13 | 3.6 | 26 | 2.6 | 77 | 3.0 | 17 | 1.5 | 5 | 1.9 | 19 | 4.2 | 15 | 1.7 | 46 | 2.4 | 33 | 3.2 |

The mean scores for Indigenous and non-Indigenous students on the use of computers at school index were not statistically different (Table 4.11). There were significantly more Indigenous students than non-Indigenous students who reported frequently playing simulation games at school.

**Table 4.11** Computer use at school index and percentage of students who reported doing school-related activities frequently at school by Indigenous background

| Indigenous background | Computer use at school | | Chat online at school | | Use email at school | | Browse the Internet for school work | | Download, upload or browse material from the school's website | | Post your work on the school's website | | Play simulations at school | | Practice and drilling | | Doing individual homework on a school computer | | Use school computers for group work and communication with other students | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean index | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. |
| Indigenous | 0.38 | 0.03 | 10 | 1.3 | 23 | 2 | 64 | 1.9 | 19 | 1.4 | 7 | 1.2 | 25 | 1.7 | 11 | 1.1 | 36 | 1.8 | 28 | 1.9 |
| Non-Indigenous | 0.40 | 0.02 | 8 | 0.6 | 28 | 1.5 | 65 | 0.9 | 22 | 1.1 | 6 | 0.5 | 14 | 0.5 | 9 | 0.7 | 38 | 0.7 | 27 | 0.8 |

Students from higher socioeconomic backgrounds reported using computers for school more frequently than students from lower socioeconomic backgrounds. Significant differences were found between students in each of the socioeconomic quartiles (Table 4.12).

A significantly higher proportion of students in the highest socioeconomic quartile reported using email at school, downloading, uploading or browsing material from the school's website, playing simulations at school, doing individual homework on a school computer, and using school computers for group work and communication with other students more frequently than students in the lowest socioeconomic quartile.

**Table 4.12** Computer use at school index and percentage of students who reported doing school-related activities frequently at school by socioeconomic background

| Socioeconomic background | Computer use at school | | Chat online at school | | Use email at school | | Browse the Internet for school work | | Download, upload or browse material from the school's website | | Post your work on the school's website | | Play simulations at school | | Practice and drilling | | Doing individual homework on a school computer | | Use school computers for group work and communication with other students | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean index | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. |
| Lowest quartile | 0.28 | 0.02 | 8 | 0.6 | 21 | 1.3 | 58 | 1.4 | 15 | 0.8 | 5 | 0.6 | 16 | 0.9 | 8 | 0.6 | 31 | 1.0 | 23 | 1.0 |
| Second quartile | 0.36 | 0.02 | 9 | 0.7 | 24 | 1.4 | 64 | 1.1 | 18 | 1.0 | 5 | 0.5 | 15 | 0.8 | 9 | 0.7 | 36 | 1.2 | 25 | 1.0 |
| Third quartile | 0.43 | 0.03 | 9 | 0.9 | 29 | 1.7 | 67 | 1.2 | 23 | 1.3 | 6 | 0.6 | 14 | 0.8 | 9 | 0.8 | 39 | 1.1 | 28 | 1.0 |
| Highest quartile | 0.56 | 0.03 | 7 | 0.8 | 36 | 2.4 | 72 | 1.2 | 31 | 1.9 | 8 | 1.0 | 12 | 0.7 | 11 | 1.1 | 45 | 1.3 | 31 | 1.7 |

## Summary

Access to computers and the Internet at school was very high for Australian students. While much of the time in school was reported to be searching the Internet for school work, or doing individual work on the computer, there was also a substantial amount of time spent on email and chatting online.

Students' access to digital technologies was found to be ameliorated to some extent at state level, where in some states with lower levels of access to computers at home there was greater access to computers and the Internet at school. In terms of socioeconomic background, however, this was not the case, and students from an advantaged socioeconomic background were found to have more access and use computers at school to a greater extent than students from disadvantaged.

The next chapter of this report examines students' attitudes and confidence in using ICT.

Chapter

5

# Students' attitudes and confidence in using information and communication technologies

The use of computers can be strongly affected by how students feel about computers, and how confident they are in using computers and in performing particular ICT tasks. Being interested and feeling confident using ICT may also affect the frequency and degree of engagement in learning through ICT. This chapter examines the attitudes and confidence that students reported in their use of ICT.

## Key findings

- Australian students have a significantly less positive attitude to computers than on average across the OECD;
- Males were found to hold significantly more positive attitudes towards computers than females. Australian females reported the least positive attitudes towards computers of females in all participating countries;
- Students from the most disadvantaged backgrounds reported the least positive attitudes towards computers;
- Australian students were very confident about performing high-level computer tasks, and male students reported significantly higher levels of confidence than females;
- Students in New South Wales reported the highest level of confidence in performing high-level tasks across Australia;
- Confidence in performing these tasks was found to be the lowest amongst students from disadvantaged backgrounds, and highest amongst those from advantaged backgrounds.

## Students' attitudes towards computers

In PISA 2009, students' attitudes towards computers were measured with the following four statements:

- It is very important to me to work with a computer.
- I think playing or working with a computer is really fun.
- I use a computer because I am very interested in computers.
- I lose track of time when I am working with the computer.

Students rated their level of agreement with each item on a four-point Likert scale (strongly disagree, disagree, agree and strongly agree). Students are considered to have positive attitudes towards computers if they agreed or strongly agreed with the statements. When interpreting the results for attitudes, it is important to remember that the data is generated by students' subjective self-report and not from information that is directly measured or observed. Students across countries may not interpret or respond to the survey questions in the same way.

## Attitudes towards computers from an international perspective

Table 5.1 shows the proportion of students in a selection of the participating countries agreeing or strongly agreeing to each of the above statements. Whilst levels of agreement with the statements about working with computers being important and fun are high, there is a much lower level of agreement with the other statements.

Eighty per cent of Australian students agreed that it is very important to work with a computer. This is obviously quite a high proportion, but is still statistically significantly lower than the average over the OECD, and than the proportion of students in countries such as Macao-China, Finland and Singapore who agreed with this item.

Compared to the OECD average[1], Australian students showed a significantly and substantially lower motivation to work with computers purely for interest, with fewer than half of Australian students agreeing with this statement. In comparison, around 80 percent of students in Canada, Finland, Hong-Kong and Macao-China reported using a computer because of a personal interest. The proportions of Australian students who agreed that playing or working on computers was fun, and agreed that they tended to lose track of time when they work on the computer (sometimes used as an indicator of 'flow' or engagement with a task) were similar to those found in other participating countries.

**Table 5.1** Attitudes towards computers items by country[a]

| Country | It is very important to me to work with a computer | | I think playing or working with a computer is really fun | | I use a computer because I am very interested in computers | | I lose track of time when I am working with the computer | |
|---|---|---|---|---|---|---|---|---|
| | % | S.E. | % | S.E. | % | S.E. | % | S.E. |
| **Australia** | 80 | 0.5 | 85 | 0.4 | 48 | 0.6 | 66 | 0.6 |
| Canada | 83 | 0.5 | 89 | 0.3 | 79 | 0.4 | 68 | 0.5 |
| Finland | 88 | 0.5 | 88 | 0.5 | 49 | 0.8 | 68 | 0.8 |
| Hong Kong-China | 86 | 0.5 | 93 | 0.4 | 79 | 0.7 | 51 | 0.8 |
| Ireland | 75 | 0.8 | 89 | 0.5 | 76 | 0.8 | 77 | 0.8 |
| Japan | 77 | 0.7 | 82 | 0.6 | 67 | 0.8 | 62 | 0.8 |
| Korea | 81 | 0.6 | 88 | 0.5 | 59 | 1.0 | 66 | 0.8 |
| Macao-China | 89 | 0.5 | 93 | 0.3 | 82 | 0.5 | 57 | 0.6 |
| New Zealand | 79 | 0.7 | 89 | 0.4 | 52 | 0.9 | 66 | 0.8 |
| Singapore | 88 | 0.5 | 94 | 0.3 | 64 | 0.6 | 66 | 0.7 |
| **OECD average-28** | 83 | 0.1 | 87 | 0.1 | 76 | 0.1 | 69 | 0.1 |

[a] Percentages in tables in this chapter represent the proportion of students agreeing or strongly agreeing to the statements

The attitudes towards computers index was created using the four items, with values standardised so that the mean of zero represented the mean of the OECD student population. A positive score indicates an attitude towards computers that is more positive on average across OECD countries, whereas a negative score indicates an attitude that is less positive than the OECD average.

Not surprisingly, given the lower levels of agreement to each of the individual statements compared to the OECD average, Australian students scored significantly lower than the OECD average on this index, as did students in Hong Kong–China, Korea, Finland, Japan and New Zealand. Australia's score on this index was, in fact, the lowest of all participating countries.

Scores on the attitudes towards computers index were then calculated separately for male and female students, in order to examine potential gender differences in how students feel about ICT. Only in Canada, Ireland and Japan were there no gender differences in attitudes towards computers. Where gender differences were apparent, it was generally males who indicated more positive attitudes towards working with computers. This was particularly evident in Australia, Finland and Korea, and to a lesser extent in New Zealand and Singapore (see Figure 5.1). In five of

1 Based on 28 OECD countries. For more information about the OECD average refer to the Reader's Guide.

the 45 participating countries – Israel, Spain, Jordan, Qatar and Thailand – females scored higher on the attitudes towards computers index than their male peers. Australian students actually scored the lowest on this index of all participating countries[2], with Australian females exhibiting the least positive attitudes of females in all other participating countries, and males scoring the lower on this index than males in all countries, other than Japan and Turkey.

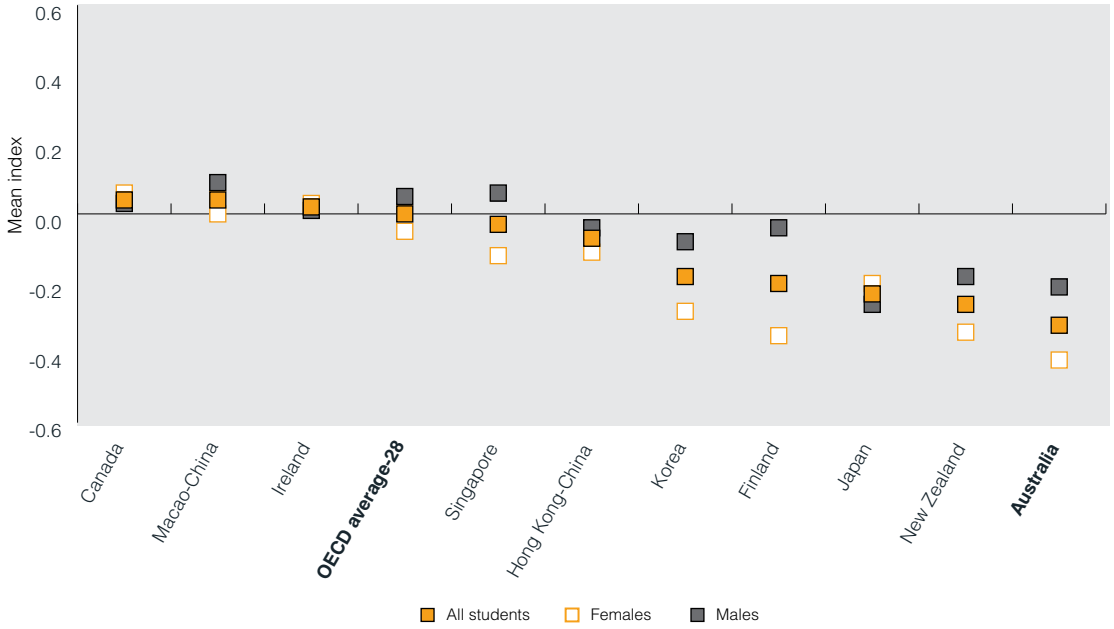



**Figure 5.1** Attitudes towards computers for selected countries, with gender differences

## Attitudes towards computers across Australian states

Attitudes towards computers did not vary greatly across the Australian states and territories (Table 5.2). Compared to the other jurisdictions, a higher proportion of students in the ACT saw the importance of working with computers. Agreement with this item was lower in Western Australia, Tasmania and the Northern Territory, although it should be noted that more than three-quarters of students in these jurisdictions did perceive the importance of working with computers.

**Table 5.2** Attitudes towards computers by state

| State | It is very important to me to work with a computer | | I think playing or working with a computer is really fun | | I use a computer because I am very interested | | I lose track of time when I am working with the computer | |
|---|---|---|---|---|---|---|---|---|
| | % | S.E. | % | S.E. | % | S.E. | % | S.E. |
| ACT | 88 | 0.7 | 87 | 0.9 | 48 | 1.9 | 66 | 1.4 |
| NSW | 80 | 0.8 | 86 | 0.8 | 50 | 1.2 | 66 | 0.9 |
| VIC | 79 | 1.3 | 86 | 1.1 | 48 | 1.1 | 65 | 1.1 |
| QLD | 82 | 0.9 | 84 | 0.9 | 50 | 1.2 | 66 | 1.5 |
| SA | 84 | 1.1 | 85 | 1.1 | 48 | 1.6 | 66 | 1.6 |
| WA | 76 | 1.8 | 84 | 1.3 | 44 | 2.2 | 68 | 1.6 |
| TAS | 78 | 1.2 | 80 | 1.1 | 41 | 1.4 | 61 | 1.4 |
| NT | 77 | 1.8 | 85 | 1.5 | 47 | 2.3 | 67 | 1.9 |
| Australia | 80 | 0.5 | 85 | 0.4 | 48 | 0.6 | 66 | 0.6 |

2 A full list of participating countries and their scores on all attitudinal variables can be found in the OECD Report: PISA 2009: Students on line (2011).

Figure 5.2 shows the Attitudes towards Computers index scores, by state and by gender. While males consistently scored significantly higher on this index in all states, the differences were largest in Victoria, the Northern Territory, Western Australia and Tasmania.

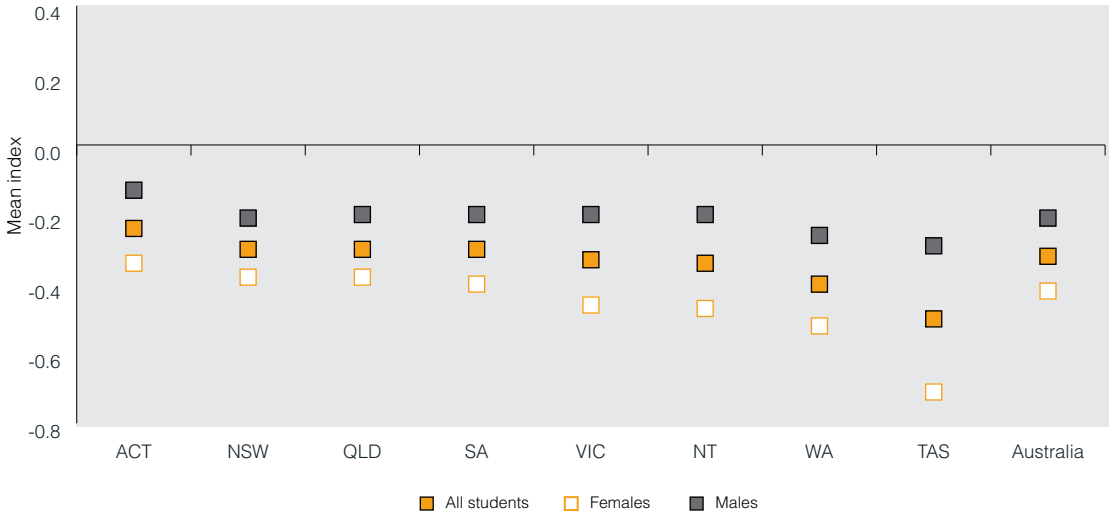



**Figure 5.2** Attitudes towards computers by state, with gender differences

## Indigenous students' attitudes towards computers

Table 5.3 presents the proportion of Indigenous and non-Indigenous students who agreed or strongly agreed to the attitudes towards computers items. Overall, similar proportions of Indigenous and non-Indigenous students agreed with these items, apart from the item pertaining to the importance of working with a computer. A much lower proportion of Indigenous students than non-Indigenous students agreed that working with a computer was important to them.

**Table 5.3** Attitudes towards computers by Indigenous background

| Indigenous background | It is very important to me to work with a computer | | I think playing or working with a computer is really fun | | I use a computer because I am very interested | | I lose track of time when I am working with the computer | |
|---|---|---|---|---|---|---|---|---|
| | % | S.E. | % | S.E. | % | S.E. | % | S.E. |
| Indigenous | 69 | 1.88 | 83 | 1.65 | 49 | 1.95 | 62 | 1.97 |
| non-Indigenous | 80 | .47 | 85 | .44 | 48 | .58 | 66 | .58 |

Figure 5.3 presents the average scores for Indigenous and non-Indigenous students on the attitudes towards computers index. There was no gender difference in attitudes towards computers among Indigenous students, however, among non-Indigenous students, males held significantly more positive attitudes towards working with computers than did female students. While the lack of gender differences in the Indigenous population could be seen as positive, the average scores on the index are very low, and reflect both a lack of interest in using computers (although using computers is still perceived as "fun") and a lower perception of the importance of computers.

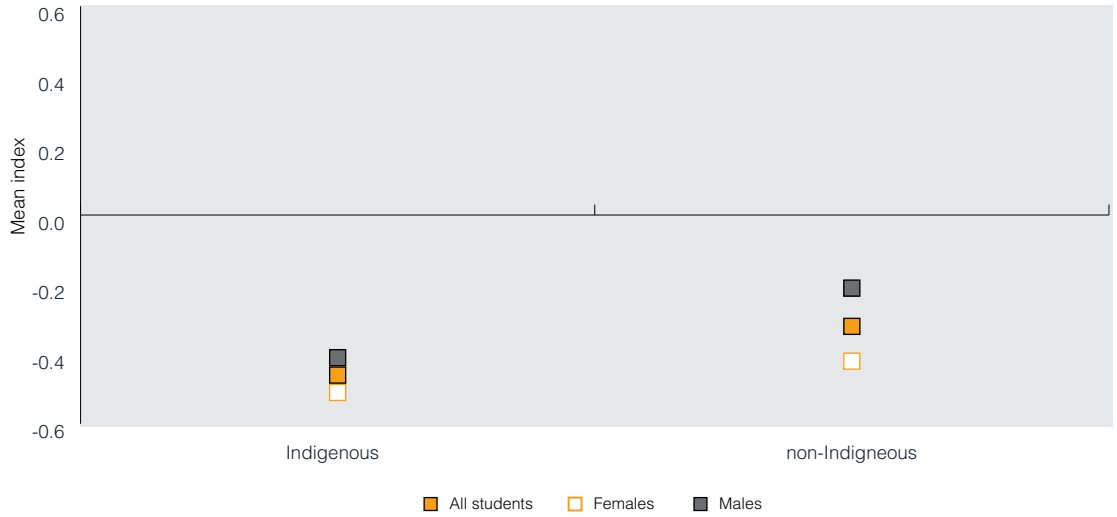



**Figure 5.3** Attitudes towards computers by Indigenous background, with gender differences

## Attitudes towards computers and socioeconomic background

As seen in Table 5.4, the proportion of students from higher levels of socioeconomic background that agreed with each of the items tended to be higher than the proportions of students from lower socioeconomic background who endorsed the items, however, the difference was only significant for the first item – the importance of working with computers. This is of concern, as it may reflect a lack of understanding of the workforce of the future by students from poorer backgrounds, and it is these students that will need to have higher levels of training than in the past as there will be fewer jobs that do not require computer use.

**Table 5.4** Attitudes towards computers by socioeconomic background

| Socioeconomic background | It is very important to me to work with a computer | | I think playing or working with a computer is really fun | | I use a computer because I am very interested | | I lose track of time when I am working with the computer | |
|---|---|---|---|---|---|---|---|---|
| | % | S.E. | % | S.E. | % | S.E. | % | S.E. |
| Lowest quartile | 72 | .86 | 82 | .89 | 47 | 1.05 | 67 | .90 |
| Second quartile | 79 | .83 | 85 | .62 | 47 | .94 | 65 | 1.03 |
| Third quartile | 83 | .70 | 86 | .65 | 48 | 1.00 | 66 | 1.00 |
| Highest quartile | 86 | .62 | 88 | .82 | 51 | .98 | 66 | .99 |

Figure 5.4 shows the distribution by gender and socioeconomic background of the attitudes towards computers index. It is worth noting that gender differences in favour of males are apparent at all levels of socioeconomic background, but are greater at the highest level.

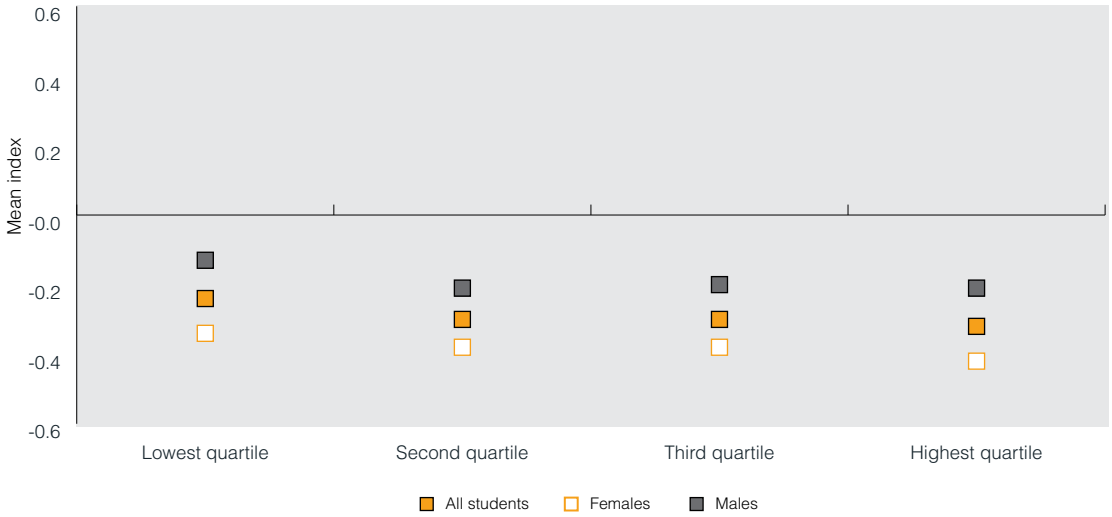



**Figure 5.4** Attitudes towards computers by socioeconomic background

## Attitudes towards computers and performance

Table 5.5 presents the average digital reading performance scores of students grouped according to their score on the Attitudes towards Computer Index. While attitudes towards computers may have an influence on a student's ongoing engagement with using them, the evidence presented in Table 5.5 indicate that it is only among students with the least positive attitudes towards computers that digital reading performance is different to that of other students. These students achieved at a significantly lower level than students with more positive attitudes, and it is unfortunate that this group of students is likely to include Indigenous and low socioeconomic background students.

**Table 5.5** Digital reading literacy performance by quartiles on the attitudes towards computer index for Australia

| Lowest quartile | | Second quartile | | Third quartile | | Highest quartile | |
|---|---|---|---|---|---|---|---|
| Mean index score | S.E. | Mean index score | S.E. | Mean index score | S.E. | Mean index score | S.E. |
| 525 | 3.3 | 547 | 3.1 | 549 | 3.5 | 549 | 3.6 |

These data are presented graphically in Figure 5.5, along with the data for males and females separately. The gap in achievement between males and females is clearly much larger amongst students with poor attitudes towards computers than amongst those with more positive attitudes, but it is also clear that even a slightly more positive attitude is related to higher achievement scores for both male and female students. While there was still a significant difference in digital reading performance between males and females, the difference was much smaller (18 score points compared to 40 score points) among students with more positive attitudes towards computers.

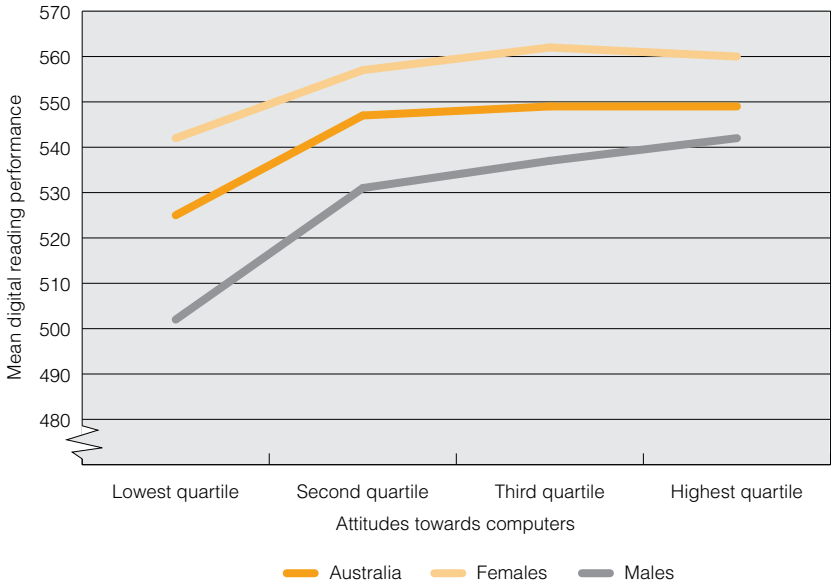



**Figure 5.5** Digital reading literacy performance by index of attitudes towards computers

## Students' confidence in performing high-level tasks on computers

In PISA 2009, students' confidence in performing a number of high-level ICT tasks was investigated. Students rated their confidence in their ability to perform each task from the following list on a four-point scale (I can do this very well by myself, I can do this with help from someone, I know what this means but I cannot do it, and I don't know what this means):

- Edit digital photographs or other graphical images.
- Create a database (e.g. using Microsoft Access).
- Use a spreadsheet to plot a graph.
- Create a presentation (e.g. using Microsoft PowerPoint).
- Create a multi-media presentation (with sound, pictures and/or video).

### Confidence in performing high-level tasks on computers from an international perspective

For most Australian students, creating a presentation was the task that most students approached with a high level of confidence. This was found to be true, although to a lesser extent, on average across OECD countries, but was certainly not the case in all countries. While 90 per cent of Australian students were confident about this task, only a little over 30 per cent of students in Japan expressed the same level of confidence (Table 5.6). Creating a database was the task that Australian students exhibited least confidence in, and this was consistent across other OECD countries. In Japan and Korea even smaller proportions of students were confident about this task, indicating that it is not likely covered in the curricula of most countries and that it is perhaps not a task that students would undertake on their own.

**Table 5.6** Percentage of students who indicated they could perform high-level tasks very well by themselves or with help from someone by country

| Country | Edit digital photographs or other graphical images | | | | Create a database | | | | Use a spreadsheet to plot a graph | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | I can do this very well by myself | | I can do this with help from someone | | I can do this very well by myself | | I can do this with help from someone | | I can do this very well by myself | | I can do this with help from someone | |
| | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. |
| **Australia** | 59 | 0.6 | 28 | 0.5 | 27 | 0.5 | 31 | 0.4 | 57 | 0.6 | 28 | 0.4 |
| Canada | 61 | 0.5 | 25 | 0.5 | 29 | 0.5 | 28 | 0.5 | 51 | 0.6 | 28 | 0.5 |
| Finland | 54 | 0.9 | 34 | 0.8 | 16 | 0.7 | 31 | 0.7 | 31 | 0.8 | 35 | 0.8 |
| Ireland | 59 | 1.0 | 25 | 0.7 | 31 | 0.9 | 28 | 0.7 | 47 | 1.3 | 27 | 0.9 |
| Japan | 34 | 0.8 | 38 | 0.7 | 15 | 0.6 | 31 | 0.6 | 31 | 0.8 | 42 | 0.8 |
| Korea | 66 | 0.8 | 22 | 0.8 | 13 | 0.5 | 38 | 0.9 | 34 | 1.0 | 36 | 0.8 |
| New Zealand | 52 | 0.8 | 30 | 0.9 | 23 | 0.7 | 28 | 0.8 | 52 | 0.8 | 29 | 0.6 |
| Hong Kong-China | 59 | 0.8 | 32 | 0.8 | 29 | 0.7 | 39 | 0.6 | 53 | 1.1 | 36 | 0.9 |
| Macao-China | 48 | 0.6 | 36 | 0.5 | 23 | 0.5 | 36 | 0.6 | 31 | 0.6 | 36 | 0.6 |
| Singapore | 42 | 0.7 | 39 | 0.6 | 19 | 0.6 | 34 | 0.7 | 28 | 0.6 | 38 | 0.6 |
| **OECD average-29** | 60 | 0.1 | 25 | 0.1 | 27 | 0.1 | 32 | 0.1 | 52 | 0.2 | 28 | 0.1 |

| Country | Create a presentation | | | | Create a multi-media presentation | | | |
|---|---|---|---|---|---|---|---|---|
| | I can do this very well by myself | | I can do this with help from someone | | I can do this very well by myself | | I can do this with help from someone | |
| | % | S.E. | % | S.E. | % | S.E. | % | S.E. |
| **Australia** | 90 | 0.4 | 7 | 0.3 | 61 | 0.5 | 28 | 0.4 |
| Canada | 80 | 0.5 | 13 | 0.4 | 56 | 0.6 | 29 | 0.5 |
| Finland | 60 | 1.4 | 25 | 0.9 | 41 | 0.8 | 35 | 0.7 |
| Ireland | 60 | 1.3 | 21 | 0.7 | 48 | 1.1 | 27 | 0.8 |
| Japan | 31 | 0.9 | 35 | 0.7 | 18 | 0.6 | 32 | 0.7 |
| Korea | 64 | 1.3 | 24 | 1.0 | 37 | 0.9 | 38 | 0.7 |
| New Zealand | 80 | 0.7 | 13 | 0.5 | 49 | 0.9 | 34 | 0.8 |
| Hong Kong-China | 82 | 0.8 | 15 | 0.7 | 57 | 0.9 | 35 | 0.9 |
| Macao-China | 70 | 0.5 | 19 | 0.5 | 47 | 0.7 | 37 | 0.6 |
| Singapore | 82 | 0.6 | 14 | 0.5 | 49 | 0.8 | 38 | 0.7 |
| **OECD average-29** | 71 | 0.2 | 17 | 0.1 | 54 | 0.2 | 29 | 0.1 |

Students' ratings of confidence in their ability to perform these high-level ICT tasks were then used to create the index of Self-Confidence in ICT. Figure 5.5 graphs the average scores on this index for a selection of countries, for all students and for males and females separately.

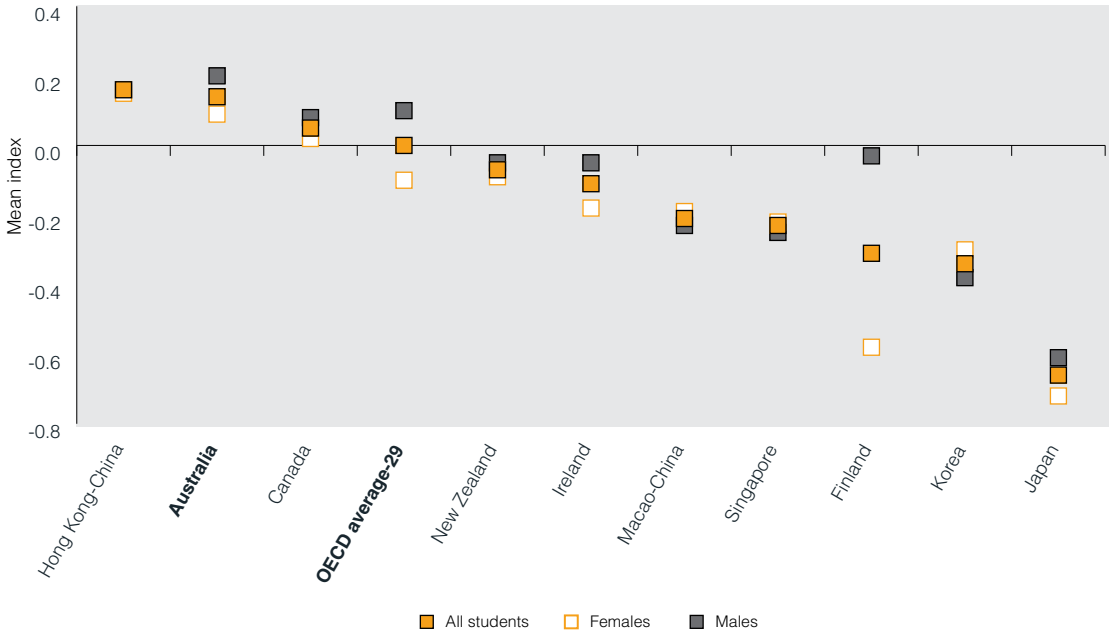



**Figure 5.6** Students' confidence in performing high-level tasks on computers for selected countries, with gender differences

Of interest in Figure 5.6 is the great variation across countries, with large gender differences in self-confidence found in some countries but not in others. In Australia, for example, there was a small (but still statistically significant) difference in the index scores of male and female students, whereas in Finland the gap was exceptionally wide, with male students indicating a substantially higher level of confidence than female students. In all countries in which a significant gender difference was found, it was male students who exhibited higher levels of confidence. There were no gender difference in self-confidence in ICT in New Zealand, Hong Kong – China, Macao – China, or Singapore.

## Confidence in performing high-level tasks on computers across Australian states

Table 5.7 presents the proportions of students from each of the Australian states and territories who were confident in their ability to undertake each of the ICT tasks, on their own or with assistance. There were few differences between the jurisdictions, although a substantially higher proportion of students in New South Wales were confident about creating a database – higher than both the Australian average and the OECD average. Overall, students in every state showed confidence in performing these tasks, either alone or with some assistance.

**Table 5.7** Percentage of students who indicated they could perform high-level tasks very well by themselves or with help from someone, by state

| State | Edit digital photographs or other graphical images | | | | Create a database | | | | Use a spreadsheet to plot a graph | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | I can do this very well by myself | | I can do this with help from someone | | I can do this very well by myself | | I can do this with help from someone | | I can do this very well by myself | | I can do this with help from someone | |
| | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. |
| ACT | 58 | 1.3 | 28 | 1.3 | 23 | 1.5 | 32 | 1.2 | 58 | 2.3 | 30 | 1.9 |
| NSW | 61 | 1.2 | 27 | 1.0 | 36 | 1.2 | 33 | .9 | 61 | 1.3 | 27 | .9 |
| VIC | 58 | 1.4 | 30 | 0.9 | 23 | 1.1 | 31 | 1.1 | 52 | 1.4 | 30 | 1.0 |
| QLD | 59 | 0.9 | 28 | 0.9 | 25 | 1.3 | 30 | .9 | 59 | 1.7 | 26 | .9 |
| SA | 54 | 1.5 | 32 | 1.2 | 21 | 1.2 | 30 | 1.3 | 56 | 1.8 | 29 | 1.2 |
| WA | 59 | 1.4 | 27 | 1.2 | 24 | 1.3 | 31 | 1.5 | 51 | 2.4 | 29 | 1.6 |
| TAS | 59 | 2.2 | 29 | 2.0 | 25 | 1.9 | 30 | 1.4 | 50 | 2.2 | 32 | 1.6 |
| NT | 54 | 3.1 | 31 | 2.5 | 21 | 1.4 | 26 | 1.5 | 59 | 2.2 | 27 | 1.7 |

| State | Create a presentation | | | | Create a multi-media presentation | | | |
|---|---|---|---|---|---|---|---|---|
| | I can do this very well by myself | | I can do this with help from someone | | I can do this very well by myself | | I can do this with help from someone | |
| | % | S.E. | % | S.E. | % | S.E. | % | S.E. |
| ACT | 91 | 1.6 | 6.9 | 1.1 | 58 | 2.7 | 31 | 2.3 |
| NSW | 90 | .7 | 5.9 | .4 | 63 | 1.1 | 28 | .9 |
| VIC | 91 | .8 | 6.1 | .6 | 61 | 1.2 | 29 | 1.0 |
| QLD | 89 | .9 | 7.4 | .7 | 63 | 1.1 | 27 | 1.0 |
| SA | 89 | .8 | 7.3 | .6 | 59 | 1.8 | 31 | 1.4 |
| WA | 89 | 1.3 | 7.3 | .9 | 58 | 1.5 | 29 | 1.1 |
| TAS | 88 | .8 | 8.1 | .8 | 59 | 1.6 | 30 | 1.7 |
| NT | 91 | 1.1 | 5.6 | .9 | 65 | 2.5 | 24 | 1.9 |

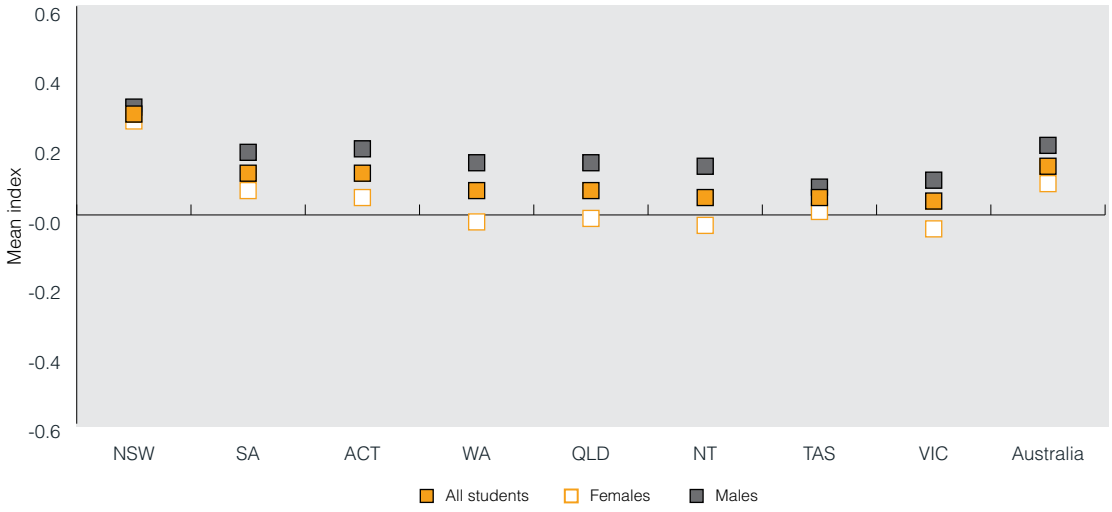



**Figure 5.7** Students' confidence in performing high-level tasks on computers by state, with gender differences

As can be seen in Figure 5.7, students in New South Wales reported significantly higher levels of self-confidence in performing high-level ICT tasks, with no gender difference apparent among students in this state. There was no significant gender difference in self-confidence among students in the Northern Territory either, but this is primarily an effect of the larger standard errors for estimates in this state. In all other states, male students reported significantly higher levels of confidence in ICT on average than did females.

## Confidence in performing high-level tasks on computers by Indigenous background

Further analysis was conducted to examine the confidence levels of Indigenous and non-Indigenous students on these tasks, and the percentage agreement on each is shown in Table 5.8.

The major differences between Indigenous and non-Indigenous students were in the tasks "using a spreadsheet to plot a graph" and "create a presentation", for which Indigenous students reported significantly lower levels of confidence than non-Indigenous students.

**Table 5.8** Percentage of students who indicated they could perform high-level tasks very well by themselves or with help from someone by Indigenous background

| Indigenous background | Edit digital photographs or other graphical images | | | | Create a database | | | | Use a spreadsheet to plot a graph | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | I can do this very well by myself | | I can do this with help from someone | | I can do this very well by myself | | I can do this with help from someone | | I can do this very well by myself | | I can do this with help from someone | |
| | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. |
| Indigenous | 57 | 2.4 | 27 | 2.0 | 27 | 1.7 | 30 | 1.8 | 44 | 2.4 | 31 | 1.8 |
| non-Indigenous | 59 | 0.7 | 29 | 0.5 | 27 | 0.6 | 31 | 0.5 | 57 | 0.6 | 28 | 0.4 |

| Indigenous background | Create a presentation | | | | Create a multi-media presentation | | | |
|---|---|---|---|---|---|---|---|---|
| | I can do this very well by myself | | I can do this with help from someone | | I can do this very well by myself | | I can do this with help from someone | |
| | % | S.E. | % | S.E. | % | S.E. | % | S.E. |
| Indigenous | 79 | 2.0 | 13 | 1.6 | 56 | 1.8 | 29 | 1.9 |
| non-Indigenous | 90 | 0.4 | 6 | 0.3 | 61 | 0.5 | 28 | 0.4 |

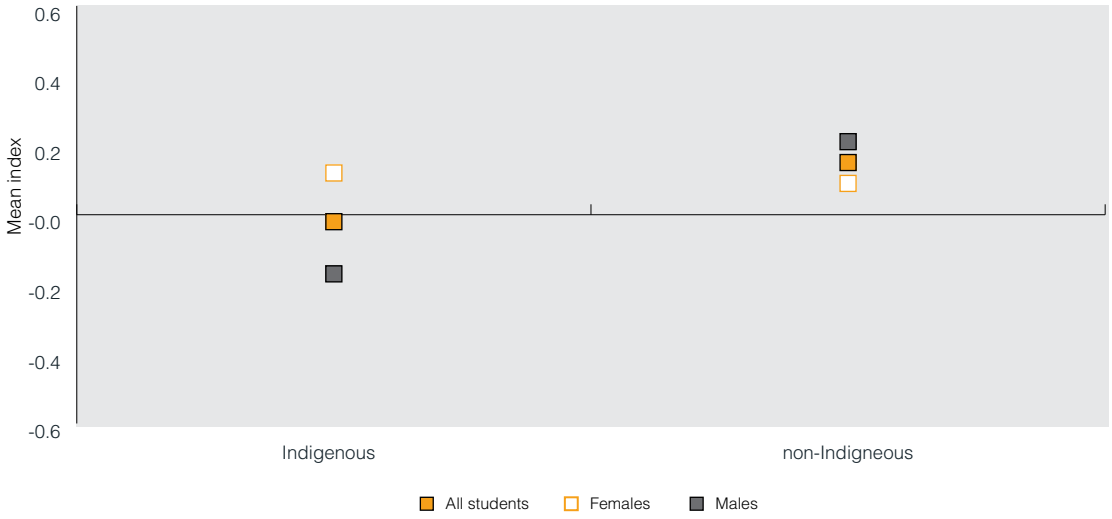



**Figure 5.8** Students' confidence in performing high-level tasks on computers by Indigenous background, with gender differences

While gender differences were apparent amongst both Indigenous and non-Indigenous students, the magnitude and direction of that for Indigenous students is worthy of note. Against the overall international trend, female Indigenous students were significantly, and quite substantially, more confident on all of the high-level tasks than their male counterparts (Figure 5.8).

## Confidence in performing high-level tasks on computers and socioeconomic background

On all tasks, confidence in performance increased along with socioeconomic background (Table 5.9). This was least evident for "create a database", which is not surprising given it is the task for which students, overall, indicated the least confidence.

**Table 5.9** Percentage of students who indicated they could perform high-level tasks very well by themselves or with help from someone by socioeconomic background

| Socioeconomic background | Edit digital photographs or other graphical images | | | | Create a database | | | | Use a spreadsheet to plot a graph | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | I can do this very well by myself | | I can do this with help from someone | | I can do this very well by myself | | I can do this with help from someone | | I can do this very well by myself | | I can do this with help from someone | |
| | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. | % | S.E. |
| Lowest quartile | 52 | 1.1 | 31 | 0.8 | 25 | 0.8 | 32 | 1.1 | 45 | 1.0 | 32 | 0.8 |
| Second quartile | 59 | 1.1 | 28 | 1.0 | 27 | 1.0 | 32 | 1.0 | 54 | 1.1 | 29 | 0.9 |
| Third quartile | 60 | 1.0 | 28 | 0.8 | 28 | 1.0 | 30 | 0.9 | 59 | 1.1 | 28 | 0.9 |
| Highest quartile | 65 | 1.1 | 27 | 0.9 | 30 | 1.0 | 31 | 0.8 | 69 | 1.0 | 23 | 0.9 |

| Socioeconomic background | Create a presentation | | | | Create a multi-media presentation | | | |
|---|---|---|---|---|---|---|---|---|
| | I can do this very well by myself | | I can do this with help from someone | | I can do this very well by myself | | I can do this with help from someone | |
| | % | S.E. | % | S.E. | % | S.E. | % | S.E. |
| Lowest quartile | 82 | 0.8 | 12 | 0.6 | 52 | 0.9 | 32 | 1.0 |
| Second quartile | 90 | 0.6 | 7 | 0.5 | 61 | 1.0 | 29 | 1.0 |
| Third quartile | 92 | 0.6 | 5 | 0.4 | 64 | 0.9 | 27 | 0.8 |
| Highest quartile | 96 | 0.5 | 3 | 0.4 | 68 | 1.0 | 25 | 0.8 |

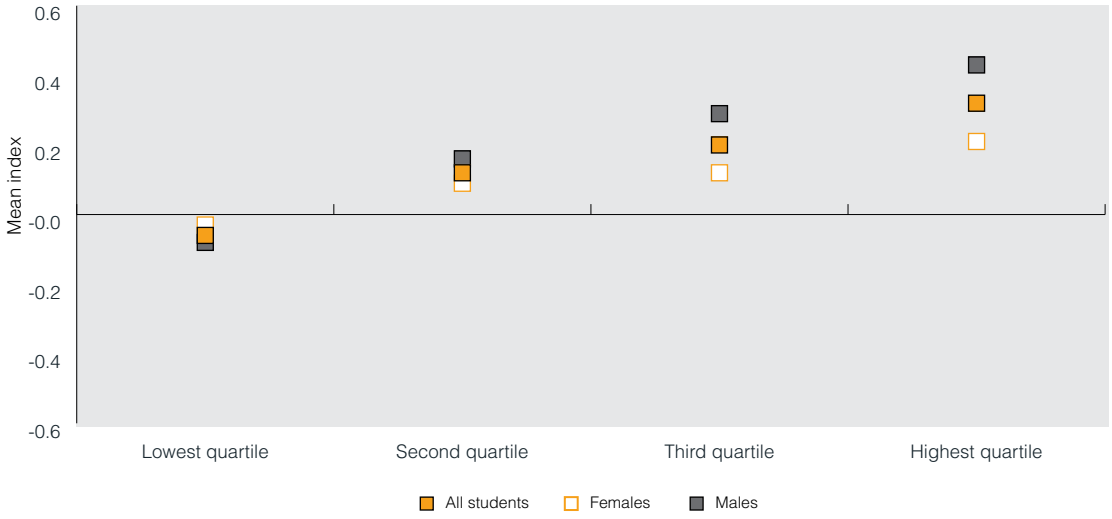



**Figure 5.9** Students' confidence in performing high-level tasks on computers by socioeconomic background

As can be seen in Figure 5.9, there are gender differences in levels of confidence for students at each level of socioeconomic quartile, and there are also significant differences between each quartile of socioeconomic background. The gender differences are significant for students in each quartile other than the lowest, and increase in magnitude as level of socioeconomic background increases. It is difficult to know how to interpret this pattern, and it will be the subject of some further investigation. The significant increase in confidence between each quartile of socioeconomic background is possibly a reflection of schools' greater ability to extend students in

this area when there are higher levels of resources available in terms of teachers and computers, which is more likely for schools enrolling students with high levels of socioeconomic background, and also partly that there is some confounding with socioeconomic background, given that we ask if there is a computer and other digital resources in the home. If students are from homes with digital resources they are likely to be using them at home more frequently and developing confidence away from school.

## The relationship between confidence in performing high-level tasks on computers and performance

The relationship between confidence and achievement is rarely straightforward. Table 5.10 shows that students with the lowest levels of confidence in performing high-level tasks achieved much lower scores on the assessment of digital reading than did those in other quartiles, but the relationship for those with higher levels of self-confidence was not as simple to interpret.

**Table 5.10** Digital reading performance by quartiles on the index of self-confidence in high-level ICT tasks, for Australia

| Lowest quartile | | Second quartile | | Third quartile | | Highest quartile | |
|---|---|---|---|---|---|---|---|
| Mean index score | S.E. | Mean index score | S.E. | Mean index score | S.E. | Mean index score | S.E. |
| 511 | 3.1 | 550 | 3.2 | 559 | 3.7 | 549 | 3.4 |

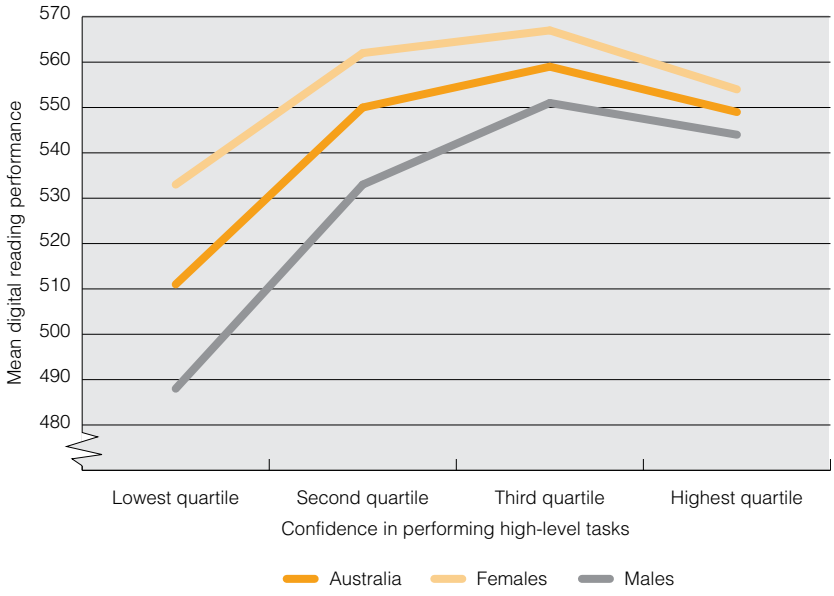



**Figure 5.10** Digital reading literacy performance by index of confidence in performing high-level tasks

Figure 5.10 shows the difference in digital reading score by confidence, by gender. At the lowest levels of confidence in performing high-level tasks, there is a 45 score point difference in electronic reading scores between females and males – at the highest level of self-confidence this gap narrows to a non-significant 10 score points. The pattern of performance across the quartiles of self-confidence, however, is slightly different for males and females. The reading score for females at the highest level of self-confidence is significantly lower than that for female students with lower levels of self-confidence (in the third and second quartiles of self-confidence); however for males there are no statistically significant differences in the performance scores of students in the second, third or highest quartile of confidence. This finding is not as easy to interpret – could it be that a group of over-confident students did not try as hard on the digital reading literacy assessment as they could? Further investigation could prove fruitful in disentangling this relationship.

## Summary

Relative to students in other OECD countries participating in this assessment, Australian students reported high levels of confidence in performing high-level tasks. Disparities were apparent when looking at confidence not only by students' socioeconomic background but also by gender. Male students in most states reported higher levels of confidence in being able to perform these tasks. The relationship between confidence and performance on the assessment indicated that those with low levels of confidence would achieve at a significantly lower level than students who reported higher levels of confidence.

Interest in computers seemed more of a matter of pragmatism than anything else for Australian students. While students agreed that it was important for them to work with computers, less than half thought it was fun. Males were more likely than females to agree that working with computers was fun – in all states, and across all socioeconomic backgrounds. Students with the least positive attitudes towards computers were found to be those who recorded the lowest scores on the assessment of electronic reading, perhaps not surprisingly.

Students from disadvantaged backgrounds showed the least positive attitudes towards computers and reported the lowest levels of confidence in performing high-level tasks than students from any other backgrounds; however the difference between this group and the group from the most advantaged background was particularly large. Those students who were less positive in their attitudes towards computers and who were the least-confident in their ability to undertake high-level ICT tasks were also the students that scored significantly lower than others on the electronic reading assessment.

Chapter

# 6

# Conclusions and Policy Implications

The ability to read is essential to generally accepted standards for successful outcomes in life. Even without factoring in the amount of pleasure that can be derived from reading, it allows people to be well-informed about the world in which they live, to understand their rights and responsibilities, and to make informed choices about their lives. In an increasingly digitised world, and a world in which digital platforms appear and become mainstream in a very short period of time (for example iPads first appeared on the market in 2010, after this PISA survey was conducted, but already in early 2012 they are required equipment in many schools in a number of countries), students who are able to confidently navigate non-linear texts, using hyperlinks and other tools that such digital technologies provide will have an advantage over those who cannot. Korea has developed a policy to digitise textbooks and assessments by 2015 and the United States also aims to move to digital textbooks within five years. These recent trends underline the importance of close analysis of digital reading.

Overall, Australian students showed high levels of digital literacy, generally higher than their associated levels of print reading literacy. Of the countries participating in the digital literacy assessment, only Korean students outperformed Australian students, with students from New Zealand performing at the same level as Australians. Our students performed at a significantly higher level than those in Japan, whose score on print reading was not different to ours, and Hong Kong-China, who students outperformed ours in the print reading assessment. More Australian students achieved at proficiency level 5 or above in digital than in print reading (17% compared to 13%) and fewer failed to achieve proficiency level 2 (10% compared to 14%).

Australian students generally also had extremely high levels of access to computers and the Internet, with almost all students indicating that they had a computer in the home, and most reporting a connection to the internet. Similarly, almost all students reported access to computers and the Internet at school.

However this report has identified two major areas for policy attention.

## The underperformance of male students

The gender gap in print reading literacy in Australia is similar to that on average over the OECD, and at 37 score points is the equivalent of about one year of formal schooling, with the scores for males significantly lower than that for females. In digital literacy the gender difference, although still substantial, is smaller: 28 score points for Australia compared to 24 score points on average across the OECD. The proportion of male students who are deemed to be vulnerable because of their achievement levels (below proficiency level 2) is also smaller than in print literacy. Male students, on the other hand, outperformed female students in digital navigation, which influenced their proficiency in digital reading. Where both males and females achieved the same proficiency

in print reading, the males were more proficient in digital reading. That is, males perform better in digital reading than they do in print reading because of their digital navigation skills.

Australian male students were generally found to have higher levels of self-confidence in performing high-level ICT tasks, and to hold significantly more positive attitudes towards computers than females. It would appear that while this may help narrow the gender gap, the higher levels of engagement with reading of female students is still a strong influence on their digital reading accomplishments.

The primary use of computers at home for both males and females was email, chatting, downloading content such as music or films, and participating in online forums. The difference between the proportion of males and females engaging in these social activities was significant, but small. A larger proportion of males than females reported frequent engagement in playing games, and the gender difference in this was not only significant, but also large.

In terms of school-related activities, most students reported spending time doing homework and using the Internet for school-related purposes, however this was true for a higher proportion of females than males. At school, the primary use of computers was reported as browsing the Internet for school work, and significantly more females than males reported doing this frequently.

## Lack of access to, and training in the use of technology

In Chapter 2, this report highlighted significant differences in the digital reading literacy levels of certain groups of students: those attending government schools; those in remote areas; Indigenous students and poor students. While these differences are similar to those found for print reading, there were also substantial differences found in access to technology.

While most students reported having a computer at home, it was shown in Chapter 3 that this needs to be unpacked a little to understand it better. There is a positive relationship between number of computers in the home and achievement. Students who report three or more computers in their home are likely to have personal access to a computer – most likely their own computer. Students who report one computer only in the home are likely to have to share access to this computer with their parents and their siblings, thus limiting the amount of time they are able to spend participating in the very activities that contribute to digital reading literacy. The data presented in Chapter 3 provided evidence that students in government schools, those in remote areas, Indigenous students and poor students had lower levels of access to computers at home.

In general, the analysis of the items concerned with use of computers at home for leisure or school-related activities, and participation in online reading activities, supported this finding. Students in government schools, students in remote areas, Indigenous students and students from low socioeconomic background reported significantly less frequent use of computers for either leisure or school-related activities, and lower levels of participation in online reading activities than other comparison groups.

If students do not have access to computers at home for regular use, can schools help bridge the gap? Chapter 4 provided some evidence that students from lower socioeconomic background levels and students in government schools had less access to computers and the Internet at school compared to students in independent schools and those in the highest levels of socioeconomic background.

Evidence from PISA published in the international report on digital reading (OECD, 2011) indicates that computer use at home has a positive effect on achievement whereas computer use at school had a negative effect on achievement. Some research suggests that this may be because ICT is used inappropriately at school due to teachers' lack of technological, content and pedagogical knowledge (Mishra & Koehler, 2006). Therefore it is not clear whether providing additional ICT resources, teacher training or specialist ICT teachers would assist the students most in need.

UNESCO warns that simply making technology equally available to all within a society, will not suffice to bridge any knowledge divide that exists, since "access to useful, relevant knowledge is more than simply a matter of infrastructure – it depends on training, cognitive skills and regulatory frameworks geared towards contents" (2005, p. 22).

The analysis of student attitudes and confidence in using computers described in Chapter 5 found that students from disadvantaged backgrounds showed the least positive attitudes towards computers and reported the lowest levels of confidence in performing high-level tasks compared to students from any other background, and that the difference between this group and the group from the most advantaged background was particularly large. Those students who were less positive in their attitudes towards computers and who were the least confident in their ability to undertake high-level ICT tasks were also the students that scored significantly lower than others on the electronic reading assessment.

## Policy directions

Regardless of the medium (print or digital), males are underperforming in reading literacy compared to females, and addressing the problem requires a holistic approach. One such approach is the promotion of reading digital texts, in and out of school, as the evidence suggests that males tend to have better digital navigation skills than females and are more engaged with digital texts than print texts. Better digital reading proficiency in turn should lead to greater enjoyment of reading and thus better proficiency in print reading.

However parents, educators and policy makers should also take note of girls' weaker skills in digital navigation. Without those skills, students will find it difficult to make their way in the digital age.

For many students, computers are part of their daily lives. These students may have their own personal computers, or may have access to a number of computers at home. Many of these students will also have access to multiple computers at school, and will be able to use these combined resources to communicate regularly via email, to search for information on the web, to use software bought by the school or their parents to carry out school projects, and to generally become familiar with the digital environment.

There are other groups of students, however, who have more limited access to computers and the internet, and who will not have the level of familiarity with technology that is required in a 21st century workforce. Often, these are the same students who are also disadvantaged in print reading, particularly those from lower socioeconomic groups and students in remote locations.

It is essential that students in disadvantaged groups be supported with computer and network access in sufficient capacity to enable regular access so they can develop the digital reading and navigation skills they will need to participate in modern society and workplaces. These efforts also need to be accompanied by measures to improve the overall educational outcomes of students in disadvantaged groups, to ensure more equitable outcomes from Australia's education system.

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