National Assessment Program – ICT Literacy

Years 6 & 10

Report 2014



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NAP NATIONAL ASSESSMENT PROGRAM

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Foreword

Literacy in information and communication technology (ICT) is critical to students as they progress through schooling and enter a world in which information technology will be ubiquitous. Work, health care, family finances, learning and social interaction will all depend on competence in ICT. To assess progress in this crucial part of student learning, ACARA conducts a National Assessment Program (NAP) aimed at measuring ICT literacy. Every three years since 2005, a sample of Year 6 and Year 10 students from across Australia have been tested to determine their ICT knowledge, understanding and skills and their ability to use ICT creatively, critically and responsibly. This program is conducted under the auspices of the Education Council.

The proficient standards set for ICT literacy are challenging but attainable for Year 6 and Year 10 students. For example, students are asked to search websites to find appropriate material; format a document; crop an image; create a short slide show or apply knowledge of user–interface design conventions; design an online survey and use software to add two new levels to an online game.

This report provides the results of 10,562 Australian students by state, territory and student sub-groups and provides details of their achievement on the most recent test of ICT literacy. In addition to the test of ICT knowledge and skills, students were surveyed about their ICT perceptions and their use of ICT in schools and at home.

While the survey results clearly confirm the general belief that Australian students are frequent users of computer technology and continue to express interest and enjoyment when working with computers, this report shows a significant decline in their ICT literacy performance when compared to previous cycles. In 2014, the mean performance of Year 6 compared to those who participated in the last assessment in 2011 was significantly lower. Similarly, the mean performance of Year 10 students was significantly lower than the Year 10 mean performance in all previous NAP – ICT literacy assessments. Also declining was the percentage of students in Year 6 and Year 10 meeting the NAP – ICT literacy proficient standards. These declines in performance are concerning and warrant serious attention.

It is tempting to assume that students who use computing devices and smartphones for social interactions (texting, for example) understand all aspects of ICT technology and its applications. As educators, when presented with results to the contrary, we are obliged to pause and reassess our assumptions. It appears that we cannot expect students to become proficient on important employability and life skills, just by using computing devices for games and social interaction. They also need to be taught the relevant knowledge, understanding and skills.

Teachers across the country now have access to the Australian Curriculum: digital technologies. This new curriculum provides an opportunity to renew our national commitment to helping all children to gain the knowledge, understanding and skills necessary for the sophisticated use of information and communication technologies. In

addition, a technical report will be made available to researchers along with a set of school materials for teachers to use in the classroom.

The national sample assessments are a product of the collaboration and support of senior educators across all states and territories and all school sectors. ACARA acknowledges the work of the Information and Communication Technology Literacy Working Group, the project staff at the Australian Council for Educational Research (ACER) and ACARA's technology provider, SoNET, in the development, trialling and implementation of the National Assessment Program – ICT literacy. ACARA also thanks the many principals, teachers and students at government, Catholic and independent schools who took part in the trial and main assessment in 2014.

I commend this report to teachers, education leaders and the general community. It provides a valuable snapshot of our Year 6 and Year 10 students' digital literacy proficiency and highlights the urgent need for us to focus on ICT literacy, as set out in the Australian Curriculum: digital technologies, so today's students can be prepared for the digital world of the 21st century.

Emeritus Professor Steven Schwartz AM
Chair
Australian Curriculum, Assessment and Reporting Authority

Some terms used in this report

Term	Definition	Notes
Absent	Absent students are students who did not sit the tests because they were not present at school when the test was administered or were unable to sit the test as a result of an accident or mishap.	The reported statistics (means and percentages) are based on statistical analyses that have been weighted to adjust for absences.
Average age	The average age of students is calculated from the dates of birth provided by each jurisdiction or from schools.	
Confidence interval	An estimate derived from a sample is subject to uncertainty because the sample may not reflect the population precisely. The extent to which this variation exists is expressed as the confidence interval. The 95 per cent confidence interval is the range within which the estimate of the statistic based on repeated sampling would be expected to fall for 95 of 100 samples that might have been drawn.	The estimates of confidence intervals in this report are based on 'Jack–knife' replication methods. A series of sub–samples is derived from the full sample, and the statistic of interest is generated for each sub–sample. The variance is then estimated by calculating the variability in the estimate between these sub samples. This technique generates an estimate of the standard error of the estimate and the confidence interval is 1.96 times the standard error.
Exempt	Students with a language background other than English, who arrived from overseas less than a year before the tests, and students with significant intellectual disabilities or functional disabilities may be exempted from testing.	Exempt students were not included in the populations from which the samples were drawn. Functional disability: the student had a moderate to severe permanent physical disability such that he or she could not perform in the assessment situation. Intellectual disability: the student had a mental or emotional disability and cognitive delay such that he or she could not perform in the assessment situation. Limited assessment language proficiency: the student was unable to read or speak the language of the assessment and would be unable to overcome the language barrier in the assessment situation. Typically, a student who had received less than one year of instruction in the language of the assessment would be excluded.
Geolocation	The MCEECDYA Schools Geographic Location Classification System is based on the locality of individual schools and is used to disaggregate data according to Metropolitan, Provincial, and Remote.	In the weighted sample 72 percent of students were from metropolitan schools, 26 per cent were from provincial schools and two per cent were from remote schools. The remote category includes very remote schools.

Term	Definition	Notes
ICT Literacy scale	The NAP – ICT Literacy scale is a continuous scale that provides a measure of student achievement in ICT Literacy.	The NAP – ICT Literacy scale is common to Year 6 and Year 10, common across the 2005, 2008, 2011 and 2014 cycles of NAP – ICT Literacy and common across jurisdictions. The NAP – ICT Literacy scale was established as part of NAP – ICT Literacy 2005. In NAP – ICT Literacy 2005 the mean for Year 6 was set to 400 and the standard deviation for Year 6 was set to 100. In practice scores range from 0 to 1000.
Indigenous status	A student is considered to be 'Indigenous' if he or she identifies as being of Aboriginal and/or Torres Strait Islander origin. The term 'origin' is considered to relate to people's Australian Aboriginal or Torres Strait Islander descent and for some, but not all, their cultural identity.	These data were provided by jurisdictional authorities or individual schools. Students for whom 'Indigenous status' was not known are recorded separately in the data which are indicated by Indigenous status.
Language background other than English (LBOTE)	A student is classified as LBOTE if the student or parents/ guardians mainly speak a language other than English at home.	These data were provided by jurisdictional authorities or individual schools. Students for whom LBOTE status was not stated are recorded separately in the data which are reported by LBOTE status.
Parental education	Parental education represents the highest level of parental school or non–school education that a parent/ guardian has completed. This includes the highest level of primary or secondary school completed or the highest post–school qualification attained.	The higher level of school or non–school education that either parent/guardian has completed is reported. Certificate I to IV includes Australian Qualifications Framework (AQF) trade certificates. These data were provided by jurisdictional authorities or individual schools but information on parental education was not always provided by schools and education authorities. Students for whom parental education was not known are recorded separately in the data which are reported by parental education.
Parental occupation	Parental occupation represents the occupation group which includes the main work undertaken by the parent/guardian. If a parent/ guardian has more than one job, the occupation group which reflects their main job is reported.	The higher occupational group of either parent/guardian is reported. These data were provided by jurisdictional authorities or individual schools but information on parental occupation was not always provided by schools and education authorities. Students for whom parental occupation was not known are recorded separately in the data which are reported by parental education.
Participation rates	Participation rates are the percentages of sampled students that participated in the assessment.	Participation rates are calculated as the number of assessed students from whom data were recorded as a percentage of the total number of sampled students in the year level.
Percentages		The percentages of students represented in the tables have been rounded and may always not sum to 100.
Proficiency Level	In 2005 six proficiency levels were established at equally–spaced intervals across the NAP – ICT Literacy Scale. Each proficiency level spans 120 scale points. Each level description provides a synthesised overview of the knowledge skills and understandings that a student working within the level is able to demonstrate.	Proficiency Levels were set so that a student with a proficiency scale score at the bottom of a level has a 62 per cent chance of correctly answering a question at the bottom of that level, a 38 per cent chance of correctly answering a question at the top of that level, and would be expected to correctly answer at least about half of a set of questions evenly spaced across the level.

Term	Definition	Notes
Proficient Standard	Proficient Standards represent a 'challenging but reasonable' expectation of student achievement at a year level. Proficient Standards provide reference points of reasonable expectation of student achievement at that Year in the area.	The Proficient Standards in ICT Literacy (one for Year 6 and one for Year 10) were established as a result of consultations with ICT experts and representatives from jurisdictions and sectors as part of NAP – ICT Literacy – 2005. The Proficient Standard for Year 6 is 409 scale points, which is the boundary between proficiency Levels 2 and 3. The Proficient Standard for Year 10 is 529 scale points which is the boundary between Proficiency Levels 3 and 4.
Sample	A sample is a subset of a population selected so that reliable and unbiased estimates of statistics for the full population can be inferred.	The samples were designed and implemented so that estimates of ICT Literacy representative of the Year 6 and Year 10 populations in Australia, as well as for jurisdictions and designated sub–groups at a national level, could be generated. Sampling involved a two–stage process to ensure that each eligible student had an equal chance of being selected in the sample. In the first stage schools were selected from a list of all schools in each jurisdiction with a probability proportional to the number of students in the relevant Year level. In the second stage up to 20 students were selected at random from the eligible students in the school.
Sex	Sex is the distinction 'male' and 'female' as reported on a student's enrolment record.	
Significance of difference	Statistical significance refers to the likelihood of a difference being the result of chance rather than a true reflection of the measured outcomes.	Significance tests make use of the standard error of the difference. Throughout this report differences are stated to be statistically significant if there is a 95 per cent probability that the difference is a true difference that did not arise from sampling or measurement error. Where the significance of differences in performance is indicated, it relates to the comparison of mean scores or percentagesacross the 2008 and 2011 or the 2005 and 2011 cycles, between jurisdictions, or between designated groups of students. Where differences are not indicated as significant results should not be compared.
Standard deviation (S.D.)	The standard deviation is a measure of variability or dispersion in student scores from the mean (or average).	Approximately 68 per cent of student scores are expected to fall between minus one and plus one standard deviation around the mean. A low standard deviation indicates that the scores are close to the mean, whereas high standard deviation indicates that the scores are more spread out.
Withdrawn	Students may be withdrawn from the testing program by their parent/ carer. Withdrawals are intended to address issues such as religious beliefs and philosophical objections to testing.	All parents and schools were provided with information about the assessment of ICT Literacy. Withdrawn students were not included in the list of students from which the sample was derived.

Executive summary

ICT literacy in the educational goals for young Australians

The Melbourne Declaration on Educational Goals for Young Australians was adopted by state, territory and Commonwealth ministers of education in December 2008. The declaration 'sets out educational goals for young Australians' (MCEETYA, 2008: 5). As part of its preamble, the Melbourne Declaration asserts:

> *Rapid and continuing advances in information and communication technologies (ICT) are changing the ways people share, use, develop and process information and technology. In this digital age, young people need to be highly skilled in the use of ICT. While schools already employ these technologies in learning, there is a need to increase their effectiveness significantly over the next decade.*

Goal 2 of the Melbourne Declaration states, among other things, that 'all young Australians become successful learners, confident and creative individuals, and active and informed citizens'. The declaration goes on to elaborate that 'successful learners':

> *have the essential skills in literacy and numeracy and are creative and productive users of technology, especially ICT, as a foundation for success in all learning areas.*

This goal continues a theme from the earlier Adelaide Declaration on National Goals for Schooling. The Adelaide Declaration stated that when students left school they should be 'confident, creative and productive users of new technologies, particularly information and communication technologies, and understand the impact of those technologies on society' (MCEETYA, 1999).

Four cycles of national ICT literacy assessment in Australia

This report is based on the fourth cycle of national assessments in information and communication technology (ICT) literacy, which was conducted in October 2014. It provides a picture of ICT literacy among Australian school students in 2014 and the changes in ICT literacy over nine years since 2005 (the time of the first cycle). It reports on ICT literacy nationally, for jurisdictions and for particular groups of students. In addition, it profiles student use of ICT in and out of school and students' perceptions of ICT in their lives.

What is assessed in NAP – ICT Literacy?

The definition of ICT literacy adopted by MCEETYA for use in the National Assessment Program is:

> *The ability of individuals to use ICT appropriately to access, manage and evaluate information, develop new understandings, and communicate with others in order to participate effectively in society.* (MCEETYA, 2005)

This definition, together with an elaboration through a set of six key processes and a broad description of progress according to three strands, form the basis of the NAP – ICT Literacy Assessment Domain (MCEETYA, 2005), which provides the foundation of the student assessment across all four cycles of NAP – ICT Literacy. As part of the work on NAP – ICT Literacy 2014 the assessment domain was revised to create the NAP – ICT Literacy Assessment Framework. The assessment framework is consistent with the definitions and structures established in the assessment domain.

Continuing advances in hardware and software technologies have meant that the contexts in which ICT literacy can be demonstrated are in constant flux. Despite this, the core capabilities that are the basis of the NAP – ICT Literacy assessments have remained consistently relevant to the field and are congruent with curriculum developments in Australia, including the articulation of ICT capability in the Australian Curriculum.

The assessment method

The assessment instrument used in NAP – ICT Literacy 2014 was based on the design principles established initially for NAP – ICT Literacy 2005 and then continued through the assessment cycles in 2008 and 2011. The assessment instrument consisted of nine discrete test modules, each of which could be completed in a maximum of 25 minutes (controlled by the testing software). Each module followed a linear narrative sequence designed to reflect students' typical 'real-world' use of ICT. The modules included a range of school-based and out-of-school related themes.

All the modules included large tasks to be completed using purpose-built software applications. Three modules were 'trend' modules as used in at least one of the previous assessment cycles. Six were newly developed for use in the 2014 assessment. The newly developed modules covered skills such as working with tablet computers, using animation software and collaborating with other students.

Delivering the assessments

NAP – ICT Literacy 2014 was delivered by trained test administrators. In 94 per cent of schools, the assessments were delivered using an online system.

The assessments were completed by 10 562 students across all states and territories: 5622 from Year 6 and 4940 from Year 10. These students were sampled randomly from 649 schools: 334 for Year 6 and 315 for Year 10.

Measuring ICT literacy in 2014

The NAP – ICT Literacy scale was established in 2005 on the basis of the test contents and psychometric data collected during the inaugural NAP – ICT Literacy assessment.

The scale was established using Item Response Theory (IRT) scaling methodology, by applying the Rasch model. This is the same model used to scale student achievement data in the National Assessment Program – Science Literacy, Civics and Citizenship (NAP – CC), and in the National Assessment Program – Literacy and Numeracy (NAPLAN).

In NAP – ICT Literacy 2005, student scores on the scale were transformed so that the reporting scale had a mean score of 400 and standard deviation of 100 scale points for the national Year 6 sample. NAP – ICT Literacy scale scores from all four assessment cycles are reported on this same metric.

The described scale comprises six proficiency levels that are used to describe the achievement of students both at Year 6 and Year 10. Each level description provides a synthesised overview of the knowledge, skills and understandings that a student working within the level is able to demonstrate.

The cut-points for the proficiency levels are shown in Figure ES 1.

Level	Cut-point in scale score
Level 6	
	769
Level 5	
	649
Level 4	
	529
Level 3	
	409
Level 2	
	289
Level 1	

Figure ES 1 Cut-points for proficiency levels

Table ES 1 includes the described NAP – ICT Literacy scale together with examples of student achievement at each proficiency level. It also shows the percentage of students who demonstrated achievement at each proficiency level and the proficient standards for Year 6 and for Year 10. The proficient standards and student achievement in relation to the proficiency levels are discussed following Table ES 1.

Table ES 1 NAP – ICT Literacy scale proficiency level descriptors and percentage distribution of students by year level

Level	Proficiency level description	Examples of student achievement at this level	Year 6 %	Year 10 %
6	Students working at Level 6 create information products that show evidence of technical proficiency and careful planning and review. They use software features to organise information and to synthesise and represent data as integrated complete information products. They design information products consistent with the conventions of specific communication modes and audiences and use available software features to enhance the communicative effect of their work.	• Create an information product in which the flow of information is clear, logical and integrated to make the product unified and complete. • Select appropriate key points and data from available resources and use their own words to include and explicate them in an information product. • Use graphics and text software editing features, such as font formats, colour, animations and page transitions, in ways that enhance the structure and communicative purpose of an information product. • Include relevant tables and charts to enhance an information product and support these representations of data with text that clearly explains their purpose and contents.	–	0(±0.3)
5	Students working at Level 5 evaluate the credibility of information from electronic sources and select the most relevant information to use for a specific communicative purpose. They create information products that show evidence of planning and technical competence. They use software features to reshape and present information graphically consistent with presentation conventions. They design information products that combine different elements and accurately represent their source data. They use available software features to enhance the appearance of their information products.	• Create an information product in which the information flow is clear and logical and the tone and style are consistent and appropriate to a specified audience. • Select and include information from electronic resources in an information product to suit an explicit communicative purpose. • Use graphics and text software editing features such as font formats, colour and animations consistently within an information product to suit a specified audience. • Create tables and charts that accurately represent data and include them in an information product with text that refers to their contents. • Apply specialised software and file management functions such as using the history function on a web browser to return to a previously visited page or sorting data in a spreadsheet according to a specified criterion.	1(±0.3)	9(±1.5)
4	Students working at Level 4 generate well–targeted searches for electronic information sources and select relevant information from within sources to meet a specific purpose. They create information products with simple linear structures and use software commands to edit and reformat information products in ways that demonstrate some consideration of audience and communicative purpose. They recognise situations in which ICT misuse may occur and explain how specific protocols can prevent this.	• Create an information product in which the flow of information is clear and the tone is controlled to suit a specified audience. • Generate searches that target relevant resources and then select relevant sections of these resources to include, with some modification and supporting text, in an information product. • Apply graphics and text software editing features, such as font formats, colour and image placement, consistently across a simple information product. • Apply infrequently used software and file management functions such as displaying a specified hidden toolbar in a word processor, editing text in an online survey, or using a single pull–down menu function or installation wizard to save files to a specified location. • Identify security risks associated with spyware and providing personal data over the internet and explain the importance of respecting and protecting the intellectual property rights of authors.	13(±1.3)	43(±2.0)
	Proficient Standard for Year 10			

Level	Proficiency level description	Examples of student achievement at this level	Year 6 %	Year 10 %
3	Students working at Level 3 generate simple general search questions and select the best information source to meet a specific purpose. They retrieve information from given electronic sources to answer specific, concrete questions. They assemble information in a provided simple linear order to create information products. They use conventionally recognised software commands to edit and reformat information products. They recognise common examples in which ICT misuse may occur and suggest ways of avoiding them.	• Create an information product that follows a prescribed explicit structure. • Select clear, simple, relevant information from given information sources and include it in an information product. • Use graphics and text software editing features to manipulate aspects such as colour, image size and placement in simple information products. • Apply software and file management functions using common conventions such as left–aligning selected text, adding questions to an online survey, or creating and naming a new file on the desktop. • Recognise the potential for ICT misuse such as plagiarism, computer viruses and deliberate identity concealment, and suggest measures to protect against them.	42(±2.5)	33(±2.1)
	Proficient Standard for Year 6			
2	Students working at Level 2 locate simple, explicit information from within a given electronic source. They add content to and make simple changes to existing information products when instructed. They edit information products to create products that show limited consistency of design and information management. They recognise and identify basic ICT electronic security and health and safety usage issues and practices.	• Locate explicit relevant information or links to information from within a web page. • Make changes to some presentation elements in an information product. • Apply simple software and file management functions such as copying and pasting information from one column of a spreadsheet to another column or adding a web page to a list of favourites (bookmarks) in a web browser or opening an email attachment. • Recognise common computer use conventions and practices such as the use of the '.edu' suffix in the URL of a school's website, the need to keep virus protection software up to date and the need to maintain good posture when using a computer.	31(±2.4)	11(±1.4)
1	Students working at Level 1 perform basic tasks using computers and software. They implement the most commonly used file management and software commands when instructed. They recognise the most commonly used ICT terminology and functions.	• Apply graphics manipulation software features such as adding and moving predefined shapes to reproduce the basic attributes of a simple image. • Apply basic file and computer management functions such as opening and dragging and dropping files on the desktop. • Apply generic software commands such as the 'Save as' and 'Paste' function, clicking on a hyperlink to go to a web page, or selecting all the text on a page. • Recognise basic computer use conventions such as identifying the main parts of a computer and that the 'Shut down' command is a safe way to turn off a computer.	14(±1.9)	4(±1.1)

The proficient standards

One of the purposes of the NAP sample studies (in ICT literacy, civics and citizenship and science literacy) is to report on student attainment of proficient standards as key performance measures. The proportion of students achieving at or above the proficient standard is the national key performance measure (KPM) for ICT literacy specified in the *Measurement Framework for Schooling in Australia 2012* (ACARA, 2013).

Each proficient standard represents a 'challenging but reasonable' expectation of student achievement at that year level (ACARA, 2013). The proficient standards in ICT literacy (one for Year 6 and one for Year 10) were established as a result of consultations with ICT experts and representatives from all states and territories and all school sectors as part of the 2005 cycle.

Each standard is a point on the scale that is at the boundary between two proficiency levels. The Proficient Standard for Year 6 is 409 scale points, which is the boundary between levels 2 and 3 on the NAP – ICT Literacy scale. The Proficient Standard for Year 10 is 529 scale points, which is the boundary between levels 3 and 4 on the scale. Year 6 students performing at Level 3 and above, and Year 10 students performing at Level 4 and above have met or exceeded their relevant proficient standard.

Fifty-five per cent of Year 6 students and 52 per cent of Year 10 students met or exceeded the relevant proficient standard for NAP – ICT Literacy in 2014.

Comparisons of student performance by year level

Comparison of means

The mean score of Year 6 students was 413 scale points and the mean score for Year 10 students was 520 scale points. Students in Year 10 achieved, on average, 107 scale points more than students in Year 6. This difference is statistically significant and is equivalent to slightly less than (0.9) the width of a proficiency level on the NAP – ICT Literacy scale.

Comparison by proficiency level

The percentages of students demonstrating achievement of each proficiency level in Year 6 and Year 10 are presented in Table ES 1. These percentages are also displayed graphically in Figure ES 2, together with the location of the proficient standard for each year level.

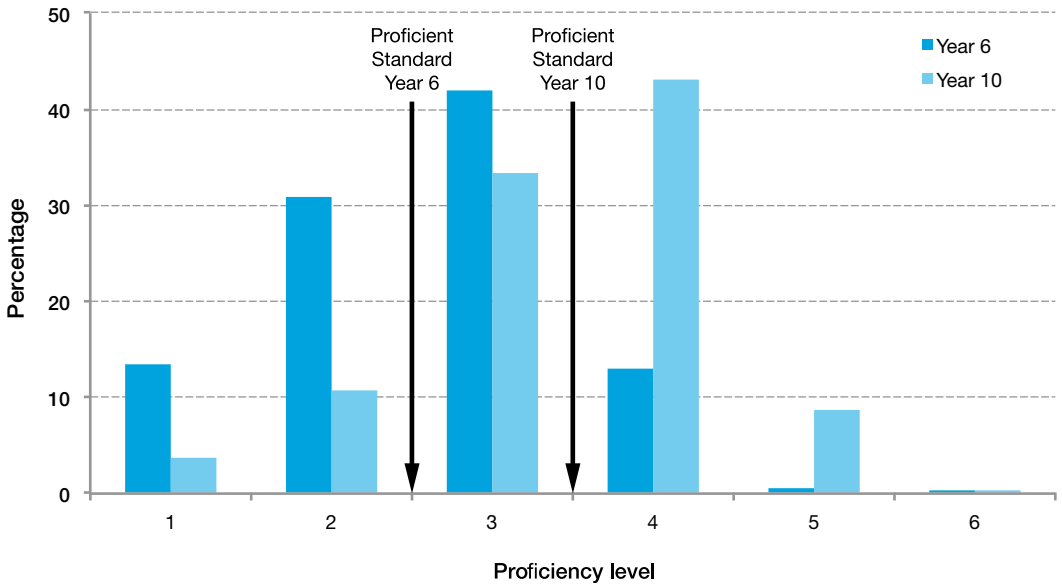


Figure ES 2 Distribution of students across proficiency levels by year level

Figure ES 2 shows that the Year 10 students' achievement distribution is centred on Level 4 and that for Year 6 is centred on Level 3. It also illustrates the overlap in achievement between Year 6 and Year 10.

Comparisons of student achievement since 2005

Comparison of means

Table ES 2 shows the mean performances on the NAP – ICT Literacy scale, with the confidence intervals associated with those means, for Years 6 and 10 across the four cycles of NAP – ICT Literacy since 2005. It also records the differences, along with the relevant confidence intervals, between the mean performances in 2014 and the mean performances in 2005, 2008 and 2011.

Table ES 2 ICT Literacy mean scale scores for Year 6 and Year 10 from 2005 to 2014

	Year 6	Year 10
2014	413 (±5.7)	520 (±6.7)
2011	435 (±5.7)	559 (±5.7)
2008	419 (±6.9)	560 (±7.1)
2005	400 (±6.3)	551 (±5.7)
Difference (2014 – 2011)	**–22** (±11.3)	**–39** (±11.8)
Difference (2014 – 2008)	–6 (±16.3)	**–40** (±16.8)
Difference (2014 – 2005)	13 (±18.2)	**–31** (±18.3)

Confidence intervals (±1.96*SE) are reported in brackets. Statistically significant differences are in **bold**. Because results are rounded to the nearest whole number, some differences may appear inconsistent.

Table ES 2 shows that, while the mean performance of students in Year 6 increased consistently from 2005 to 2011 across the three assessment cycles, it decreased

significantly by 22 scale points between 2011 and 2014.[1] The mean performance of Year 6 students in 2014 was statistically significantly lower than the mean performance in 2011, but not significantly different to the mean performance in 2005 or 2008.

There had been no significant changes in performance of Year 10 students across the three previous NAP – ICT Literacy cycles from 2005 to 2011. However, in 2014, the mean performance of Year 10 students decreased by 39 scale points. This large decrease resulted in the 2014 mean performance being statistically significantly lower than the mean performance in all the previous NAP – ICT Literacy assessments.

Comparison of attainment of the proficient standard

Table ES 3 shows the percentages of Year 6 and Year 10 students attaining (meeting or exceeding) the relevant proficient standard across the four cycles of NAP – ICT Literacy.

Table ES 3 Percentages of Year 6 and Year 10 students attaining the proficient standard in ICT literacy from 2005 to 2014

	Year 6	Year 10
2014	55 (±2.5)	52 (±2.5)
2011	62 (±2.0)	65 (±2.3)
2008	57 (±2.8)	66 (±3.0)
2005	49 (±3.0)	61 (±3.1)
Difference (2014 – 2011)	**–6** (±4.2)	**–13** (±4.5)
Difference (2014 – 2008)	–1 (±6.1)	**–14** (±6.5)
Difference (2014 – 2005)	**7** (±6.9)	**–9** (±7.3)

Confidence intervals (±1.96*SE) are reported in brackets. Statistically significant differences are in **bold**. Because results are rounded to the nearest whole number, some differences may appear inconsistent.

Whereas the percentage of students attaining the proficient standard at Year 6 increased by 13 percentage points from 49 per cent to 62 per cent between 2005 and 2011, the percentage decreased between 2011 and 2014. In 2014, 55 per cent of Year 6 students met or exceeded the proficient standard. The decrease of six per cent between 2011 and 2014 was statistically significant. The decrease has resulted in the percentage of Year 6 students meeting or exceeding the proficient standard in 2014 being closer to the 2008 percentage than the 2011 percentage.

In 2014, 52 per cent of Year 10 students attained the proficient standard. The percentage decreased from the 65 per cent recorded in 2011 by 13 percentage points—a difference that is statistically significant. The percentage of Year 10 students attaining the proficient standard in 2014 was significantly lower than the percentage recorded in all previous NAP – ICT Literacy cycles.

When considering the decrease in performance between 2011 and 2014, it was important to use the data to investigate whether the decrease could have been caused by something other than a change in students' ICT literacy as measured in 2011. This investigation

[1] Statistically significant differences in ICT Literacy scores have a probability below 5 per cent ($p < 0.05$) that the difference was due to the combined sampling and measurement error in the estimates. (See the NAP – ICT Literacy Technical Report 2014 for details.)

showed that the percentage of students correctly responding to tasks in 2014 was consistently lower than the proportion of students correctly responding to the same tasks in 2011. Further investigation of the data, test instrument and testing procedures used in 2014 provided no evidence to suggest that the measured decrease in student performance between 2011 and 2014 was caused by anything other than a decrease in students' ICT literacy. Details of this investigation are provided in Chapter 2.

Chapter 7 discusses some possible interpretations of the decreases in performance at both year levels between 2011 and 2014 and the difference between Year 6 and Year 10 in terms of possible change in the patterns of ICT use at each year level.

Differences among jurisdictions

Comparison of mean ICT Literacy scores

Table ES 4 records the average ICT Literacy scores at both year levels across jurisdictions.

Table ES 4 Year 6 and Year 10 means and mean differences with confidence intervals for ICT Literacy scores, nationally and by state and territory in 2014

	Year 6 students	Year 10 students	Difference (Year 10 – Year 6)
New South Wales	412 (±12.0)	512 (±13.7)	**99** (±18.7)
Victoria	437 (±9.6)	532 (±14.3)	**96** (±19.4)
Queensland	393 (±13.7)	504 (±16.8)	**111** (±18.1)
Western Australia	404 (±13.2)	539 (±11.8)	**135** (±20.6)
South Australia	421 (±10.3)	532 (±15.8)	**110** (±18.7)
Tasmania	385 (±15.1)	514 (±15.6)	**129** (±30.2)
ACT	429 (±26.0)	536 (±26.2)	**107** (±32.7)
Northern Territory	361 (±20.5)	501 (±19.9)	**140** (±21.6)
Australia	413 (±5.7)	520 (±6.7)	**107** (±5.7)

Confidence intervals (1.96*SE) are reported in brackets. Statistically significant differences are in **bold**.
Because results are rounded to the nearest whole number, some differences may appear inconsistent.

The national average ICT Literacy score for Year 6 students was 413 and jurisdictional averages ranged from 361 in the Northern Territory to 437 in Victoria. The national average for Year 10 students in Australia was 520, and score averages for states and territories ranged from 501 in the Northern Territory to 539 in Western Australia. As can be seen from the size of confidence intervals, the precision for smaller jurisdictions was less than for larger jurisdictions. It is important to take these differences in precision into account when interpreting the results from this assessment and comparing test performance across jurisdictions.

At the national level, the difference in test performance between Year 6 and Year 10 students was 107 score points, which is about one standard deviation. The differences in score points between Year 6 and Year 10 students ranged from 96 in Victoria to 140 in the Northern Territory. All mean score differences within jurisdictions were statistically significant and are therefore not due to sampling variation.

Comparison of attainment of the proficient standard

Table ES 5 Percentages of Year 6 and Year 10 students at or above the Proficient Standard on the ICT Literacy scale by jurisdiction in 2014

	Year 6 students	Year 10 students
New South Wales	55 (±4.9)	50 (±5.5)
Victoria	64 (±4.5)	55 (±5.9)
Queensland	48 (±5.8)	47 (±5.6)
Western Australia	52 (±4.8)	57 (±5.8)
South Australia	59 (±4.3)	57 (±5.9)
Tasmania	46 (±5.4)	51 (±5.8)
ACT	58 (±10.6)	60 (±9.1)
Northern Territory	43 (±6.3)	43 (±9.1)
Australia	55 (±2.5)	52 (±2.5)

Confidence intervals (1.96*SE) are reported in brackets.

At the national level, 55 per cent of Year 6 students attained the Proficient Standard for Year 6. Across jurisdictions, the percentages attaining the Proficient Standard ranged from 43 per cent in the Northern Territory to 64 per cent in Victoria.

Fifty-two per cent of Year 10 students performed at or above the Proficient Standard for Year 10. When comparing this proportion across states and territories, the lowest percentage was recorded for the Northern Territory (43%) and the highest jurisdictional percentage was found in ACT (60%).

ICT use at home and at school

The results from NAP – ICT Literacy 2014 show a small decline in the frequency of computer use at home between 2011 and 2014, but an increase in the frequency of computer use at school over the same period. They also show differences in computer use at home (but not at school) between metropolitan and non-metropolitan locations. Differences were also evident between Indigenous and non-Indigenous students in Year 10 (but not in Year 6). At both year levels there were differences in students' ICT literacy associated with parental occupation.

It is also evident that there were differences in the way students reported using different types of computer applications. Patterns of computer use differ between home and school use, between Year 6 and Year 10, and between male and female students. Generally, students reported the use of study utilities with similar frequency at home and at school, but students in Year 10 reported more frequent use of these types of application than those in Year 6. Communication applications were reported to be more frequently used at home than at school and were reported as more frequently used by Year 10 students than by Year 6 students. The use of entertainment applications was more frequent at home than at school. Most students at both year levels indicated that they had learned about important ICT-related topics at school. However, there was a substantial proportion of students who did not report (or did not remember) having learned about many of these topics.

Students' perceptions of using ICT

NAP – ICT Literacy 2014 shows that Australian Year 6 and Year 10 students continue to express interest in and enjoyment of working with computers, a factor that is positively associated with higher levels of ICT literacy. Most also recognise the importance of working with computers. Most students were very confident about using the internet for communication and entertainment, but few students were confident about undertaking more complex tasks such as database and website creation. Overall, similar levels of confidence were measured as in 2011. Males tended to be more interested in computer work and more confident than females about doing ICT-related tasks. However, this difference in interest and confidence between males and females was not matched by a corresponding difference in achievement. As in previous cycles of NAP – ICT Literacy, female students' performance was higher than that of male students.

An analysis model was derived that combined the main associations between ICT literacy, self-efficacy and attitudes after taking into account differences in background variables between students. In this model, ICT literacy was significantly associated with interest and enjoyment in using computers. However, it was not associated with recognition of the importance of working with computers. ICT self-efficacy was positively associated with both these attitude variables.

Differences associated with student characteristics

NAP – ICT Literacy found large differences in performance at both year levels across categories of parental occupation and parental education[2]. This was not able to be reported in previous cycles because of incomplete data coverage. Indigenous students performed at lower levels than non-Indigenous students, as had been the case in previous cycles. There were differences between male and female students at both Year 6 and Year 10 overall and in most jurisdictions. Female students performed higher than male students, as was the case in previous assessment cycles. There were also differences between metropolitan and non-metropolitan students, with metropolitan students having the highest achievement scores. There were no significant differences between students who spoke English at home and those who spoke at least one other language. There were also no differences between students born in Australia and those who were born overseas.

Conclusion

The National Assessment Program – ICT Literacy enables student achievement to be monitored over time. The assessment in 2014 has revealed that although the mean performance of students in Year 6 increased steadily from 2005 to 2011, it decreased

[2] Seventy-two per cent of Year 6 and 65 per cent of Year 10 students with parents who were senior managers or professionals attained the proficient standard. By contrast, the proficient standard was attained by 42 per cent of Year 6 and 40 per cent of students with parents who were unskilled labourers, office, sales or service staff. Seventy-three per cent of Year 6 students and 69 per cent of students with parents having a university qualification attained the proficient standard, while 39 per cent of Year 6 and 32 per cent of Year 10 students whose parents had a highest educational level of Year 9 or below attained the proficient standard.

between 2011 and 2014. The performance of Year 10 students had not changed across the three previous NAP – ICT Literacy cycles from 2005 to 2011, though it declined substantially between 2011 and 2014. Most of the relationships between ICT literacy and student characteristics have remained similar over time, so it does not appear that the overall decline is associated with particular groups of students. The decreases also appear to be similar in each of the jurisdictions.

The decline does not appear to be a result of changes in the test content, in the way the test was administered or sample obtained. One of the possible interpretations of the decline in ICT literacy is that the increased use of mobile technology devices has resulted in less emphasis on skills associated with information management and processing but more emphasis on communication applications. It is also possible that there has been less emphasis placed in schools on the teaching of skills associated with ICT literacy, with the development of young people's ICT literacy competencies increasingly being taken for granted. Such a shift in emphasis may have contributed to changes in ICT literacy achievement between 2011 and 2014. The reasons for the decrease in Year 6 and Year 10 students' ICT literacy levels remain issues for further investigation.

Chapter 1: Introduction

This report is based on the fourth cycle of national assessments in information and communication technology (ICT) literacy, which was conducted in October 2014. It provides a picture of ICT literacy among Australian school students in 2014 and the changes in ICT literacy over nine years since 2005 (the time of the first cycle). It reports on ICT literacy nationally, for jurisdictions and for particular groups of students. In addition, it profiles student use of ICT in and out of school and students' perceptions of ICT in their lives.

ICT literacy in the educational goals for young Australians

The Melbourne Declaration on Educational Goals for Young Australians was adopted by state, territory and Commonwealth ministers of education in December 2008. The declaration 'sets out educational goals for young Australians' (MCEETYA, 2008, p. 5). As part of its preamble, the Melbourne Declaration asserts:

> *Rapid and continuing advances in information and communication technologies (ICT) are changing the ways people share, use, develop and process information and technology. In this digital age, young people need to be highly skilled in the use of ICT. While schools already employ these technologies in learning, there is a need to increase their effectiveness significantly over the next decade.*

Goal 2 of the Melbourne Declaration states, among other things, that 'all young Australians become successful learners, confident and creative individuals, and active and informed citizens'. The declaration goes on to elaborate that 'successful learners':

> *have the essential skills in literacy and numeracy and are creative and productive users of technology, especially ICT, as a foundation for success in all learning areas.*

This goal continues a theme from the earlier Adelaide Declaration on National Goals for Schooling. The Adelaide Declaration stated that when students left school they should be 'confident, creative and productive users of new technologies, particularly information and communication technologies, and understand the impact of those technologies on society' (MCEETYA, 1999).

The Australian Curriculum identifies seven general capabilities that encompass 'knowledge, skills, behaviours and dispositions' that are presumed to provide the basis for living and working successfully (ACARA, 2012). ICT capability is one of these. According to the Australian Curriculum, students develop ICT capability as they learn to use ICT 'to access, create and communicate information and ideas, solve problems and work collaboratively in all learning areas at school' as well as outside school (ACARA, 2012).

In that context, ICT capability is conceptualised as being concerned with using ICT for purposes such as information access and management, information creation and presentation, problem solving, communication, creative expression and empirical reasoning. It is seen as applying ICT to research, creating multimedia information products, analysing data, designing solutions to problems, controlling processes and devices, and computation, while working both independently and in collaboration with others (ACARA, 2012). The statement also identifies safe working as part of the capability.

ICT literacy in the National Assessment Program

A companion document to the Melbourne Declaration outlined strategies intended to support the implementation of its educational goals over a four-year period from 2009 through 2012 (MCEETYA, 2009). This includes a commitment to evaluation through a national assessment program, comprising national tests in literacy and numeracy across the school population in specified year levels, sample assessments in science literacy, civics and citizenship, and ICT literacy, and participation in relevant international testing programs (MCEETYA, 2009).

The National Assessment Program originated with the work of the MCEETYA National Education Performance Monitoring Taskforce (NEPMT), and later the Performance Measurement and Reporting Taskforce (PMRT) which developed key performance measures to monitor and report on progress towards the achievement of goals for schooling on a nationally comparable basis. Sample-based assessment surveys were initiated in science literacy, civics and citizenship, and ICT literacy on a rolling triennial basis. The first of these was the sample assessment in science literacy in Year 6 conducted in 2003. The first national assessment in civics and citizenship took place in 2004, and the first national assessment in ICT literacy was undertaken in 2005.

The 2005 sample assessment in ICT literacy (NAP – ICT Literacy 2005) was conducted among students in Year 6 and Year 10 (MCEETYA, 2007). It consisted of computer-based and combined tasks requiring the performance of specific functions within software simulations with the creation of products using live applications in a rotated set of thematic modules. The inclusion of 'large' tasks that were completed using multiple functions within live software broke new ground in assessment. When completing these large tasks, students typically needed to select, assimilate and synthesise the information they had been working with in the lead-up tasks and reframe the information to fulfil a specified communicative purpose. Previously, assessment methods that provided for analysing higher-level abilities (such as rubric-scored portfolios) had proven to be very difficult to apply across classrooms. The NAP – ICT Literacy scale, as well as proficiency levels and proficient standards for Year 6 and Year 10, had been established in this first assessment cycle. These proficient standards constitute the reportable key performance measures in ICT literacy.

The second cycle of the national assessments in ICT literacy (NAP – ICT Literacy 2008) extended this approach of performance assessment to incorporate developments in ICT and the *Statements of Learning for Information and Communication Technologies* developed through the Australian Education Systems Official Committee (AESOC) on behalf of MCEETYA (AESOC, 2006). The second cycle also incorporated tasks that reflected changes in the nature of ICT that had emerged over three years (MCEETYA, 2010). NAP – ICT Literacy 2011 incorporated additional features resulting from new developments in ICT, including multimedia video applications and collaborative use of ICT through wikis and other applications. The current fourth assessment cycle, NAP – ICTL 2014, included new modules based on tablet devices and animations.

A key feature of these assessments is the inclusion of 'link' items across cycles: items that are common to two or more adjacent cycles. These link items provide the basis for measuring change over time. In addition, the national assessments in ICT literacy include common items between the Year 6 and Year 10 assessments, thus providing an opportunity to construct a scale to describe achievement across both year levels, and to assess the difference in performance of students at the two year levels assessed in each cycle.

What is assessed in NAP – ICT Literacy

The definition of ICT literacy adopted by MCEETYA for use in the National Assessment Program is:

> *The ability of individuals to use ICT appropriately to access, manage and evaluate information, develop new understandings, and communicate with others in order to participate effectively in society.* (MCEETYA, 2005)

This definition, together with an elaboration through a set of six key processes and a broad description of progress according to three strands, form the basis of the NAP – ICT Literacy Assessment Domain (MCEETYA, 2005) which consistently describes the foundation of the work across the four cycles of NAP – ICT Literacy.

At its inception, the NAP – ICT Literacy Assessment Domain was influenced by work conducted by the Educational Testing Service (ETS) to develop a framework for ICT literacy (ETS, 2002).

Since this initial work undertaken by ETS, there has been growing interest in the assessment of ICT literacy-related competencies in Australia and internationally (Erstad, 2010). The European Commission articulated 'digital competence' as a core competence (European Commission, 2006) and two international projects have emerged in which Australia is participating: the Assessment and Teaching of 21st Century Skills (Griffin, McGaw & Care, 2012) and the International Computer and Information Literacy Study (ICILS) commissioned by the International Association for the Evaluation of Educational Achievement (IEA) (Fraillon, Ainley, Schulz, Friedman & Gebhardt, 2014). As part of the work on NAP – ICT Literacy 2014 the assessment domain was revised to create the NAP – ICT Literacy Assessment Framework. The assessment framework is consistent with the definitions and structures established in the assessment domain.

Continuing advances in hardware and software technologies have meant that the contexts in which ICT literacy can be demonstrated are in constant flux. Despite this, the core capabilities that are the basis of the NAP – ICT Literacy assessments have remained consistently relevant in the field and congruent with curriculum developments in Australia, including the articulation of ICT capability in the Australian Curriculum.

ICT literacy continues to be regarded as a broad set of cross-disciplinary capabilities that are used to manage and communicate information. Binkley et al. (2011, p. 52) have synthesised and documented the operational definitions of ICT literacy that have developed over the past decade. Consistent with the argument of Markauskaite (2006), these combine aspects of technological expertise with concepts of information literacy and extend to include ways in which collected information can be transformed and used to communicate ideas (see Catts & Lau, 2008). ICT literacy has not focused on programming but on computer use (with computers being seen as an important sub-domain of ICT). More recent writing about information literacy has adopted and largely subsumed computer (or ICT) literacy now that digital technologies have developed as primary information management resources.

Stages in the 2014 national assessment of ICT literacy

The first stage of the 2014 national assessment was a review of the contexts in which ICT literacy could be demonstrated by young people to inform the development of assessment contexts for inclusion in the 2014 assessment. This stage involved an analysis of key documents and gathering information on the ICT applications that were used by young people at school and at home. This work was conducted in consultation with the NAP – ICT Literacy Working Group. Most of these activities took place in the middle of 2013. For NAP – ICT Literacy 2011, material was developed that involved multimedia applications and collaboration or knowledge-sharing tools. For NAP – ICT Literacy 2014, a module based on a tablet device and a module that involved creating an animation were included.

The second stage consisted of the development of instruments and technologies for delivery. In NAP – ICT Literacy, the items and tasks were embedded in 25-minute test ‘modules’, each of which had its own unifying theme. The assessment instruments were designed to include three secure trend modules and tasks that had been used in the previous national assessments, as well as six new modules and tasks specifically developed for 2014. The selection of trend modules was based on analyses of data from previous assessments and was carried out with reference to the equating design for the study. The development of new modules and tasks took place over the period from June to December 2013 and included cognitive laboratories with small groups of students. At the same time there was a redevelopment of the student questionnaire material. Data on the use of ICT applications, separately regarding the school and home context (a distinction that had been introduced in NAP – ICT Literacy 2011), were again collected in 2014. The measures of student confidence in using ICT and interest and enjoyment were extended. In both cases, most of the existing items were retained to enable trends to be evaluated. Two new questions were added. One asked what students had learnt in school about using ICT and the other asked about the use of ICT in various school activities.

The second stage also included a review and further development of the delivery methods. To serve this end, the software was written to make use of internet delivery but also allow the use of USB drives on local computers as a back-up where internet capacity was not sufficient. The principal delivery method in NAP – ICT Literacy 2014 was online using the internet. Alternatives involving delivery on USB drives connected to local school computers (the USB drive acting as a web server to the student's computer) as well as delivery using a set of portable computers (mini-lab) were developed.

The third stage involved the field trial of the instruments, which was conducted with about 2200 students in 110 schools from three jurisdictions between March and the beginning of April 2014.

The fourth stage involved a revision of the instruments on the basis of the analyses of field trial data. This activity involved an evaluation of the characteristics of each task to determine whether it should be deleted from the scaling, deleted from the main study test or (in the case of partial credit items) have the scoring categories modified.

The fifth stage included the preparation, delivery and scoring of the main survey. Preparation occurred from June 2014, the main survey was conducted from mid-October to mid-November 2014, with scoring taking place from 12 November to 28 November. Data files for analysis were compiled between January and February 2015. Student background data were collected from schools and education systems during the course of the survey. The assessment survey achieved a nationally representative sample, after removal of exclusions, of 10562 students from Year 6 and Year 10: 5622 from Year 6 and 4940 from Year 10. These students were sampled randomly from 649 schools[3].

The sixth and final stage, which took place between February and June 2015, involved the analyses of data and writing of the reports for this study.

Structure of the report

This report is one of the key outcomes of the 2014 NAP – ICT Literacy project. It is intended to be used by educators and policy makers to provide a profile of ICT literacy at Year 6 and Year 10 across Australia. It is accompanied by a technical report that provides more detailed information about the developmental and analytical procedures, which provide the basis for this report. Sample assessment modules are made available as School Release Materials and are accompanied by scoring guides.

Following this brief introduction, the report proceeds with chapter 2 which outlines the way in which ICT literacy was assessed. The chapter describes the framework, the assessment instrument, the method of delivering the assessment and the sample that was surveyed.

Chapters 3 and 4 focus on the results of the ICT literacy assessment. Chapter 3 presents a national profile of ICT literacy. It discusses the ICT Literacy scale and the six proficiency levels that are used to describe the achievement of students. It discusses the relationship of results in 2014 to those obtained in 2011, 2008 and 2005 including measures of ICT literacy for Year 6 and Year 10. Chapter 3 also includes some ideas for teaching foci that

[3] Prior to exclusions there were 653 participating schools.

are suggested with reference to the ICT Literacy scale. Chapter 4 describes patterns of ICT literacy among jurisdictions and in relation to gender, parental occupation and education, Indigenous status, language background and geographic location.

Chapters 5 and 6 are concerned with other aspects of ICT. Chapter 5 is concerned with student use of ICT at home and at school. It includes a detailed analysis of the applications most frequently used by students as well as the types of school activities in which ICT is used. Chapter 6 focuses on students' perceptions of using ICT. In particular, it reports analyses of student learning about ICT at school, students' interest and enjoyment in using ICT and students' sense of confidence in using ICT. It also explores the relationships between familiarity with ICT, perceptions of ICT and measured ICT literacy.

Chapter 7 provides an overview of the findings and a discussion of the implications of those findings for Australian schools and school systems. It reviews changes in ICT literacy between 2005 and 2014, the differences in ICT literacy among jurisdictions, and associations between ICT literacy and background characteristics of students. Based on these perspectives it suggests some areas on which the teaching of ICT literacy could focus in order to improve student competencies in this area. The chapter also summarises the evidence from the report about the extent of the use of ICT at home and school and the extent to which digital divides are evident.

Chapter 2: Assessing ICT literacy

NAP – ICT Literacy 2014 was based on the NAP – ICT Literacy Assessment Framework (ACARA, 2014) which is consistent with the assessment domain used in the three previous assessment cycles in 2005, 2008 and 2011. As was the case in those three previous cycles, the assessment instrument was computer-based and included a seamless combination of simulated and authentic software applications. The assessment as a whole was structured to be congruent with the previous assessments to provide a basis for comparison with those assessments. This chapter outlines some key features of the NAP – ICT Literacy 2014 assessment. It contains a brief description of the assessment framework that underpinned the ICT literacy assessment without repeating the detail that was elaborated in the reports of the previous assessment cycles (ACARA, 2012). The assessment instrument, and the tasks incorporated in that instrument, is described with an emphasis on the new tasks and how all the tasks embodied as much authenticity as possible. In addition, the chapter provides information on how the assessment was delivered online, making maximum possible use of school computing resources. Finally, the chapter describes the designed and achieved sample of students who participated in the assessment.

ICT literacy assessment framework

Definition

Prior to the 2005 national assessment, the Ministerial Council on Education, Employment, Training and Youth Affairs (MCEETYA) defined ICT as 'technologies used for accessing, gathering, manipulation and presentation or communication of information' and adopted the following definition of ICT literacy:

> *The ability of individuals to use ICT appropriately to access, manage and evaluate information, develop new understandings, and communicate with others in order to participate effectively in society.* (MCEETYA, 2005)

This definition, which draws heavily on the Framework for ICT Literacy developed by the International ICT Literacy Panel in 2003 and the OECD PISA ICT Literacy Feasibility Study (ETS, 2002), was the basis for the 2005 assessment and remained the basis for the 2008 assessment. In addition, while ICT could be broadly defined to include a range of tools and systems, these assessments focused primarily on the use of computers rather than other forms of ICT.

Framework

The 2014 assessment framework envisaged ICT literacy as comprising a set of six integrated key processes:

1 Accessing information (identifying the information needed and knowing how to find and retrieve information)

2 Managing information (organising and storing information for retrieval and reuse)

3 Evaluating (reflecting on the processes used to design and construct ICT solutions and making judgements regarding the integrity, relevance and usefulness of information)

4 Developing new understandings (creating information and knowledge by synthesising, adapting, applying, designing, inventing or authoring)

5 Communicating (exchanging information by sharing knowledge and creating information products to suit the audience, the context and the medium)

6 Using ICT appropriately (making critical, reflective and strategic ICT decisions and using ICT responsibly by considering social, legal and ethical issues).

Conceptions of progress

Any assessment is underpinned by a conception of progress in the area being assessed. This assessment of ICT literacy was based on a hierarchy of what students typically know and can do. It was articulated in a progress map described in terms of levels of increasing complexity and sophistication in using ICT. For convenience, students' skills and understandings were described in bands of proficiency. Each band described skills and understandings that are progressively more demanding. The progress map is a generalised developmental sequence that enables information on the full range of student performance to be collected and reported. Student achievement of the different ICT literacy processes can only be demonstrated by taking into account the communicative context, purpose and consequences of the medium. As such, the ICT literacy progress map was based on three 'strands': (a) Working with information; (b) Creating and sharing information; and (c) Using ICT responsibly.

- In *Working with information*, students progress from using key words to retrieve information from a specified source, through identifying search question terms and suitable sources, to using a range of specialised sourcing tools and seeking confirmation of the credibility of information from external sources.
- In *Creating and sharing information*, students progress from using functions within software to edit, format, adapt and generate work for a specific purpose, through integrating and interpreting information from multiple sources with the selection and combination of software and tools, to using specialised tools to control, expand and author information, producing representations of complex phenomena.
- In *Using ICT responsibly*, students progress from understanding and using basic terminology and uses of ICT in everyday life, through recognising responsible use of ICT in particular contexts, to understanding the impact and influence of ICT over time and the social, economic and ethical issues associated with its use.

Table 2.1 Information and communication technology literacy progress map

Proficiency Level	Strand a: Working with information	Strand b: Creating and sharing information	Strand c: Using ICT responsibly
6	Uses a range of specialised sourcing tools. Seeks confirmation of the integrity of information from credible, external sources. Uses tools, procedures and protocols to secure and retrieve information.	Uses specialised tools to control, expand and author information. Produces complex products. Critiques work and applies knowledge of conventions that shape interpretations when communicating across a range of environments and contexts.	Understands the impact and influence of ICT over time, recognising the benefits, constraints and influence of social, legal, economic and ethical issues on participation in society.
5	Searches for and reviews the information needed, redefining the search to limit or expand. Judges the quality of information for credibility, accuracy, reliability and comprehensiveness. Uses appropriate file formats and procedures to store, protect, retrieve and exchange information.	Uses tools to interrogate, reframe and adapt information. Uses a range of tools to create and enhance the design, style and meaning of information products to suit the purpose and audience.	Understands the social, legal, economic and ethical consequences associated with using ICT across a range of environments and contexts.
4	Develops questions or keyword combinations and selects appropriate tools to locate information. Appraises located information for relevance, currency and usefulness. Uses tools to structure, group and reorganise information for retrieval.	Integrates and interprets information from multiple sources. Selects and combines software and tools to structure, link and present work. Communicates work for different purposes, environments and contexts.	Understands the need for laws, codes of conduct and procedures for ICT use in different contexts. Recognises the potential for misuse of ICT and that there are procedures to address this.
3	Identifies a search question, terms and suitable sources. Browses and retrieves information. Compares and contrasts information from similar sources. Organises and arranges relevant information and files.	Reorganises information from similar sources, using the main ideas. Selects software and tools to combine and transform text, images and other elements. Communicates work using different representations for particular contexts.	Recognises fair use, software restrictions and legal requirements. Identifies responsible use of ICT in particular contexts.
2	Identifies and uses keywords in a search to locate and retrieve information from various sources. Identifies and records relevant content.	Uses the functions within software to edit, format, adapt and generate work to achieve a specific purpose and when communicating with others.	Identifies codes of conduct and ergonomic practices for ICT. Understands ICT terminology and use of computers in society.
1	Uses keywords provided to retrieve information from a single, specified source. Recognises information required. Opens software and saves files.	Identifies and uses some of the basic symbols and functions of software to record ideas.	Understands and uses basic terminology and general procedures for ICT. Describes uses of ICT in everyday life.

In each of the strands there were six proficiency levels hypothesised. These were not proposed as discrete steps that are discontinuous, but as a means of representing progress within each strand. The proficiency levels in each strand are shown in Table 2.1. Sample tasks are available in the released materials from the 2005, 2008, 2011 and 2014 assessments.

The NAP – ICT Literacy Assessment Framework and other frameworks

The NAP – ICT Literacy Assessment Framework prepared for the first NAP – ICT Literacy assessment in 2005 is the key document that defines what is being assessed[4]. However, there are two other documents that have informed the Australian national perspective on ICT literacy. The first is the *Statements of Learning for Information and Communication Technologies* developed through the Australian Education Systems Official Committee (AESOC) on behalf of MCEETYA (AESOC, 2006). The Statements of Learning described the 'knowledge, skills, understandings and capacities' in the field of ICT that all students in Australia should have 'the opportunity to learn'.

The second is *Information and Communication Technology (ICT) Capability* (ACARA, 2013). In the Australian Curriculum, ICT capability is identified as one of the general cross-curricular capabilities that will assist students to live and work successfully in the twenty-first century (ACARA, 2012). The ICT capability learning continuum (specified for the end of Year 2, end of Year 4, end of Year 6, end of Year 8 and end of Year 10) is organised into five interrelated elements (ACARA, 2013):

1 Applying social and ethical protocols and practices when using ICT
2 Investigating with ICT
3 Creating with ICT
4 Communicating with ICT
5 Managing and operating ICT.

Although these three documents served a slightly different purpose in supporting the implementation of ICT literacy education in Australia, they are clearly interrelated. This is especially evident in their conceptualisation of the components and breadth of ICT literacy.

Figure 2.1 shows a mapping of the elements of the NAP – ICT Literacy Assessment Framework with those of the Statements of Learning for ICT and ICT Capability. The mapping illustrates the strongest connections between the elements, but these are not necessarily the only connections. The mapping shows the congruence between the NAP – ICT Literacy Assessment Framework and each of the Statements of Learning for ICT and the ICT Capability statement. Three of the NAP – ICT Literacy elements—Developing new understandings; Communicating; and Using ICT appropriately—correspond directly to three elements in each of the Statements of Learning for ICT and of ICT Capability.

[4] In a similar manner, the ICT curriculum for England presents 'lines of progression' in strands and sub-strands. In the United States the National Education Technology Standards (NETS) for students provided by the International Society for Technology in Education (ISTE) represent capability with six sets of standards.

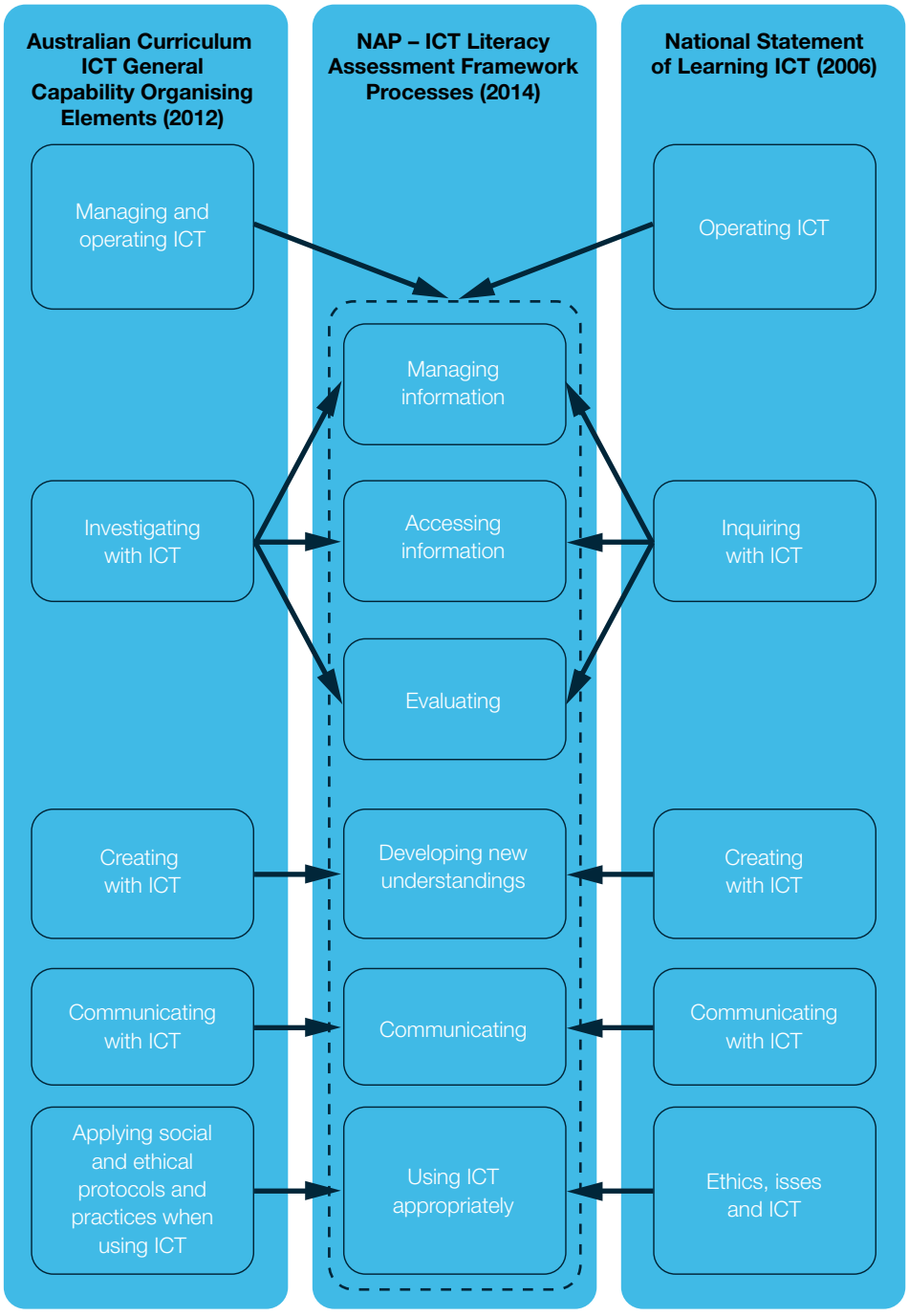


Figure 2.1 Mapping of the NAP – ICT Literacy Assessment Framework, Statements of Learning and ICT Capability

The two main differences between the NAP – ICT Literacy Assessment Framework and the other two documents relate to the treatment of ICT inquiry/investigative processes and ICT operation (skills and processes). In the NAP – ICT Literacy Assessment Framework, the process of inquiry is represented across the three processes of accessing, managing and evaluating information, whereas in the Statements of Learning for ICT and the ICT Capability statement these integrated processes have been subsumed under the general concept of inquiring/investigating. This difference reflects the different purposes of the documents. The Statements of Learning for ICT and the ICT Capability statement have a focus on curriculum implementation that supports an integration of the processes of accessing, evaluating and

managing information. One purpose of the NAP – ICT Literacy Assessment Framework is to provide a framework for the development of assessment tasks and items that target each of these components and represent them as discrete elements. This aspect of the assessment framework underpins the processes of assessment design and reporting that are central to the National Assessment Program.

The Statements of Learning for ICT and the ICT Capability statement each also describes a discrete element relating to operating (and managing) ICT. While there are some differences in the elaborations of these between the two documents, their general essence relates to the application of technical knowledge and skills to work with information. This concept is the global unifier across the NAP – ICT Literacy Assessment Framework, and this has been represented using the dotted line around the elements of the Assessment Framework shown in Figure 2.1. All the tasks in the NAP – ICT Literacy assessment instrument require students to demonstrate operational skills and understandings. Because the test is an authentic representation of ICT use, the global theme of ICT operation is embedded in each task and is inferred across all aspects of student performance. In the case of the NAP – ICT Literacy Assessment Framework, the inclusion of an overarching element relating to operational use would be redundant because of the nature of the assessment program, whereas in the Statements of Learning for ICT and the ICT Capability statement it is of course an essential component to inform curriculum.

In summary, the elements of ICT learning specified in the ICT Capability statement in the Australian Curriculum and the Statements of Learning for ICT were consistent with the elements for assessment described in the NAP – ICT Literacy Assessment Framework. Differences of structure across the documents reflect their different primary purposes to inform assessment (in the case of the Assessment Framework) or curriculum (in the case of the Statements of Learning for ICT and ICT Capability).

Assessment instrument

Design

The assessment instrument used in NAP – ICT Literacy 2014 was based on the design principles established for NAP – ICT Literacy 2005 and continued through the assessment cycles in 2008 and 2011. The assessment instrument consisted of nine discrete test modules, each of which could be completed in a maximum of 25 minutes (controlled by the testing software). Each module followed a linear narrative sequence designed to reflect students' typical 'real-world' use of ICT. The modules included a range of school-based and out-of-school-based themes.

All the modules included large tasks to be completed using purpose-built software applications. Three modules were 'trend' modules as used in at least one of the previous assessment cycles. Six were newly developed for use in the 2014 assessment. The newly developed modules covered skills such as working with tablet computers, using animation software and collaborating with other students.

Each student was administered two trend modules and two new modules appropriate to their year level. The modules were randomly assigned to the students.

Trend modules: a basis for measuring change

The three trend modules – Art Show (from NAP – ICT Literacy 2011), Sports Picnic (from NAP – ICT Literacy 2008 and 2011) and Friend's PC (from NAP – ICT Literacy 2008 and 2011) – were included in the 2014 instrument to enable direct comparisons between the performance of students in 2014 with those of previous cycles of NAP – ICT Literacy. The modules were chosen on the basis that their contents have remained relevant over time, and the comparability of the student data in response to the tasks with the data provided by students across their previous administrations were confirmed in the Field Trial (see the Technical Report for more detail of these empirical analyses).

- *Art Show* (Years 6 and 10): students played the role of content manager for web-based resources. The focus related to students' decision making around the selection and inclusion of appropriate content and the technical processes of adding content to web-based resources using software that reflected standard design interface conventions.
- *Sports Picnic* (Years 6 and 10): This module reflected the development during the middle part of the previous decade of web-based communication devices such as blogs, web-based databases that could sort and filter information and web-based mapping software. The large task in this module required students to make use of given information and an unfamiliar piece of design software (that made use of conventional software features) to create an invitation for a specified purpose and audience.
- *Friend's PC* (Years 6 and 10): Students were required to complete a series of technical tasks relating to setting up software on a computer and finally make use of a piece of image editing software to make specified changes to an image. This module had a focus on software skills reliant on knowledge and application of software and interface design conventions.

New modules: providing for changes in ICT

The newly developed modules for use in 2014 were designed to ensure that the full breadth and range of the assessment framework were represented in the NAP – ICT Literacy test instrument, with a focus on ensuring that the modules referenced more recent developments in the types of software students could be expected to be using. To accommodate the variability in internet capacity, one of these used an animation video rather than one containing complex multimedia (video) content. The practical challenges associated with delivering audio-based national assessments using school computer resources precluded audio from being used in these test modules.

The six newly developed modules were: Computer Game, Battle of the Bands, Techno-teaching, Slide Show, Technology on the Go, and Animation Video.

- *Computer Game* (Year 10 only): Students were asked to work on a project concerned with creating an online game for the class. The task was to use some software to design a survey, ask the teacher to help administer the survey, interpret the survey results and use some software to design the game.
- *Battle of the Bands* (Year 10 only): Three students have formed a music band that has won a talent contest and been invited to enter an interstate competition. Students were asked to help the band by completing the online registration for the competition, promote the band's next gig through social media and set up a crowd-funding web page to raise money.

- *Techno-teaching* (Year 10 only): Students were asked to write a report in collaboration with another student on whether computers can replace teachers in the classroom. They were required to search websites to find appropriate material and to format a report that has been drafted by their colleague.
- *Slide Show* (Years 6 and 10): Students completed a class project about the Tasmanian Devil Program on Maria Island. The module involved opening and saving files, searching websites for information on the topic, creating a short slide show about the Tasmanian Devil Program on Maria Island and scripting notes to go with the slide show.
- *Technology on the Go* (Years 6 and 10): A student has borrowed a tablet computer to take on a two-week school trip to Central Australia. The student was asked to set up the tablet to access the internet, install a number of applications on the tablet computer, set up one of the applications to collect weather data and use software to manage the data.
- *Animation Video* (Years 6 and 10): The student was part of a design team creating an animated video about water safety around lakes and dams. The video was aimed at upper primary school students. The student was required to use purpose-built animation software to make the video and then modify settings on a video-sharing website in order then to upload the file to the website.

Delivery methods

Assessment system in 2014

NAP – ICT Literacy 2014 was delivered in most schools (94%) using an online system. Preparatory activities were conducted to ensure that schools were able to conduct the assessment in the manner intended. Participating schools carried out an online technical readiness test (TRT) on all assessment-designated computers. In a few schools (31 schools or 5% of schools) it was necessary to administer the assessment using USB devices attached to school computers. Because the testing software itself was entirely web-based it could be delivered using the internet or using a USB device as a local server. In a very few schools (eight schools) it was necessary to provide suitable laptop computers for the test administration. Even though there were variations in the back-end delivery method, it was possible to ensure that each student had an equivalent test-taking experience[5]. During the assessment a help desk was available to respond to any technical issues that arose.

Evolving delivery methods but consistent assessment experience

A different mix of back-end delivery software systems has been used in each of the four cycles of NAP – ICT Literacy. Despite this, the on-screen environment experienced by the student has remained consistent throughout. The only change in the on-screen experience over the four cycles has been an update of the colours and some minor layout changes to the screen theme used in 2014. The student screen had three main sections: a surrounding border of test-taking information and navigation facilities; a central information section that could house stimulus materials for students to read or (simulated or live) software

[5] The NAP – ICT Literacy data require students to have the same test-taking experiences (speed, screen display, time allowed, etc.) to enable use of the data for the purpose of comparing student achievement within and across the assessment cycles.

applications; and a lower section containing the instructional and interrogative text of the assessment items and the response areas for multiple-choice and constructed response items. The assessment items were presented in a linear sequence to students. Students were not permitted to return to previously completed items because in some cases later items in a sequence provide clues or even answers to earlier items.

The administration for each student involved completing a tutorial of 10 minutes (which provided an introduction to the system and practice questions), four test modules each lasting 20 minutes and the 10-minute student questionnaire. There was provision for four 5-minute breaks between test modules.

Flexible delivery

Special provisions were made as part of NAP – ICT Literacy 2014 for eight schools (one covered both Year 6 and Year 10, so there were nine school units in total) in very remote locations. Of these eight schools, six used the online delivery mode and two used the USB mode. Flexible delivery was a practice initiated in NAP – ICT Literacy 2011 to take account of the distances involved in accessing these schools, to better target the instrument and to provide opportunity for higher participation rates. The provisions included modifications to the assessment and to the method of administration.

For flexible delivery, the number of modules to be completed by each student was reduced from four to three and the timer was removed from the application to allow students additional time to complete the tasks. In addition, the teacher was permitted to read the instructions and questions to students (similar to the provision in the regular delivery for test administrators to read instructions and questions to students requiring support). Teachers—rather than test administrators—administered the assessment. These teachers were trained using a video, telephone and written materials, and a help desk was maintained for these schools and teachers. Teachers were able to administer the assessment to small groups of students or to individuals when it was possible and appropriate over a period of several weeks.

Sample

The samples were designed and implemented to obtain estimates of ICT literacy that were representative of the Year 6 and Year 10 populations in Australia, within states and territories and designated subgroups at the national level. Sampling procedures were designed to minimise any potential bias and to maximise the precision of estimates.

Sample design

The sampling procedure followed the cluster sampling procedures established for national sample surveys conducted by the Performance Measurement and Reporting Taskforce (Murphy & Schulz, 2006). Cluster sampling is cost-effective because a group of students from the same school can be surveyed at the same time, rather than possibly just one or two students if a simple random sample of students from the population were to be drawn. Sampling involves a two-stage process to ensure that each eligible student has an equal chance of being selected in the sample. The sample size for NAP – ICT Literacy 2014 was similar to that for NAP – ICT Literacy 2011.

Sampling process

In the first stage of sampling, schools were selected from a list of all schools in each state or territory with a probability proportional to the number of students in the relevant year level enrolled at that school. The list of schools was stratified by a number of characteristics to increase the precision of sampling procedures. The NAP – ICT Literacy 2014 Technical Report will provide details of the stratification used for the sampling of schools. A small number of schools was excluded from the selection process. The number of schools selected in each of the mainland states was of similar size to ensure comparable levels of precision in the population estimates derived from jurisdictional samples.

In the second stage, up to 20 students were selected at random from a school-provided list of all eligible students from each target year level. Not all schools had 20 students at the year level and in these cases all of these students were assessed. By selecting students at random from the year level, and by selecting up to 20 students per school, the sample had enhanced precision over a sample of the same number of students based on selecting intact classes because the effect of students being in the same classes was reduced. Furthermore, it enabled improved planning for the number of computers needed for administering the survey at each school.

Achieved sample

The total achieved sample for the survey consisted of 10562 students from Year 6 and Year 10: 5622 from Year 6 and 4940 from Year 10. These students were sampled randomly from 649 schools: 334 for Year 6 and 315 for Year 10. Schools were recorded as missing if fewer than 50 per cent of sampled students participated. The overall participation rates[6] of students were 91 per cent at Year 6 and 81 per cent at Year 10. It can be inferred from this that there is little potential for bias arising from differential participation by students at the national level. The overall participation rate at Year 6 was the same as for NAP – ICT Literacy 2011, but the rate for Year 10 was slightly lower (by five percentage points). Participation rates among the jurisdictions were largely similar to those of NAP – ICT 2011 with the exception of the Northern Territory where participation in NAP – ICT 2014 was lower than in 2011. The participation rate of 53 per cent for Year 10 in the Northern Territory is of concern for the estimates in that jurisdiction. Table 2.2 records the distribution of the achieved and target samples (unweighted frequencies) across the states and territories for each year level.

[6] Participation rates are weighted at the school and student level and include replacement schools. See the NAP – ICT Literacy Technical Report for further details.

Table 2.2 Numbers of students and schools in the target and achieved samples

	Year 6				Year 10			
	Schools		Students		Schools		Students	
	Target sample	Achieved sample	Target sample	Achieved sample	Target sample	Achieved sample	Target sample	Achieved sample
New South Wales	50	52	1004	908	50	49	1000	770
Victoria	50	53	1018	926	50	48	1000	806
Queensland	50	52	1010	870	50	50	1000	809
Western Australia	45	46	889	795	50	50	1015	801
South Australia	45	49	932	805	50	49	1000	760
Tasmania	40	43	799	706	35	35	701	525
ACT	20	19	400	341	20	21	420	320
Northern Territory	20	20	390	271	15	13	301	149
Australia	**320**	**334**	**6442**	**5622**	**320**	**315**	**6437**	**4940**

Note: Target samples refer to the numbers of students and schools selected in the sampling process. Achieved samples refer to the numbers of students and schools that actually participated.

The average achieved cluster size was 17 students per school in Year 6 and 16 students per school in Year 10. The achieved cluster size was less than 20 because some schools had fewer than 20 students at the year level and some Year 10 students were unavailable for the assessment due to absence or having left school for the year (although return visits were made to a number of schools to assess absentees). In some jurisdictions the achieved sample shown in Table 2.2 exceeds the target sample. This is because the sample size was increased to account for larger proportions of very small schools.

Details of the social and demographic characteristics of students in the sample are recorded in Table 2.3. Missing data often arise when data regarding background characteristics are gathered on the basis of information supplied by parents through schools or school systems. For parental education and occupation, data were missing for about 10 per cent of students with some variation across jurisdictions. The level of missing data for parental education and occupation is only about half of what was recorded in the previous NAP – ICT Literacy assessment in 2011. Missing data for other characteristics were 5 per cent or less.

Table 2.3 National percentage distribution of sample characteristics (weighted)

	Year 6		Year 10	
	%	Valid %	%	Valid %
Student gender				
Male	50	50	52	52
Female	50	50	48	48
Missing data	0		0	
Parental occupation				
Senior managers & professionals	25	28	24	27
Other managers & associate professionals	23	25	25	28
Tradespeople & skilled office, sales & service staff	21	24	21	24
Unskilled labourers, office, sales & service staff	14	16	13	15
Not in paid work for 12 months	7	7	6	6
Missing data	10		11	
Parental education				
Year 9 or below	2	3	3	3
Year 10	5	6	5	6
Year 11	3	3	4	4
Year 12	10	11	7	8
Certificate I to IV (including trade certificate)	25	27	26	29
Advanced Diploma / Diploma	13	14	16	18
Bachelor degree or above	34	37	29	32
Not stated / Unknown	7		10	
Indigenous status				
Aboriginal or Torres Strait Islander	4	4	4	4
Not Aboriginal or Torres Strait Islander	94	96	92	96
Missing data	2		4	
Language at home				
English	76	79	76	78
Other than English	20	21	22	22
Missing data	3		3	
Country of birth				
Australia	86	87	85	85
Outside of Australia	13	13	15	15
Missing data	1		0	
Geographic location				
Metropolitan	73	73	74	74
Provincial	26	26	25	25
Remote	1	1	1	1
Missing data	0		0	

Notes: Table 2.3 shows for each variable the percentage of all participating students in each category and the percentage of responses for which data were not missing.
Levels of missing data varied across jurisdictions.

Calculating the precision of estimates

For any survey there is a level of uncertainty regarding the extent to which an estimate measured from the sample of students is the same as the true value of the parameter for the population. An estimate derived from a sample is subject to uncertainty because there is an error associated with the process of random sampling. If a statistic was estimated from different samples drawn from the same population of students, the observed values for the statistic would vary from sample to sample. The extent to which this variation exists is expressed as the confidence interval. The 95 per cent confidence interval is the range within which the estimate of the statistic based on repeated sampling would be expected to fall for 95 of 100 samples that might have been drawn.

The survey sample design in this study involves clustering, stratification, and disproportionate allocation, which means it is not appropriate to use the estimates of confidence intervals through standard software procedures because these generally assume a simple random sample and will therefore underestimate the real confidence intervals. The estimates of confidence intervals in this report are based on 'Jackknife' replication methods. In replication methods, a series of sub-samples is derived from the full sample and the statistic of interest is generated for each sub-sample. The variance is then estimated by calculating the variability in the estimate between these sub-samples. This technique generates an estimate of the standard error of the estimate and the confidence interval is 1.96 times the standard error. Further details are provided in the NAP – ITC Literacy 2011 Technical Report.

Estimating the significance of differences

When appropriate, differences in means were tested for significance. This was done to avoid reporting differences that were only the result of random fluctuations due to the process of sampling. Statistical significance refers to the likelihood of a difference being the result of chance rather than a true reflection of the measured outcomes. Significance tests make use of the standard error of the difference instead of simply reviewing possible overlap between confidence intervals, because even in cases of an overlap differences might still be statistically significant. Throughout this report, differences are stated to be statistically significant if there is a 95 per cent probability that the difference is a true difference which is not due to sampling or measurement error.

The size of differences

In large samples, it is possible that relatively small differences are statistically significant even if the differences themselves have little importance. Another way of looking at differences is to consider the effect size. Effect size is useful when considering the differences between measured scores (such as NAP – ICT Literacy scores or questionnaire scale scores) across groups. Effect size provides a comparison of the difference in average scores between two groups with reference to the degree to which the scores vary within the groups. When the effect size is large, it means that the difference between average scores is large relative to the spread of the scores, and could therefore be considered as 'important'. Conversely, when the effect size is small, it means that the observed difference is relatively small compared with the spread of the scores and arguably less 'important'.

The effect size is the difference between group means divided by the standard deviation. These values can be classified as small, moderate or large. When first proposed, an

effect size of 0.2 was considered small (average growth in one year), 0.5 was considered moderate and 0.8 was considered large (Cohen, 1969). However, following the conventions that have developed in research and measurement, the precedent of other NAP sample assessments and the spread of significant mean differences in NAP – ICT Literacy, this report has adopted the following categories as descriptors: effect sizes above 0.1 are regarded as indicating small effects, those above 0.3 are moderate effects, and those above 0.5 are large effects. Descriptors relating score point differences to standard deviations are used in the report when regarded as informative.

For NAP – ICT Literacy 2014, the difference in performance between Year 6 and Year 10 students is 107 points. Consequently, given the Year 6 standard deviation from 2005 of 100 score points, a moderate effect on the NAP – ICT Literacy scale roughly corresponds to the average growth in one school year or 30 scale points. For the questionnaire scales, a moderate effect is roughly three scale points given that the Year 6 standard deviation was set at 10 score points.

Administration

In order to ensure the smooth operation of the system and to assure data quality, test administrators travelled to each school to administer the assessment. The assessment was usually administered to groups of ten students in two testing sessions during the school day. In some schools, it was possible to have 20 students complete the assessment in one session. Students sampled for the assessment were withdrawn from regular classes and completed the assessment in a designated area of the school where the computer equipment was located. The administration took place between 13 October and 14 November 2014.

Comparability across cycles of NAP – ICT Literacy

One of the key purposes of NAP – ICT Literacy is to measure changes in ICT literacy over time. This can only happen if ICT literacy is measured using an instrument and operational procedures that provide valid, reliable and comparable data across cycles. This was planned for in the processes of instrument development, which was conducted in consultation with the NAP – ICT Literacy Working Group, and in the operational procedures, which were developed to be consistent with those of previous assessment cycles. The data collected in NAP – ICT Literacy were also used to investigate the comparability of data collected in 2014 with those of previous cycles. The NAP – ICT Literacy 2014 Technical Report contains full detail of the checking that was conducted regarding the test and procedures. Following is a summary of what was found from these investigations.

The NAP – ICT Literacy test used in 2014 was highly reliable (0.952)[7]. Careful checks were implemented to determine whether the overall decrease in achievement between 2011 and 2014 (see Chapter 3) were reflected in student performance on the individual assessment

[7] PV/EAP reliability from ConQuest, for further details see the NAP – ICT Literacy 2014 Technical Report.

tasks. This was done by comparing the percentages of students correctly responding to each of the tasks used in both the 2011 and 2014 assessments (the tasks from Sports Picnic, Friend's PC and Art Show). This investigation revealed that a significantly lower proportion of students correctly responded to the tasks administered in 2014 than when the same tasks were administered in 2011. This decrease was consistent across tasks and observable at each year level.

The test design (the number of modules completed by each student and time allowed for each module) in 2014 was the same as that used in 2011. The basis for the comparison between 2011 and 2014 was the performance of students on the tasks used in both cycles, the introduction of the new test modules in 2014 would not have compromised the comparability of data collected in 2014 with those of previous assessment cycles. The data from the tasks completed in 2014 and 2011were first examined to see whether they were measuring student achievement in statistically comparable way across the assessment cycles[8]. Only data from tasks that satisfied this standard were used to equate the 2014 data to the NAP - ICT Literacy scale. Since its inception in 2004, the NAP – ICT Literacy assessment has employed the same model of using secure trend modules as the basis for establishing comparisons of student achievement across cycles while also refreshing the instrument with newly developed modules each cycle.

The only operational difference between NAP – ICT Literacy 2011 and 2014 was a change in the primary delivery method from USB-based in 2011 (one USB per computer) to internet-based delivery in 2014. In both cycles the tasks were completed on desktop computers (and in a small number of schools on notebook computers) so the difference between the cycles relates only to the mechanism by which the test content was delivered to the computers. It is possible that if the tasks performed differently for students when delivered over the internet than by USB stick, this could have influenced student performance. Reports from the NAP – ICT Literacy test administrators in 2014 did not suggest that the internet-delivered tasks responded to students' actions differently in any discernible way (such as more slowly or with lag) from the USB-delivered items in 2011.

The sampling procedures used in NAP – ICT Literacy 2014 were the same as those used in previous cycles. The national participation rate (reported earlier in this chapter) at each year level was sufficiently high to infer that the sample of students was unbiased at the national level, and consequently suitable to support comparisons in student achievement with previous assessment cycles. The participation rate at each year level met the international standards for reporting national achievement used in the OECD Programme for International Student Assessment[9] (PISA) and IEA studies such as the International Civics and Citizenship Education Study (ICCS) and International Computer and Information Literacy Study (ICILS)[10].

NAP – ICT Literacy collects information on student background and on student use of and attitudes towards the use of computers; Chapters 4, 5 and 6 report on these in detail. When considering the comparability of the 2014 data with those from previous cycles one can look for patterns of differential relationships between the contextual information collected (such as student gender, school location, student use of ICT) and student achievement across

[8] Full details of this process are provided in the NAP – ICT Literacy 2014 Technical Report

[9] For further details see the PISA 2012 Technical Report (OECD, 2014, p 69)

[10] For further details see the ICCS 2009 Technical Report (Schulz, Ainley & Fraillon, 2001, p 84) and the ICILS Technical Report (Fraillon et al, forthcoming)

cycles. Extreme differences in these relationships, in particular in contrast to patterns across previous cycles may suggest some differences in the comparability of data across cycles. No such differences exist between the 2014 data and those of previous cycles.

Summary

The NAP – ICT Literacy 2014 assessment was developed to reflect ongoing changes in technologies and in national and international conceptualisations of ICT-related literacies without compromising its essential link to the three previous cycles of NAP – ICT Literacy. The Assessment Framework that underpins NAP – ICT Literacy is congruent with the *Statements of Learning for Information and Communication Technologies* and the ICT Capability statement for the Australian Curriculum, which are two more recently developed documents that guide Australian national perspectives on ICT literacy teaching and learning.

The assessment was designed so that there was a core of three modules that had been used in previous cycles of NAP – ICT Literacy and six new modules developed for inclusion in 2014. This design enables the measurement of changes in ICT literacy over the four cycles of NAP – ICT Literacy and allows the assessment to take account of new developments in ICT software, hardware and use. In 2014, the assessment was administered using an online delivery system supported by a backup system using USB drives to maintain measurement equivalence across students.

The total achieved sample for the survey consisted of 10562 students from Year 6 and Year 10: 5622 from Year 6 and 4940 from Year 10. These students were sampled randomly from 649 schools: 334 for Year 6 and 315 for Year 10. The overall participation rates of students were 91 per cent at Year 6 and 81 per cent at Year 10 and met international standards for reporting data at the national level.

Analysis of the procedures used to implement NAP – ICT Literacy 2014 and of the data collected at the national level show that the 2014 data are suitable for comparison with those collected in previous cycles of NAP – ICT Literacy.

Chapter 3: A national profile of ICT literacy

This chapter describes the development of the NAP – ICT Literacy scale followed by a discussion of student achievement on this scale at the national level. It then uses example items taken from the 2014 test to illustrate the different levels of proficiency described on the scale. Finally we include some suggested teaching foci that relate to student achievement against the scale and further reference Australian data from the IEA International Computer and Information Literacy Study (ICILS) collected in 2013.

Developing the NAP – ICT Literacy scale

The NAP – ICT Literacy scale was established in 2005 on the basis of the test contents and psychometric data collected during the inaugural NAP – ICT Literacy assessment. The scale comprises six proficiency levels that are used to describe the achievement of students at both Year 6 and Year 10. The scale descriptors have been reviewed following each subsequent cycle of NAP – ICT Literacy to ensure that they are an accurate reflection of the NAP – ICT Literacy test contents.

The empirical scale

The Rasch Item Response Theory (IRT) model was used to establish the empirical component of the scale. This is the same model that has also been used to establish the empirical scales in the National Assessment Program – Science Literacy, Civics and Citizenship (NAP – CC), and in the National Assessment Program – Literacy and Numeracy (NAPLAN). More information about the scaling model and procedures is provided in the NAP – ICT Literacy 2014 Technical Report.

The 2014 NAP – ICT Literacy test includes a proportion of test questions that were used in the 2011 test, which in turn contained test questions that had already been used in the 2008 assessment (some questions were common for all three tests). Common questions were also included in the assessments of Year 6 and Year 10 (in each of the 2005, 2008, 2011 and 2014 cycles). In 2005, data from the common questions at Year 6 and Year 10 were used to establish a single NAP – ICT Literacy scale across those year levels. In 2008, 2011 and 2014, data from the common items between year levels and across assessment

cycles were used to derive comparable student achievement scores on the established NAP – ICT Literacy scale. The scale was set in 2005, with a mean score of 400 and standard deviation of 100 scale points for the national Year 6 sample. NAP – ICT Literacy scale scores from all four assessment cycles are reported on this same metric.

Figure 3.1 shows the relative difficulty of all the items and the performance of Australian students on the scale. The distributions of Year 6 and Year 10 student achievement are displayed separately. Figure 3.1 will be discussed in terms of the general features of the distributions of the test item difficulty and student achievement against the NAP – ICT Literacy scale. The remaining sections of this chapter discuss the achievement of Year 6 and Year 10 students nationally in greater detail.

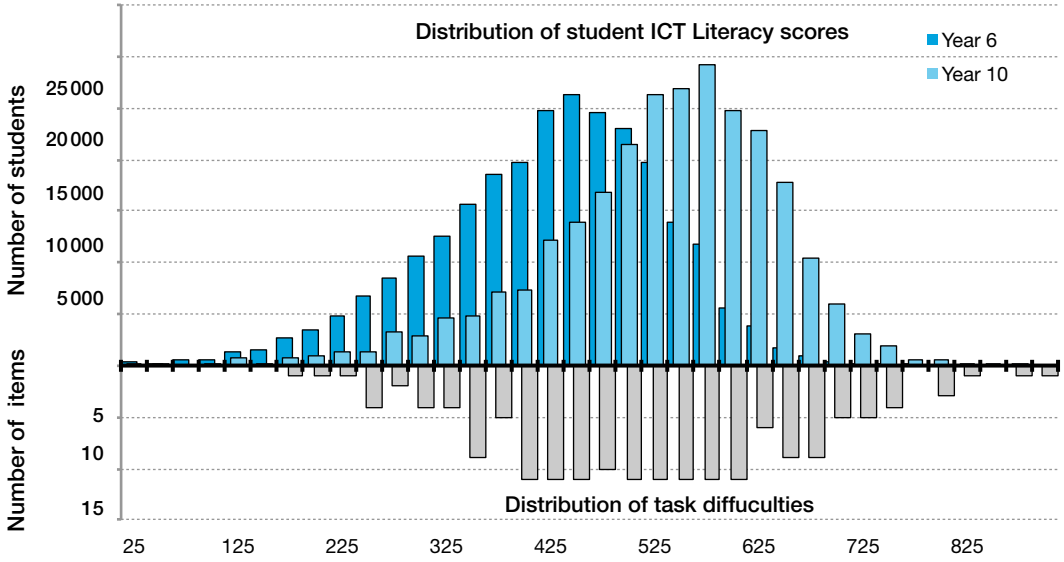


Figure 3.1 Distributions of student ICT Literacy scores and task difficulties in 2014

Figure 3.1 shows that the difficulty of the test items covers most of the range of achievement displayed by the students, with a high proportion of tasks in the middle of the range. At the lower end of the scale there are proportionally fewer tasks than students. The Year 6 and Year 10 distributions of students both appear to be normal, with the Year 10 student distribution centred somewhat more than 100 scale points above the Year 6 distribution. At each year level there is, however, a 'tail' of students demonstrating low levels of achievement. Figure 3.1 shows that students in each of Year 6 and Year 10 demonstrated achievement from the lowest to upper end of the scale, but that the highest levels of achievement (above 700 scale points) were attained by only a few Year 10 students.

The proficiency levels

Six proficiency levels were established at equally spaced intervals across the NAP – ICT Literacy scale in 2005. Each proficiency level spans 120 scale points.

Each level description provides a synthesised overview of the knowledge, skills and understandings that a student working within the level is able to demonstrate. The levels were set so that a student with a proficiency scale score at the bottom of a level has a 62 per cent chance of correctly answering a question at the bottom of that level, a 38 per cent chance of correctly answering a question at the top of that level, and would be

expected to correctly answer at least about half of a set of questions evenly spaced across the level. The cut-points for the proficiency levels are shown in Figure 3.2.

Level	Cut-point in scale score
Level 6	
	769
Level 5	
	649
Level 4	
	529
Level 3	
	409
Level 2	
	289
Level 1	

Figure 3.2 Cut-points for proficiency levels

Describing the NAP – ICT Literacy scale

Summary descriptions for all six levels were established in 2005 based on expert judgements of the contents of the questions situated within each level. These descriptions were confirmed in 2008 and 2011 against the new test content developed for each new assessment cycle. Broadly, the level descriptors included reference to the three strands of the progress map in the NAP – ICT Literacy Assessment Framework. Across the six proficiency levels the descriptors refer to: information search and evaluation, software applications in terms of their functions and features (rather than specific software products), and aspects of appropriate and ethical use of ICT. As a consequence, the descriptors have continued to be relevant and applicable to demonstrations of ICT literacy achievement even though different software contexts have evolved over the four cycles of NAP – ICT Literacy. The assessment modules, and the tasks those modules contain, were updated to reflect new software contexts and applications, but the underlying construct has remained constant. This principle is followed in most assessment studies that extend over several cycles and are concerned with measuring change. It is accepted that changes in methods and content are necessary for assessments to remain relevant, but that maintaining the meaning of the construct is a necessary condition for measuring change (von Davier & Mazzeo, 2009).

The NAP – ICT Literacy scale represents a hierarchy of the knowledge, skills and understanding included in the construct of ICT literacy. Overall, higher levels on the scale refer to more complex applications of knowledge, skills and understandings in ICT literacy. The scale is developmental in the sense that students are assumed to be typically able to demonstrate achievement of the skills and cognition described in the scale below as well as at their measured level of achievement.

Table 3.1 includes the described NAP – ICT Literacy scale together with examples of student achievement at each proficiency level. It also shows the percentage of students who demonstrated achievement at each proficiency level and the proficient standards for Year 6 and for Year 10. The proficient standards and student achievement in relation to the proficiency levels are discussed in the following sections.

Table 3.1 NAP – ICT Literacy scale proficiency level descriptors and percentage distribution of students by year level

Level	Proficiency level description	Examples of student achievement at this level	Year 6 %	Year 10 %
6	Students working at Level 6 create information products that show evidence of technical proficiency and careful planning and review. They use software features to organise information and to synthesise and represent data as integrated complete information products. They design information products consistent with the conventions of specific communication modes and audiences and use available software features to enhance the communicative effect of their work.	• Create an information product in which the flow of information is clear, logical and integrated to make the product unified and complete. • Select appropriate key points and data from available resources and use their own words to include and explicate them in an information product. • Use graphics and text software editing features, such as font formats, colour, animations and page transitions, in ways that enhance the structure and communicative purpose of an information product. • Include relevant tables and charts to enhance an information product and support these representations of data with text that clearly explains their purpose and contents.	–	0(±0.3)
5	Students working at Level 5 evaluate the credibility of information from electronic sources and select the most relevant information to use for a specific communicative purpose. They create information products that show evidence of planning and technical competence. They use software features to reshape and present information graphically consistent with presentation conventions. They design information products that combine different elements and accurately represent their source data. They use available software features to enhance the appearance of their information products.	• Create an information product in which the information flow is clear and logical and the tone and style are consistent and appropriate to a specified audience. • Select and include information from electronic resources in an information product to suit an explicit communicative purpose. • Use graphics and text software editing features such as font formats, colour and animations consistently within an information product to suit a specified audience. • Create tables and charts that accurately represent data and include them in an information product with text that refers to their contents. • Apply specialised software and file management functions such as using the history function on a web browser to return to a previously visited page or sorting data in a spreadsheet according to a specified criterion.	1(±0.3)	9(±1.5)
4	Students working at Level 4 generate well–targeted searches for electronic information sources and select relevant information from within sources to meet a specific purpose. They create information products with simple linear structures and use software commands to edit and reformat information products in ways that demonstrate some consideration of audience and communicative purpose. They recognise situations in which ICT misuse may occur and explain how specific protocols can prevent this.	• Create an information product in which the flow of information is clear and the tone is controlled to suit a specified audience. • Generate searches that target relevant resources and then select relevant sections of these resources to include, with some modification and supporting text, in an information product. • Apply graphics and text software editing features, such as font formats, colour and image placement, consistently across a simple information product. • Apply infrequently used software and file management functions such as displaying a specified hidden toolbar in a word processor, editing text in an online survey, or using a single pull–down menu function or installation wizard to save files to a specified location. • Identify security risks associated with spyware and providing personal data over the internet and explain the importance of respecting and protecting the intellectual property rights of authors.	13(±1.3)	43(±2.0)
	Proficient Standard for Year 10			

Level	Proficiency level description	Examples of student achievement at this level	Year 6 %	Year 10 %
3	Students working at Level 3 generate simple general search questions and select the best information source to meet a specific purpose. They retrieve information from given electronic sources to answer specific, concrete questions. They assemble information in a provided simple linear order to create information products. They use conventionally recognised software commands to edit and reformat information products. They recognise common examples in which ICT misuse may occur and suggest ways of avoiding them.	• Create an information product that follows a prescribed explicit structure. • Select clear, simple, relevant information from given information sources and include it in an information product. • Use graphics and text software editing features to manipulate aspects such as colour, image size and placement in simple information products. • Apply software and file management functions using common conventions such as left–aligning selected text, adding questions to an online survey, or creating and naming a new file on the desktop. • Recognise the potential for ICT misuse such as plagiarism, computer viruses and deliberate identity concealment, and suggest measures to protect against them.	42(±2.5)	33(±2.1)
	Proficient Standard for Year 6			
2	Students working at Level 2 locate simple, explicit information from within a given electronic source. They add content to and make simple changes to existing information products when instructed. They edit information products to create products that show limited consistency of design and information management. They recognise and identify basic ICT electronic security and health and safety usage issues and practices.	• Locate explicit relevant information or links to information from within a web page. • Make changes to some presentation elements in an information product. • Apply simple software and file management functions such as copying and pasting information from one column of a spreadsheet to another column or adding a web page to a list of favourites (bookmarks) in a web browser or opening an email attachment. • Recognise common computer use conventions and practices such as the use of the '.edu' suffix in the URL of a school's website, the need to keep virus protection software up to date and the need to maintain good posture when using a computer.	31(±2.4)	11(±1.4)
1	Students working at Level 1 perform basic tasks using computers and software. They implement the most commonly used file management and software commands when instructed. They recognise the most commonly used ICT terminology and functions.	• Apply graphics manipulation software features such as adding and moving predefined shapes to reproduce the basic attributes of a simple image. • Apply basic file and computer management functions such as opening and dragging and dropping files on the desktop. • Apply generic software commands such as the 'Save as' and 'Paste' function, clicking on a hyperlink to go to a web page, or selecting all the text on a page. • Recognise basic computer use conventions such as identifying the main parts of a computer and that the 'Shut down' command is a safe way to turn off a computer.	14(±1.9)	4(±1.1)

The proficient standards

One of the purposes of the NAP sample studies (in ICT Literacy, Civics and Citizenship and Science Literacy) is to report on student attainment of proficient standards as key performance measures. The proportion of students achieving at or above the proficient standard is the national key performance measure (KPM) for ICT literacy specified in the *Measurement Framework for Schooling in Australia 2012* (ACARA, 2013).

The proficient standards 'represent a "challenging but reasonable" expectation of student achievement at a year level with students needing to demonstrate more than elementary skills expected at that year level' (ACARA, 2013, p. 5). This is different to the definition of either a benchmark or a National Minimum Standard which refers to minimum competence. The proficient standards in ICT literacy (one for Year 6 and one for Year 10) were established as a result of consultations with ICT experts and representatives from all states and territories and all school sectors as part of the 2005 cycle. The standards setting group included practicing teachers with specific ICT expertise, ICT curriculum experts and educational assessment experts. The procedures followed by the group are outlined in the report of NAP – ICT Literacy for 2005 (MCEETYA, 2007, pp. 46–47).

The Proficient Standard for Year 6 and the Proficient Standard for Year 10 were established in 2005 on the NAP – ICT Literacy scale. Each standard is a point on the scale that is at the boundary between two proficiency levels and defines a 'challenging but reasonable expectation of student performance at that year level'. The Proficient Standard for Year 6 is 409 scale points, which is the boundary between levels 2 and 3 on the NAP – ICT Literacy scale. The Proficient Standard for Year 10 is 529 scale points, which is the boundary between levels 3 and 4 on the scale. Year 6 students performing at Level 3 and above and Year 10 students performing at Level 4 and above have consequently met or exceeded their relevant proficient standard.

Fifty-five per cent of Year 6 students and 52 per cent of Year 10 students met or exceeded the relevant proficient standard for NAP – ICT Literacy in 2014.

Comparisons of student performance by year level

Comparison of means

The mean score of Year 6 students was 413 scale points, and for Year 10 students it was 520 scale points. Students in Year 10 achieved, on average, 107 scale points more than students in Year 6. This difference is statistically significant and is equivalent to slightly less than (0.9) the width of a proficiency level on the NAP – ICT Literacy scale.

Comparison by proficiency level

The percentages of students demonstrating achievement of each proficiency level in Year 6 and Year 10 are presented in Table 3.1 above. These percentages are also displayed graphically in Figure 3.3, together with the location of the proficient standard for each year level. Appendix 4 records the distribution of students across proficiency levels for each jurisdiction.

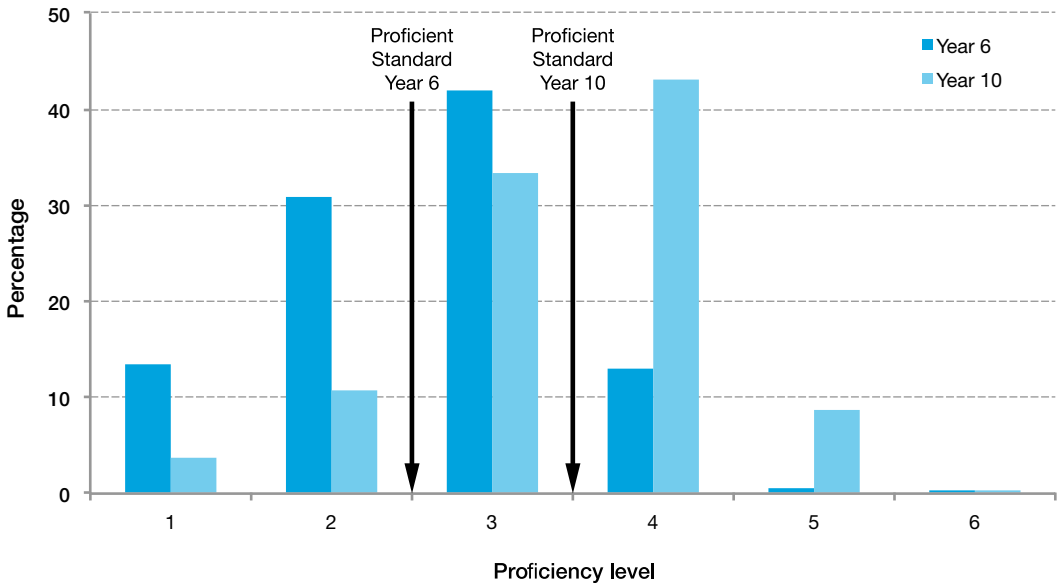


Figure 3.3 Distribution of students across proficiency levels by year level

Figure 3.3 shows that there is a concentration of student achievement at Year 6 in levels 2, 3 and 4. These levels contained 86 per cent of Year 6 students. At Year 10, levels 3, 4 and 5 contained 85 per cent of students. The figure shows that the Year 10 students' achievement distribution is centred approximately one proficiency level above that of Year 6. It also illustrates the overlap in achievement between Year 6 and Year 10. This overlap is centred on Level 3 at which the achievement of 42 per cent of Year 6 students and 33 per cent of Year 10 students is found.

Comparisons of student achievement since 2005

Comparison of means

Table 3.2 compares the NAP – ICT Literacy levels of Year 6 and Year 10 students from 2005 to 2014. It shows the mean performances on the ICT Literacy scale with its confidence intervals for Years 6 and 10 across the four cycles of NAP – ICT Literacy since 2005. It also records the differences with confidence intervals between the mean performance in 2014 and the mean performance in 2005, 2008 and 2011.

Table 3.2 ICT Literacy mean scale scores for Year 6 and Year 10 from 2005 to 2014

	Year 6	Year 10
2014	413 (±5.7)	520 (±6.7)
2011	435 (±5.7)	559 (±5.7)
2008	419 (±6.9)	560 (±7.1)
2005	400 (±6.3)	551 (±5.7)
Difference (2014 – 2011)	**–22** (±11.3)	**–39** (±11.8)
Difference (2014 – 2008)	–6 (±16.3)	**–40** (±16.8)
Difference (2014 – 2005)	13 (±18.2)	**–31** (±18.3)

Confidence intervals (±1.96*SE) are reported in brackets. Statistically significant difference are in **bold**.
Because results are rounded to the nearest whole number, some differences may appear inconsistent.

Table 3.2 shows that, while the mean performance of students in Year 6 increased consistently from 2005 to 2011 across the three assessment cycles, it decreased significantly by 22 scale points between 2011 and 2014. The mean performance of Year 6 students in 2014 was statistically significantly lower than the mean performances in 2011, but not significantly different to performance in 2005 or 2008.

The changes in performance of Year 10 students had not been statistically significant across the three previous NAP – ICT Literacy cycles from 2005 to 2011. However, in 2014, the mean performance of Year 10 students decreased by 39 scale points. This large decrease resulted in the 2014 mean performance being statistically significantly lower than the mean performance in all the previous NAP – ICT Literacy assessments.

Across the three previous cycles of NAP – ICT Literacy, the relative improvement in performance among Year 6 students compared with that of Year 10 students resulted in a decrease in the difference between the mean performances of students in Year 10 and Year 6. In 2005, the mean performance of Year 10 students was 151 scale points higher than that of Year 6 students, whereas in 2011 the corresponding difference was 124 score points. Between 2011 and 2014, the decrease in the performance of Year 10 students was larger than that of Year 6 students, and consequently the difference in the mean performance of the two groups has again become smaller. In 2014, this difference has been reduced to 107 scale points. This is the first time since data have been collected in NAP – ICT Literacy that the difference between the mean performance of Year 10 and Year 6 students is less than the width of a proficiency level on the NAP – ICT Literacy scale.

Chapter 7 discusses some possible interpretations of the significant decrease in performance at both year levels between 2011 and 2014 and the difference between Year 6 and Year 10 in terms of how ICT might be used at each year level.

Comparison of distribution across the proficiency levels

Table 3.3 shows the percentages of Year 6 and Year 10 students in each proficiency level across the four assessment cycles. These percentages and the shapes of the distribution of scale scores at each year level are graphically displayed in Figure 3.4.

The improved performance of Year 6 students from 2005 to 2011 can be seen in Table 3.3 and Figure 3.4 in the form of an upwards shift across the middle of distribution of student achievement from levels 2 and 3 to levels 3 and 4. Between 2005 and 2011, the proportion of Year 6 students performing at Level 2 decreased by 12 percentage points and there was a corresponding increase of 12 percentage points of students performing at Level 4. The proportion of students performing at Level 3 remained stable (decreasing by just one percentage point).

The decrease in performance of Year 6 students between 2011 and 2014 can also be seen in the distribution of student achievement, with a 7 per cent decrease in the proportion of Year 6 students performing at Level 4 and increases in the proportion of students performing at each of levels 3, 2 and 1.

A similar pattern of decrease between performance of students in Year 10 between 2011 and 2014 can be seen in the 10 per cent decrease in Year 10 students performing at Level 5 and increases in the percentages of students performing at each of levels 4, 3, 2 and 1.

Table 3.3 Percentage distribution of Year 6 and Year 10 students across proficiency levels on the ICT Literacy scale from 2005 to 2014

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6
Year 6						
2014	14 (±1.9)	31 (±2.4)	42 (±2.5)	13 (±1.3)	1 (±0.3)	0 (±0.0)
2011	11 (±1.6)	27 (±1.7)	40 (±2.0)	20 (±1.8)	1 (±0.6)	0 (±0.1)
2008	13 (±1.7)	30 (±2.0)	41 (±2.3)	15 (±1.6)	1 (±0.5)	0 (±0.1)
2005	13 (±1.6)	39 (±2.3)	41 (±2.7)	8 (±1.5)	0 (±0.1)	0 (±0.1)
Year 10						
2014	4 (±1.1)	11 (±1.4)	33 (±2.1)	43 (±2.0)	9 (±1.3)	0 (±0.3)
2011	2 (±0.7)	8 (±1.1)	25 (±1.8)	44 (±2.4)	19 (±1.6)	2 (±0.6)
2008	2 (±0.5)	7 (±1.5)	26 (±2.2)	47 (±3.0)	18 (±2.1)	1 (±0.6)
2005	0 (±0.3)	6 (±1.2)	32 (±2.9)	49 (±2.7)	12 (±1.7)	0 (±0.4)

Confidence intervals (±1.96*SE) are reported in brackets.
Because results are rounded to the nearest whole number, some totals may appear inconsistent.

Comparison of attainment of the proficient standard

Table 3.4 shows the percentage of Year 6 and Year 10 students attaining (meeting or exceeding) the relevant proficient standard across the four cycles of NAP – ICT Literacy.

Table 3.4 Percentages of Year 6 and Year 10 students attaining the proficient standard in ICT Literacy from 2005 to 2014

	Year 6	Year 10
2014	55 (±2.5)	52 (±2.5)
2011	62 (±2.0)	65 (±2.3)
2008	57 (±2.8)	66 (±3.0)
2005	49 (±3.0)	61 (±3.1)
Difference (2014 – 2011)	**–6** (±4.2)	**–13** (±4.5)
Difference (2014 – 2008)	–1 (±6.1)	**–14** (±6.5)
Difference (2014 – 2005)	**7** (±6.9)	**–9** (±7.3)

Confidence intervals (±1.96*SE) are reported in brackets. Statistically significant differences are in **bold**.
Because results are rounded to the nearest whole number, some differences may appear inconsistent.

Whereas the percentage of students meeting or exceeding the proficient standard at Year 6 increased by 13 percentage points from 49 per cent to 62 per cent between 2005 and 2011, the percentage has decreased between 2011 and 2014. In 2014, 55 per cent of Year 6 students met or exceeded the proficient standard. The decrease of 6 per cent between 2011 and 2014 was statistically significant. The decrease has resulted in the percentage of Year 6 students meeting or exceeding the proficient standard being closer to the 2008 percentage than the 2011 percentage.

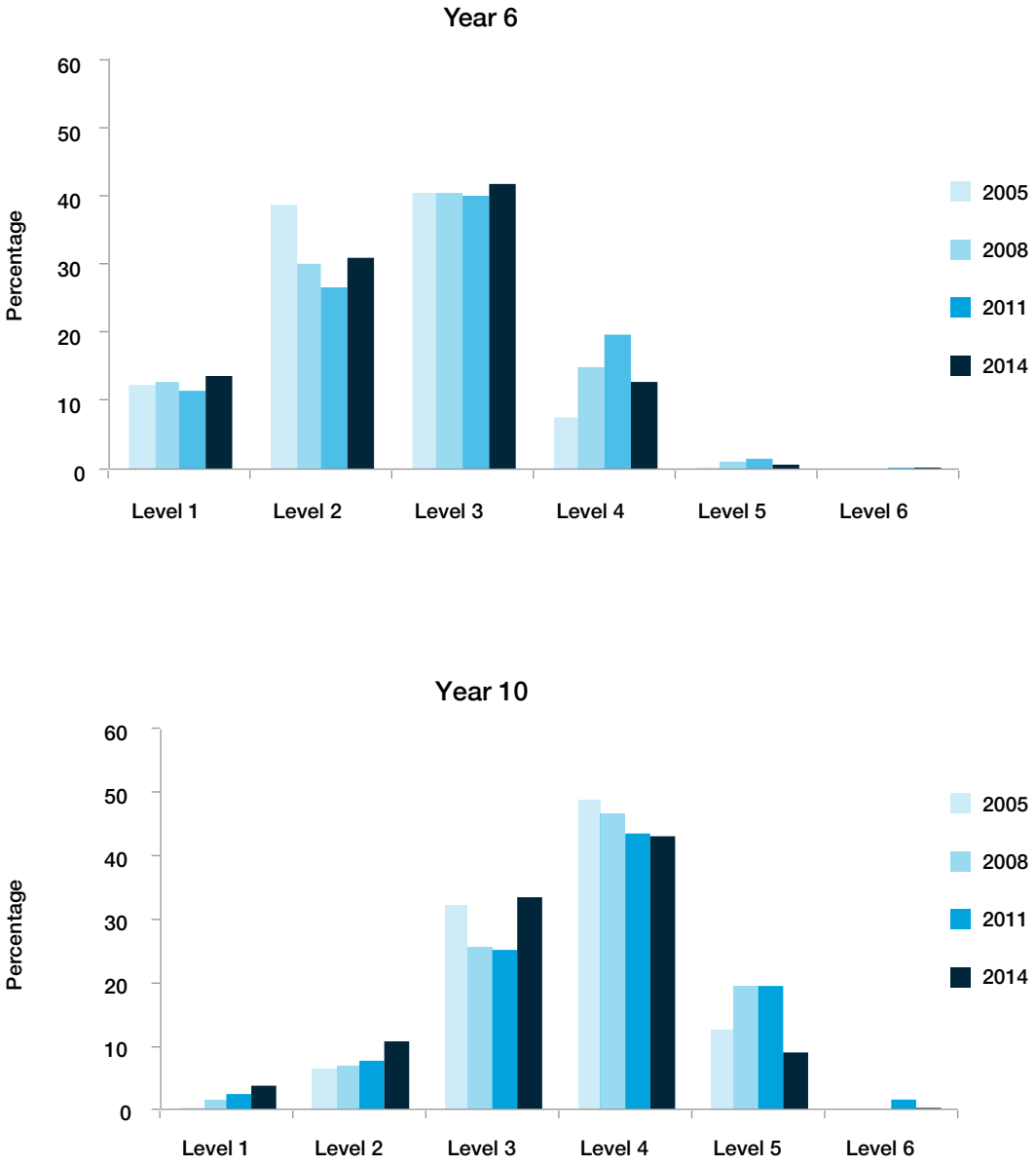


Figure 3.4 Distributions across proficiency levels for Year 6 and Year 10 students from 2005 to 2014

In 2014, 52 per cent of Year 10 students met or exceeded the proficient standard. The percentage decreased from the 65 per cent recorded in 2011 by 13 percentage points; a difference that is statistically significant. The percentage of Year 10 students meeting or exceeding the proficient standard in 2014 was significantly lower than the percentages recorded in all previous NAP – ICT Literacy cycles.

Illustrative examples of proficiency for the NAP – ICT Literacy scale

The content focus across the levels in the NAP – ICT Literacy scale described in Table 3.1 shifts and broadens from the lower to the higher levels. The lower levels of the scale focus on students' ICT skills, whereas the higher levels reflect students' increasing capacity to use ICT knowledge, skills and understanding to source and reframe information for specific communicative purposes. Achievement at the higher levels of the scale is demonstrated by students' sets of responses to modules that involve research and analysis of information leading up to the production of an information product. Figures 3.5 to 3.8 include descriptions of four test modules (Art Show, Computer Game, Battle of the Bands and Sports Picnic) including their large tasks that have been used to illustrate examples of student achievement across the NAP – ICT Literacy levels.

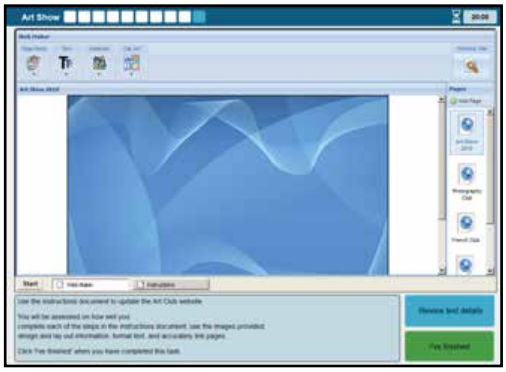
Following figures 3.5 to 3.8 are illustrative examples of achievement on the example tasks. The illustrative examples are taken both from the large tasks and stand-alone tasks from across the four modules. The examples reflect the receptive, productive, information literacy, technical and ethical use elements that comprise the breadth of knowledge, skills and understandings measured in the NAP – ICT Literacy assessment.

Overview

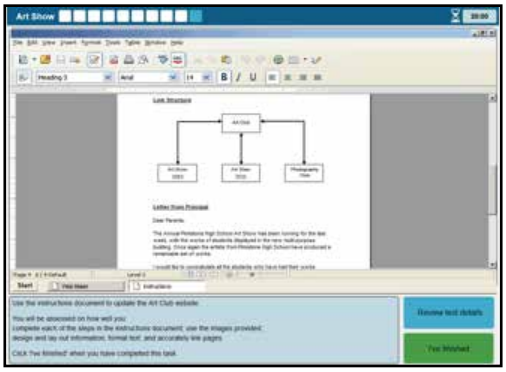
Students were told that they were part of the team responsible for maintaining a school website. Students completed a set of file management tasks (such as saving an email attachment to a specified location) and technical tasks (such as preparing an image for use in a website) in preparation for creating a new web page for the annual art show.

Large task

Students were provided with a set of instructions and visual web design software and instructed to create a new web page within the school website to promote the current year's annual art show. Students completed a combination of technical tasks (such as importing images into the web design software) and design tasks (such as aligning text and images to create a balanced web page layout). The final web page was assessed against 11 discrete criteria relating to the students' use of the available information and software features to support the communicative purpose of the web page.



Screen 1: A new blank web page in the visual web design software used to create the Art Show web page



Screen 2: A web design brief containing instructions for creating the Art Show web page

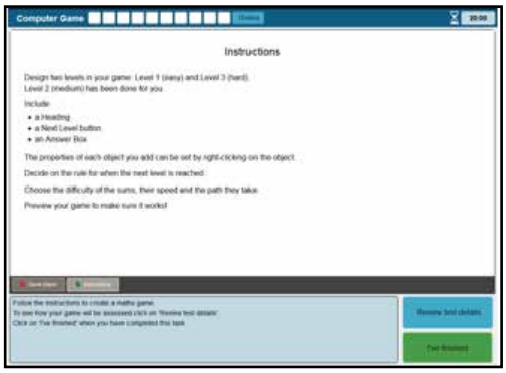
Figure 3.5 Art Show student assessment module – overview and large task

Overview

Students were asked to work on a project concerned with creating an online mathematics learning game for the class. The task is to use some software to design a survey, ask the teacher to help administer the survey, interpret the survey results and use some software to design the game.

Large task

Students were provided with a template of a simple piece of game design software with one level already complete. Students were instructed to add two new levels to the game and configure the types of problems presented, the difficulty of the problems and the rules for changing from one level to the next. Students could also edit the layout and appearance of each level.



Screen 1: The instructions provided to students about configuring the game

Screen 2: The pre–configured level that students were given as the default starting point for the large task

Figure 3.6 Computer Game assessment module – overview and large task

Overview

Three students who formed a music band that has won a talent contest have been invited to enter an interstate competition. The students were asked to help the band by completing the online registration for the competition, promote the band's next gig through social media and set up a crowd–funding web page to raise money.

Large task

Students complete a series of specified tasks to set up a crowd–funding page for their band on a crowd–funding website. In particular, they add details of their campaign, choose a template for their page and link the campaign to a suitable social media website.

Screen 1: The instructions provided to students about setting up the web page on the crowd–funding site

Screen 2: The details entry page on the crowd–funding site

Screen 3: The web page with information about the band

Screen 4: The page allowing students to link the crowd–funding page to a social media site

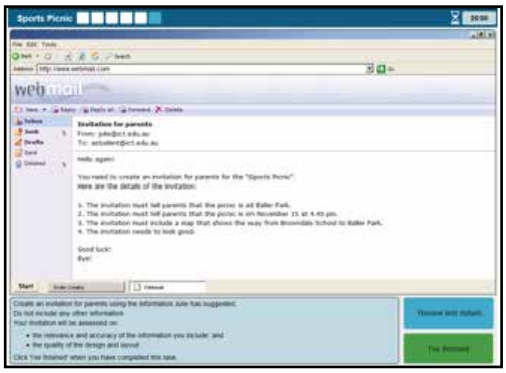
Figure 3.7 Battle of the Bands assessment module – overview and large task

Overview

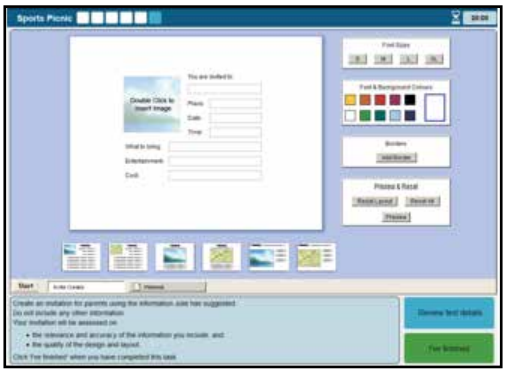
Students helped to plan a school sports picnic. They used a blog website and a comparative search engine to identify a venue and to select sports equipment that meet given criteria. They used tailored graphics software to produce invitations to the picnic that include a map generated using embedded mapping software.

Large task

Students are provided with a template of an online invitation builder. The invitation builder enables students to select a template from a fixed set of templates, add and format text, insert a map (using an embedded piece of mapping software) and edit the general layout and colours of the invitation. Students are given specific instructions about what information to include in the invitation.



Screen 1: The instructions provided to students about what to include in the invitation



Screen 2: The invitation builder software with a range of templates

Figure 3.8 Sports Picnic assessment module – overview and large task

Illustrative examples of levels 6, 5 and 4

Level 6 and Level 5

Students working at Level 6 create information products that show evidence of technical proficiency and careful planning and review. They use software features to organise information and to synthesise and represent data as integrated complete information products. They design information products consistent with the conventions of specific communication modes and audiences, and use available software features to enhance the communicative effect of their work.

Students working at Level 5 evaluate the credibility of information from electronic sources and select the most relevant information to use for a specific communicative purpose. They create information products that show evidence of planning and technical competence. They use software features to reshape and present information graphically consistent with presentation conventions. They design information products that combine different elements and accurately represent their source data. They use available software features to enhance the appearance of their information products.

Large task examples

Art Show web page

The Art Show web page created by students working at levels 6 and 5 typically has the following features:

- The buttons to connect the pages of the website have been added, and they:

» link to the pages specified in the design structure

» are placed on the page in a clear position consistent with web-design principle

» match the layout of other navigation buttons on the pages.

Computer Game

The computer games created by students working at levels 6 and 5 show evidence of careful planning of colour to denote the functionality of the different elements of the game across the different levels.

Stand-alone task examples

Example 1

In this example (shown in Figure 3.9), students were asked whether an advertisement on a website was generated by a person or a computer and to give a reason to explain their choice. Students working at Level 6 are typically able to identify that a computer created the advertisement and to explain that the content of the advertisement was most likely generated using metadata relating to the user's browsing history.

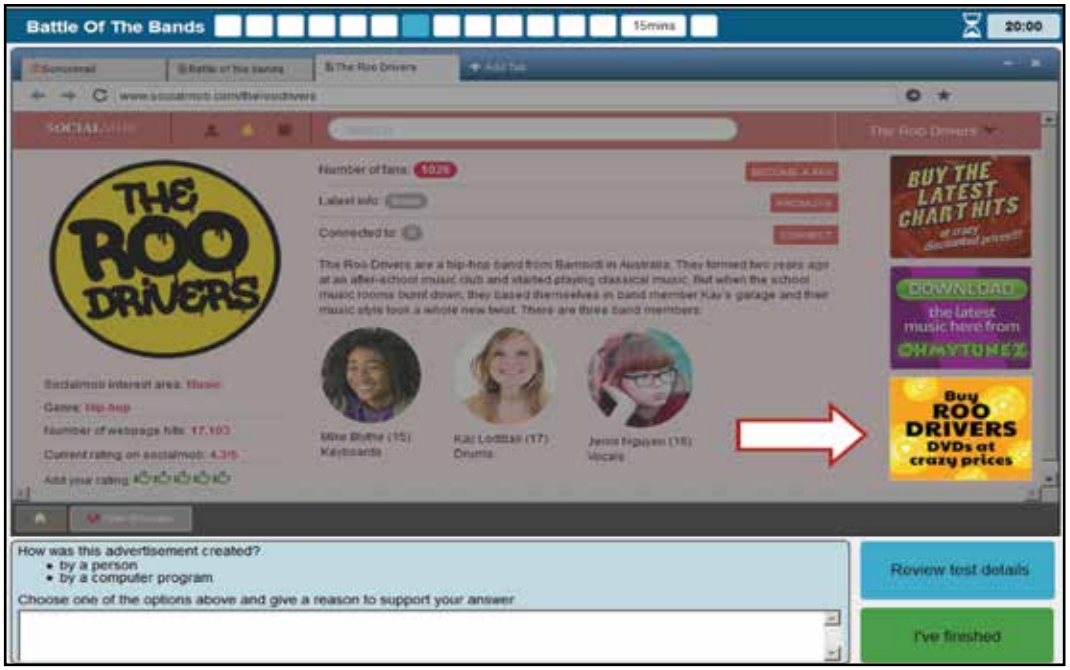


Figure 3.9 Levels 6 and 5 stand-alone task example 1 – Battle of the Bands

Example 2

In this example (shown in Figure 3.10), students had set up an online survey for members of their class and were then provided with a screen option to 'send' an email to a user group called 'DL-All School'. They were asked to give two reasons why it might be a problem to send their email to this list. Students working at Level 5 are typically able to indicate both that:

- as the email was unsolicited and unexpected, it was equivalent to sending spam to the group users, and

- the user group was broader than the students' class and consequently the students may receive data from people outside their class that was not relevant to the survey.

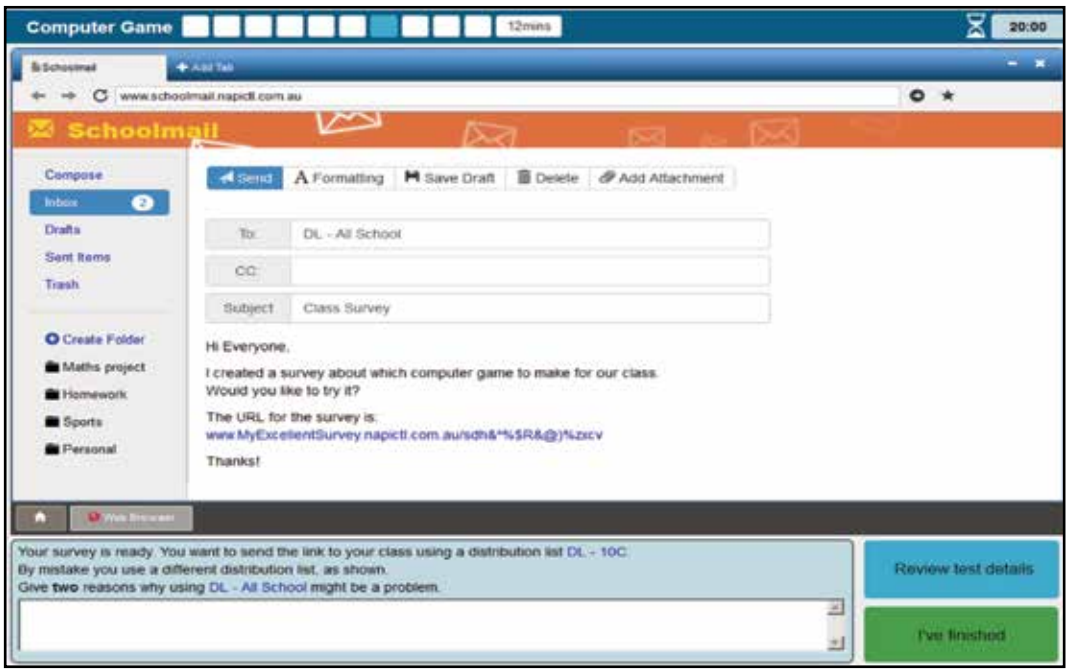


Figure 3.10 Levels 6 and 5 stand-alone task example 2 – Computer Game

Example 3

This task example (shown in Figure 3.11) required students to search for information in a blog. The information search was a multiple-step process requiring students to scroll through the blog, check the contents of different entries and take note of the icons that gave information about the facilities at different venues. Each facilities icon had a scroll-over label to clarify its meaning. Students working at levels 6 and 5 can typically navigate the blog site and locate the embedded information within the site that meets the specified search criteria (that is, a park with change rooms and picnic area). The contents of the blog site included some irrelevant information (such as information about a stadium) and some distracting information (such as information about parks that did not have the necessary facilities). There was only one park listed on the blog site that met the search criteria.

Figure 3.11 Levels 6 and 5 stand-alone task example 3 – Sports Picnic

Example 4

In this task example (shown in Figure 3.12), students had received an email with instructions relating to their task attached in two file formats: .txt and .pdf. The students were asked to specify an advantage of sending information in the .pdf format (compared with the .txt format). Students working at Level 5 can typically refer to any one of the following possible advantages:

- a lower likelihood that users will edit the document
- consistency of layout across different computer operating systems, devices or software
- the facility to include pictures and formatting and attachments within the file
- the capacity to password protect the file.

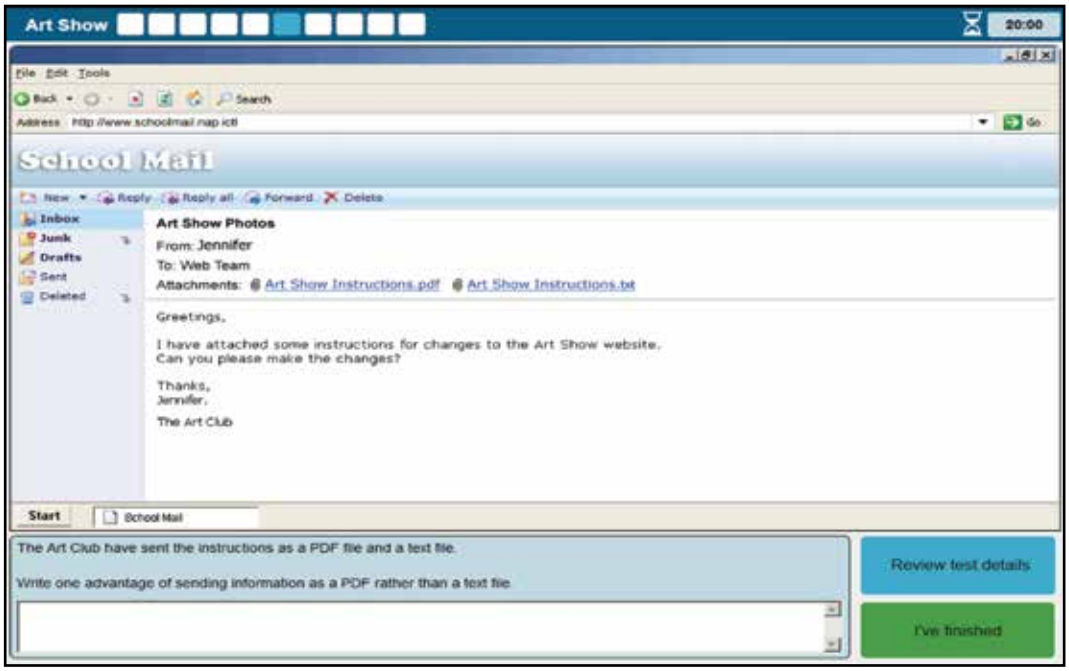


Figure 3.12 Levels 6 and 5 stand-alone task example 4 – Art Show

Level 4

Students working at Level 4 generate well-targeted searches for electronic information sources and select relevant information from within sources to meet a specific purpose. They create information products with simple linear structures and use software commands to edit and reformat information products in ways that demonstrate some consideration of audience and communicative purpose. They recognise situations in which ICT misuse may occur and explain how specific protocols can prevent this.

Large task examples

Art Show web page

The Art Show web page created by students working at Level 4 typically has the following features:

- Specified relevant images were imported using the web design software features.
- Inserted images were aligned symmetrically and demonstrated balance with the web page layout.
- Text was copied from a document and pasted into the web page accurately.
- A background image was applied to the web page.
- Most web page elements were placed and aligned consistently with some overlapping or unusual gaps between elements.

Computer Game

The computer game created by students working at Level 4 includes the requisite specified elements (levels, answer boxes, page headings) with page layouts that show some evidence of control and planning.

Stand-alone task examples

Example 5

This example is the same as that shown as example task 1 (Figure 3.8). Students working at Level 4 can typically recognise that the advertisement has been generated (automatically) by a computer. What distinguishes Level 4 achievement from the achievement of students at higher levels is the quality of the explanation that students can give to support their recognition that the advertisement has been automatically generated.

Example 6

In this task example (shown in Figure 3.13), students had previously posted information about a gig for their band on a social media website. Students were then asked to create three tags for their gig. This skill requires students to understand the purpose of tags as keyword links to content. Students working at Level 4 are typically able to provide three different relevant tags. The relevance of the tags was judged by trained scorers. Tags that were deemed as relevant related to the band, gigs/concerts and the location of the gig.

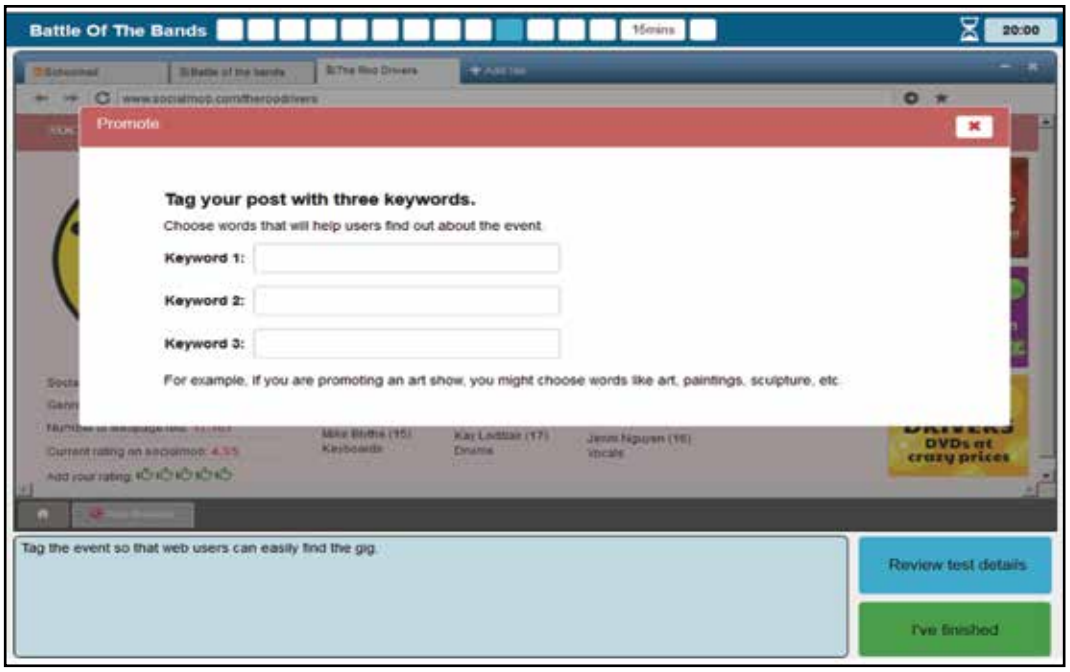


Figure 3.13 Level 4 stand-alone task example 6 – Battle of the Bands

Illustrative examples of levels 3, 2 and 1

As the NAP – ICT Literacy scale extends downwards from Level 6, the proportion of scale content detailing skills and simple, single process information management (such as editing or adding text) increases, while the proportion of scale content detailing students' reframing of information to create new information products decreases. As such, the illustrations of achievement at these lower levels tend to be student responses to discrete tasks, rather than global judgements that can be made across large pieces of student work (such as the web page and game that were used to illustrate achievements at levels 6, 5 and 4). Following are examples of assessment items that are indicative of achievement at each of levels 3, 2 and 1.

Level 3

Students working at Level 3 generate simple general search questions and select the best information source to meet a specific purpose. They retrieve information from given electronic sources to answer specific, concrete questions. They assemble information in a provided simple linear order to create information products. They use conventionally recognised software commands to edit and reformat information products. They recognise common examples in which ICT misuse may occur and suggest ways of avoiding them.

Stand-alone task examples

Example 7

This task example (shown in Figure 3.14) gave rise to two examples of achievement at Level 3. In the first instance, students were required to activate the map from within an invitation template (by clicking on the map) and then to enter the start and end points. Students working at Level 3 are typically able to enter both the start and finish points specified in the task instructions. Regardless of whether or not students entered these points accurately, when they clicked on the Search button (on the mapping software) they were then provided the map of the route. The map was pre-set to be too small to display clearly on the invitation. Students working at Level 3 can typically adjust the zoom setting of the map and then reorient the map so that it shows both the start and end points of the route and is of a sufficient size to display clearly in the invitation. This is shown in the screenshot on the right of Figure 3.14.

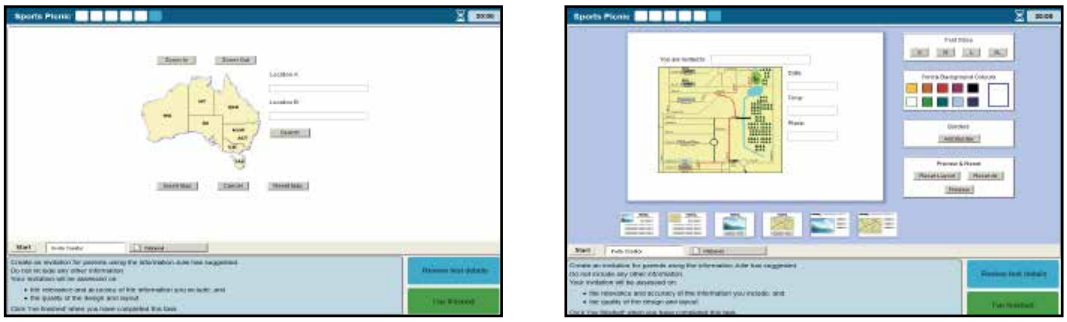


Figure 3.14 Level 3 stand-alone task example 7 – Sports Picnic

Example 8

In this task example (shown in Figure 3.15), students have already set up an online survey and their teacher is asking for the password to access the survey. Students are asked why a password might be needed to enter the survey. Students working at Level 3 can typically indicate that the purpose of the password is to provide some level of security to the work. They may express this in a number of different ways: directly (for example, by referring to protection or security) or in terms of the potential consequences of unrestricted access (for example, by indicating that someone you don't know may edit the contents of the survey).

Figure 3.15 Level 3 stand-alone task example 8 – Computer Game

Example 9

In this task example (shown in Figure 3.16), students are instructed to search within a social networking site for connections to a band (Synchole). The search engine within the site includes an auto-complete function, so terms matching the characters typed by the students fill dynamically as list options on the screen. Students working at Level 3 typically continue to type the name until there are sufficient matching characters to reduce the list size to display the band name. In addition to this, students working at Level 3 can then typically use the additional information in the results list to select the specified band to connect to through the site.

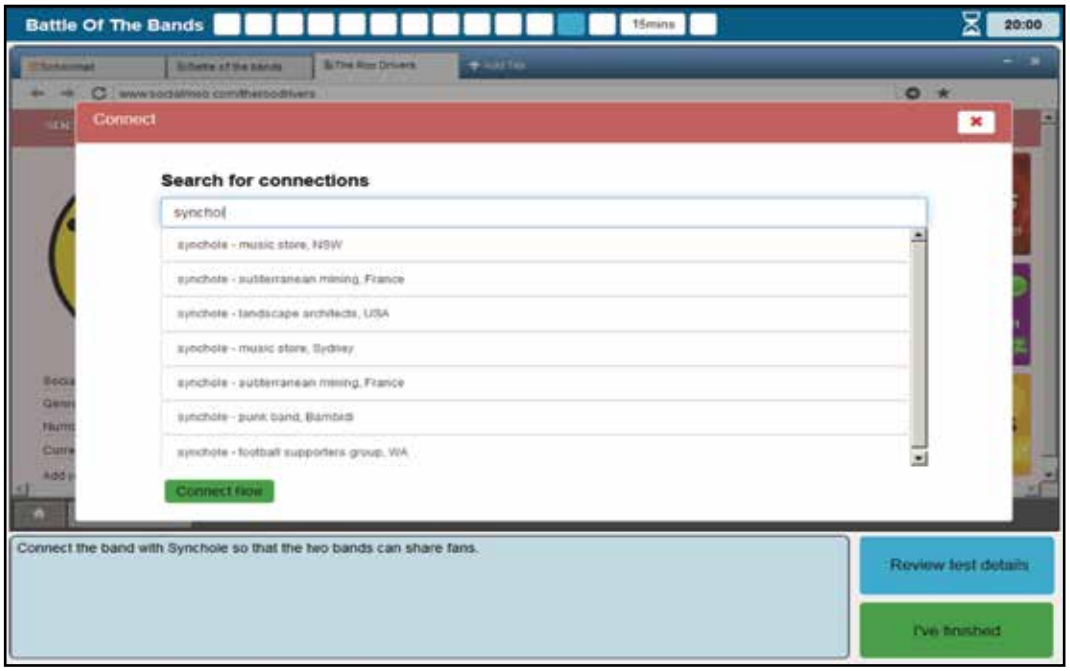


Figure 3.16 Level 3 stand-alone task example 9 – Battle of the Bands

Level 2

Students working at Level 2 locate simple, explicit information from within a given electronic source. They add content and make simple changes to existing information products when instructed. They edit information products to create products that show limited consistency of design and information management. They recognise and identify basic ICT electronic security and health and safety usage issues and practices.

Stand-alone task examples

Example 10

The task example shown in Figure 3.17 requires students to create a new folder within a web-based email site. Students working at Level 2 are typically able to recognise the conventions shown on the site to activate the creation of a new folder and then correctly name the folder.

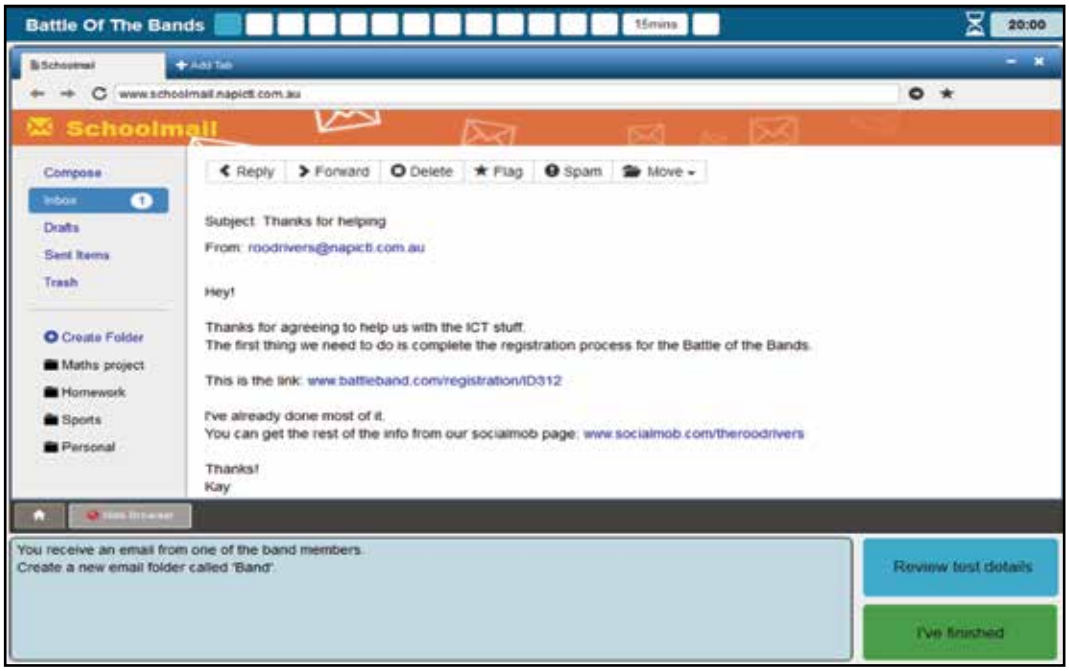


Figure 3.17 Level 2 stand-alone task example 10 – Battle of the Bands

Example 11

In this task example (shown in Figure 3.18), students at Level 2 are typically able to recognise that the highlighted boxes on the right-hand panel of the social media website are (advertising) links to external websites. By doing this, students are demonstrating familiarity of the conventions associated with the placement, content and format of embedded advertisements.

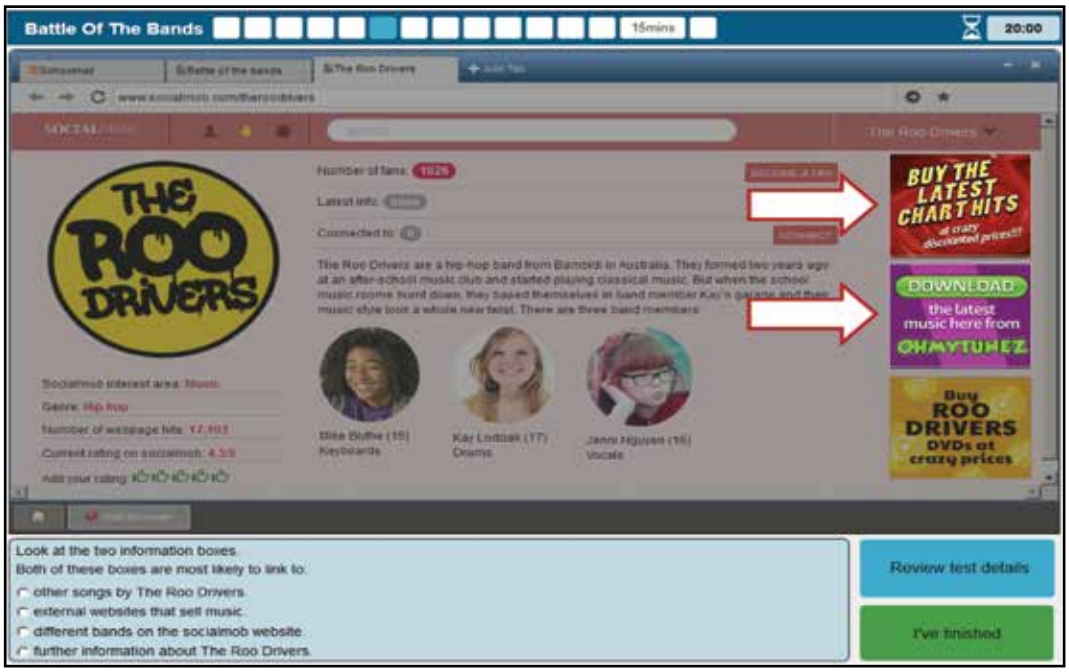


Figure 3.18 Level 2 stand-alone task example 11 – Battle of the Bands

Example 12

For this task example (shown in Figure 3.19), students were asked about the effect of changing a software setting to link specified software to a given action. Students working at Level 2 are typically able to identify that the software settings on the computer can be linked to peripheral devices.

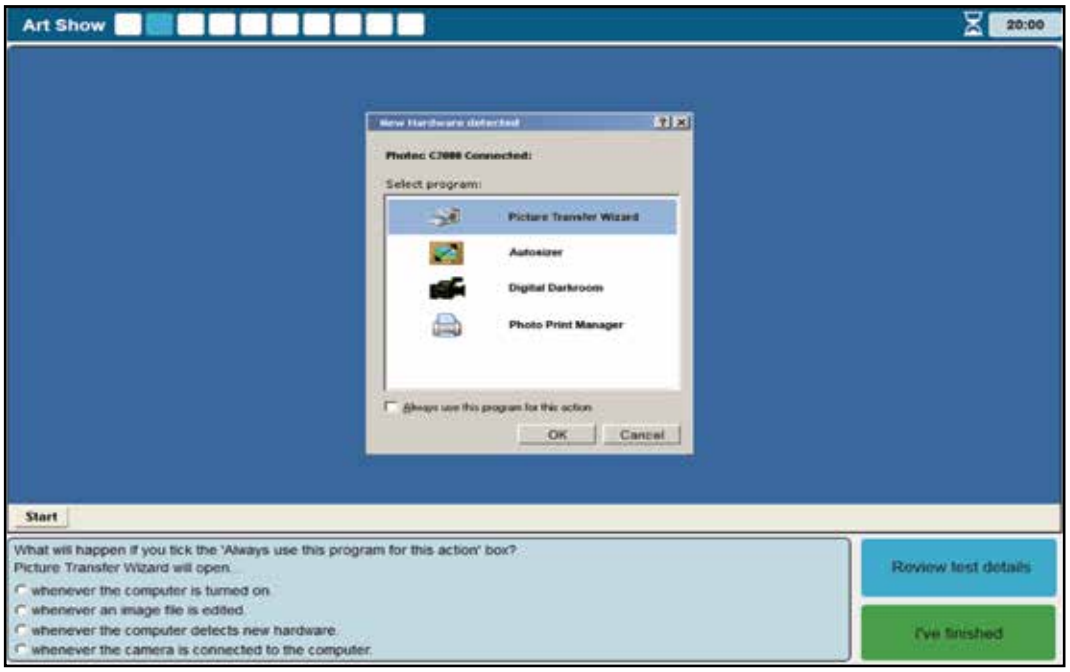


Figure 3.19 Level 2 stand-alone task example 12 – Art Show

Level 1

Students working at Level 1 perform basic tasks using computers and software. They implement the most commonly used file management and software commands when instructed. They recognise the most commonly used ICT terminology and functions.

Stand-alone task examples

Example 13

In this task example (shown in Figure 3.20), students working at Level 1 are typically able to click on the hyperlink on the screen in order to navigate to the sports blog. Students at this level are recognising and making use of the most basic of ICT navigation conventions.

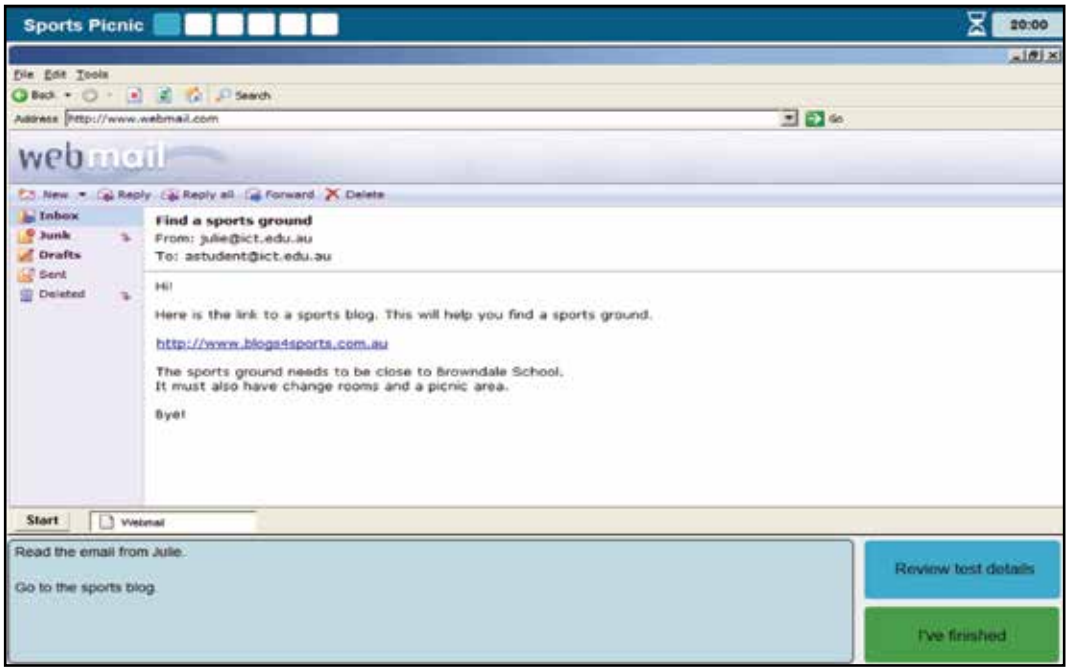


Figure 3.20 Level 1 stand-alone task example 13 – Sports Picnic

Example 14

In this task example (shown in Figure 3.21), students working at Level 1 are able to recognise the webmail convention that a number displayed on a webmail tab (or icon) typically indicates the number of new/unread email messages that are in the user's inbox.

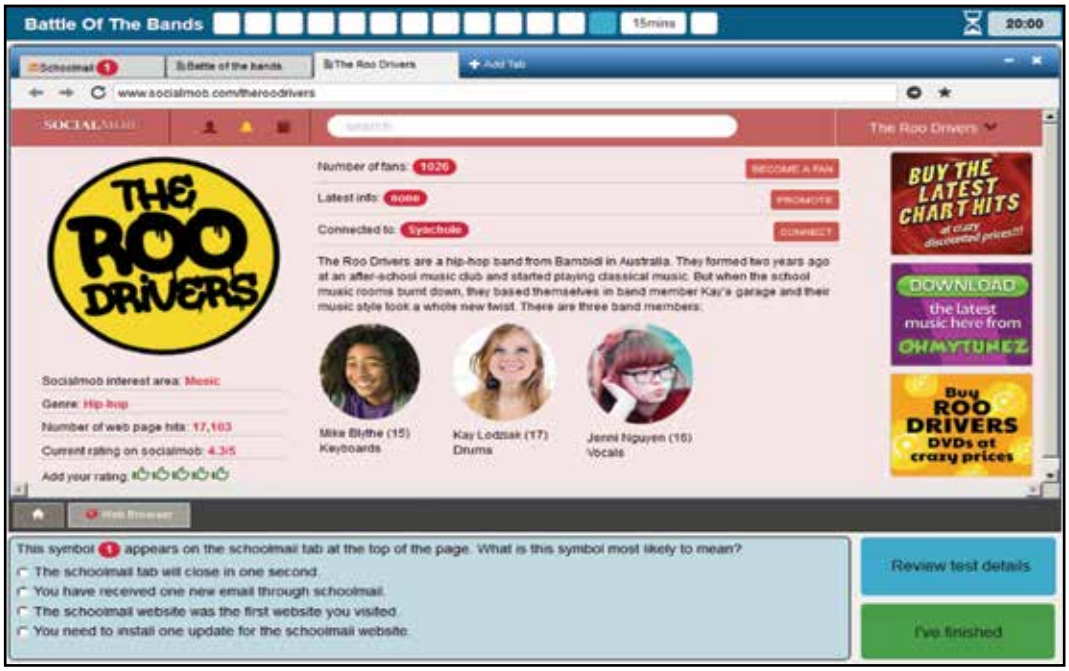


Figure 3.21 Level 1 stand-alone task example 14 – Battle of the Bands

Example 15

In the task example shown in Figure 3.22, students working at Level 1 are typically able to recognise that the warning message displayed on the screen shows that the user access to a website has been blocked. This requires students to both recognise the convention associated with such messages and read the explanatory text in the message itself.

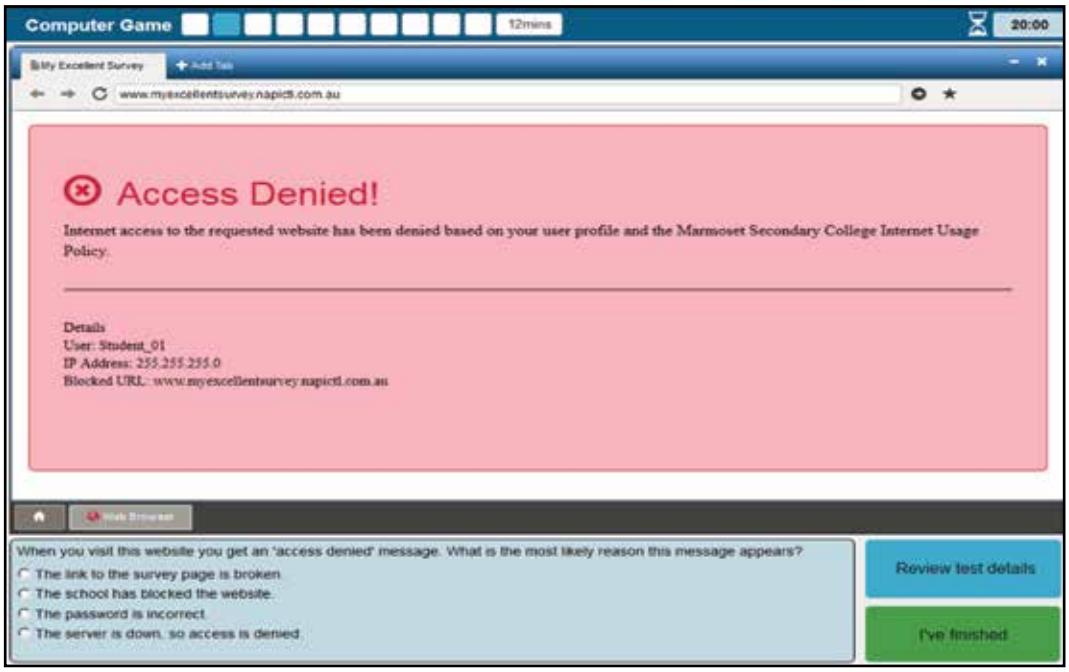


Figure 3.22 Level 1 stand-alone task example 15 – Computer Game

Teaching foci for developing ICT literacy

Introduction

The following section comments on teaching foci that may support the development of ICT literacy in students. These comments are informed by the content of the NAP – ICT Literacy assessment, the NAP – ICT Literacy scale and the student achievement data from the NAP – ICT Literacy, together with survey information from teachers and students about teaching practices involving ICT collected through Australia's participation in the 2013 International Computer and Information Literacy Study (ICILS). This cross-national study (involving 21 countries) of Year 8 student learning and achievement in computer and information literacy involved measures that are very similar to those of NAP – ICT Literacy (Fraillon et al., 2014). The computer and information literacy test and achievement measures in ICILS are very similar to those of NAP – ICT Literacy. However, ICILS collects information from students and teachers about teaching practices associated with the development of computer and information literacy. The following comments on teaching foci to support the development of ICT literacy are further informed by information collected from ICILS.

Learning progression described on the NAP – ICT Literacy scale

The NAP – ICT Literacy scale describes achievement from the performance of very basic skills through to high-level information literacy evidenced in sophisticated receptive and productive communication of digital information. By considering learning progression up the scale, we can describe the key achievement differences between levels. This provides guidance about what teachers may focus on when supporting student learning in ICT literacy.

Students working at Level 1 perform basic tasks using computers and software. Fourteen per cent of Year 6 students and 4 per cent of Year 10 students nationally are performing at Level 1.The difference between working at Level 1 and higher levels relates to the breadth of tasks students are able to complete but, more importantly, to the degree to which students are able to initiate searches for information and edit digital information.

Students working at Level 2 locate simple explicit information from within a given electronic source. They add content and make simple changes to existing information products when instructed. Thirty-one per cent of Year 6 students and 11 per cent of Year 10 students nationally performed at Level 2. A common aspect of students working at levels 1 and 2 is that they complete tasks with high levels of structure and support. A key difference between achievement at Level 2 and higher levels is the level of autonomy that students demonstrate in executing skills to complete tasks.

Students working at Level 3 generate simple general search questions and select the best information source to meet a specific purpose. They retrieve information from given electronic sources to answer specific, concrete questions. At this level, students are able to execute a range of information sourcing and editing commands independently, but these are in response to clear task requirements. Students are aware of potential misuse of ICT and, at this level, are aware of some ways of protecting against misuse. Forty-two per cent of Year 6 students and 33 per cent of Year 10 students nationally performed at Level 3. A key difference between students working at Level 3 and higher levels is their capacity to plan to complete information literacy tasks, rather than simply follow instructions about how to complete tasks. Students at higher levels also show awareness of audience and purpose in their planning and execution of communicative tasks.

Students working at Level 4 generate well-targeted searches and select relevant information from within sources to meet a specific purpose. They create information products with simple linear structures that demonstrate some consideration of audience and communicative purpose. They recognise situations in which ICT misuse may occur and explain how specific protocols can prevent this. Thirteen per cent of Year 6 students and 43 per cent of Year 10 students nationally performed at Level 4. A key difference between students achieving at Level 4 and higher levels is the degree to which students show awareness of communicative conventions (such as layout conventions) as they complete tasks. Students performing at higher levels demonstrate more precise control of software tools and strategies when searching for, evaluating and communicating information.

Students working at Level 5 evaluate the credibility of information from electronic sources and select the most relevant information to use for a specific communicative purpose. They create information products that show evidence of planning and technical competence. One per cent of Year 6 students and 9 per cent of Year 10 students nationally performed at Level 5. It is clear that levels 5 and 6 are achieved by very small proportions of students. Students

achieving at these highest levels demonstrate the knowledge and skills to search for, create and communicate using ICT in ways that target purpose and audience. The key difference between achievement at Level 5 and Level 6 is the efficiency with which students execute receptive and productive strategies and students' capacity to manipulate the conventions of communication to enhance the communicative effect of their work.

Students working at Level 6 create information products that show evidence of technical proficiency and careful planning and review. They use software features to organise information and to synthesise and represent data as integrated, complete information products. In NAP – ICT Literacy, no students at Year 6 and almost no students at Year 10 nationally performed at Level 6. Clearly this level is highly sophisticated and challenging, although data from previous cycles of NAP – ICT Literacy show that achievement of this level is attainable by Year 10 students. The efficiency and polish of work evidencing Level 6 achievement is obtained through careful planning and review with reference to the purpose of the work.

Teaching foci emphasised in ICILS

The International Computer and Information Literacy Study collected information from students and teachers that relate to the development of ICT literacy in students. Teachers were asked how much emphasis they placed on the following set of capabilities with their students:

- *Accessing information efficiently*
- *Evaluating the relevance of digital information*
- *Displaying information for a given audience/purpose*
- *Evaluating the credibility of digital information*
- *Validating the accuracy of digital information*
- *Sharing digital information with others*
- *Using computer software to construct digital work products (e.g. presentations, documents, images and diagrams)*
- *Evaluating their approach to information searches*
- *Providing digital feedback on the work of others (such as classmates)*
- *Exploring a range of digital resources when searching for information*
- *Providing references for digital information sources*
- *Understanding the consequences of making information publically available online.*

(Fraillon et al., 2014, p. 216)

Each of the capabilities listed above has a clear relationship to the achievement described in the NAP – ICT Literacy scale. Australian students and teachers are frequent users of computers and ICT at school relative to those in other countries (see chapter 5 for further details) and according to the ICILS data, Australian teachers reported giving some or strong emphasis to all but one of the above capabilities statistically significantly more than the ICILS 2013 average (Fraillon et al., 2014, p. 216). Only 'providing digital feedback on the work of others (such as classmates)' was not higher than the ICILS average; in fact, the proportion of Australian teachers providing some or strong emphasis to this capability was statistically

significantly lower than the ICILS 2013 average. The list of capabilities provides a useful checklist for teachers to consider the emphasis they provide in their own teaching.

ICILS further investigated the question of whether students reported experiencing emphasis of similar capabilities in class. In ICILS, students were asked to report whether they had learnt ('yes' or 'no') how to do the following range of ICT-related tasks at school:

- *Providing references to internet sources*
- *Accessing information with a computer*
- *Presenting information for a given audience or purpose with a computer*
- *Working out whether to trust information from the internet*
- *Deciding what information is relevant to include in school work*
- *Organising information obtained from internet sources*
- *Deciding where to look for information about an unfamiliar topic*
- *Looking for different types of digital information on a topic.*

(Fraillon et al., 2014, p. 154)

Over 80 per cent of Australian students reported having learnt about each of the above tasks, except for the final two ('deciding where to look for information about an unfamiliar topic' and 'looking for different types of digital information on a topic'). In all cases, the proportion of Australian students reporting having learnt about the tasks was statistically significantly higher than the ICILS 2013 average (Fraillon et al., 2014, p. 154).

The ICILS analyses also examined the relationship between a range of student characteristics and activities and their computer and information literacy achievement. The learning tasks were, as a set, seen to contribute to student computer and information literacy in Australia, even when other factors (such as socioeconomic background) were taken into account. This finding suggests that emphasis on these tasks can make a difference to student achievement in ICT literacy.

The distribution of student achievement on the NAP – ICT Literacy scale within and across year levels suggests further that the knowledge, skills and understandings that underpin achievement are not naturally acquired by all students. Forty-five per cent of Year 6 and 15 per cent of Year 10 students are achieving at levels 2 and 1 on the NAP – ICT Literacy scale, but very few students are achieving at levels 5 and 6. The scale, together with examples taken from ICILS, can be used to see the types of focused teaching and learning activities that can contribute to student digital literacy. Common to these activities are that they clearly focus on processes relating to information literacy and critical thinking, rather than simply focusing on computing skills. In order to support students to develop ICT literacy, there should be a deliberate focus on teaching these capabilities, which can be integrated in a broad range of classroom learning contexts. Having students complete work using ICT is the first step to developing ICT literacy, but deliberate teaching of the constituent aspects of ICT literacy (as seen in the NAP – ICT Literacy scale and suggested by the teaching and learning activities reported in ICILS) needs to be planned for and undertaken in order to better support student development of this essential set of twenty-first century capabilities.

Summary

Student data from NAP – ICT Literacy were reported against the NAP – ICT Literacy scale. The scale is described in terms of six proficiency levels that provide a profile of progress in ICT literacy. This ranges from students at Level 1 who 'perform basic tasks using computers and software, implementing commonly used file management and software commands and recognising most commonly used ICT terminology and functions', to students at Level 6 who 'are able to create information products that show evidence of technical proficiency, careful planning and review, use software features to organise information, synthesise and represent data as integrated information products, design information products consistent with the conventions of specific communication modes and audiences, and use available software features to enhance the communicative effect of their work'. Even though changes in technologies since 2005 have been incorporated in the instruments used in the successive cycles of NAP – ICT Literacy, the tasks included in those instruments continue to measure a single underlying trait and the scale descriptors established in 2005 remain applicable in 2014.

Two proficient standards – one for Year 6 and one for Year 10 – were established. The Proficient Standard for Year 6 is the boundary between levels 2 and 3 on the NAP – ICT Literacy scale. The Proficient Standard for Year 10 is the boundary between levels 3 and 4 on the scale. Fifty-five per cent of Year 6 students and 52 per cent of Year 10 students met or exceeded the relevant proficient standard in 2014.

Whereas the percentage of students meeting or exceeding the Proficient Standard for Year 6 increased by 13 percentage points from 49 per cent to 62 per cent between 2005 and 2011, the percentage decreased between 2011 and 2014. In 2014, 55 per cent of Year 6 students met or exceeded the proficient standard. The decline in performance between 2011 and 2014 is also evident in the percentage of Year 6 students meeting or exceeding the proficient standard. Furthermore, while the percentages of students attaining the Proficient Standard for Year 10 had been stable from 2005 to 2011, the percentage dropped from 65 to 52 per cent between 2011 and 2014.

Even though the mean performance of students in Year 6 had increased steadily from 2005 to 2011, it decreased by 22 scale points between 2011 and 2014. Correspondingly, the mean performance of Year 10 students decreased from 559 to 520 between 2011 and 2014, even though it had been stable between 2005 and 2011.

Chapter 7 discusses some possible interpretations of the significant decrease in performance at both year levels between 2011 and 2014, and the difference between Year 6 and Year 10 in terms of how ICT might be used at each year level.

Teaching foci to develop ICT literacy was considered with respect to NAP – ICT Literacy and ICILS. We recommend that teachers focus on capabilities and activities relating to information literacy and critical thinking, rather than simply focusing on computing skills, and that there should be a deliberate focus on teaching these capabilities, which can be integrated into a broad range of classroom learning contexts that extend beyond having students simply complete work on computers or ICT. With this in mind, there is clear evidence that Australian teachers' focus on these competencies is already high in comparison with some other countries.

Chapter 4: Patterns of ICT literacy

Chapter 3 has outlined the development of the NAP – ICT Literacy scale, the established proficiency levels and how it can be described by test items. In addition, it has shown the performance of Year 6 and Year 10 students at the national level. In its first part, this chapter will present differences in performance results across states and territories at both year levels, while in its second part it will illustrate the association of ICT literacy with a number of factors including gender, indigenous background, language spoken at home, country of birth, geographic location, parental education and parental occupation.

Performance in ICT Literacy among states and territories

Distribution of Year 6 and Year 10 by state and territory

Table 4.1 records the average ICT Literacy scores at both year levels across jurisdictions. Each estimate is accompanied by its 95 per cent confidence interval which indicates the level of precision. There is some variation in the level of precision across states and territories, which is a reflection of differing sample sizes and variation in test performance within each jurisdiction (see chapter 2 for more details on sample sizes and sample participation rates).

Table 4.1 Year 6 and Year 10 means and mean differences with confidence intervals for ICT Literacy scores, nationally and by state and territory in 2014

	Year 6 students	Year 10 students	Difference (Year 10 – Year 6)
New South Wales	412 (±12.0)	512 (±13.7)	**99** (±18.7)
Victoria	437 (±9.6)	532 (±14.3)	**96** (±19.4)
Queensland	393 (±13.7)	504 (±16.8)	**111** (±18.1)
Western Australia	404 (±13.2)	539 (±11.8)	**135** (±20.6)
South Australia	421 (±10.3)	532 (±15.8)	**110** (±18.7)
Tasmania	385 (±15.1)	514 (±15.6)	**129** (±30.2)
ACT	429 (±26.0)	536 (±26.2)	**107** (±32.7)
Northern Territory	361 (±20.5)	501 (±19.9)	**140** (±21.6)
Australia	413 (±5.7)	520 (±6.7)	**107** (±5.7)

Confidence intervals (1.96*SE) are reported in brackets. Statistically significant differences are in **bold**.
Because results are rounded to the nearest whole number, some differences may appear inconsistent.

The national average ICT Literacy score for Year 6 students was 413 and jurisdictional averages ranged from 361 in the Northern Territory to 437 in Victoria. The average Year 10 student in Australia had a score of 520, and score averages across states and territories ranged from 501 in the Northern Territory to 539 in Western Australia. As can be seen from the size of confidence intervals, the precision for smaller jurisdictions, where smaller samples had been assessed, was less than for larger jurisdictions. It is important to take these differences in precision into account when interpreting the results from this assessment.

At the national level, the difference in test performance between Year 6 and Year 10 students was 107 score points, which is about one standard deviation. The differences in score points between Year 6 and Year 10 students ranged from 96 in Victoria to 140 in the Northern Territory. All mean score differences within jurisdictions were statistically significant and are therefore not due to sampling variation.[11]

Comparisons of jurisdictional score averages and distributions across cycles

This section includes a comparison of national and jurisdictional results across the NAP – ICTL cycles in 2005, 2008, 2011 and 2014. It will also compare jurisdictional score averages in terms of their statistical significance.

Comparison of states and territories in Year 6

Table 4.2 shows the Year 6 average scale scores with their confidence intervals for each state and territory and at the national level in comparison with the results from the previous ICT Literacy assessments in 2011, 2008 and 2005. At the national level, the average scale score among Year 6 students was 22 points lower than in the previous assessment in 2011, which is a statistically significant difference. Statistically significant decreases in test performances were recorded for New South Wales (–33 score points), Queensland (–21) and ACT (–36).

At the national level, no statistically significant differences were found in comparison with the results from 2008 and 2005. At the jurisdictional level, students in ACT had a significantly lower average score in comparison with 2008 (–43), while Western Australia recorded a significant increase of test performance between 2005 and 2014 (+25). All other average scale score comparisons with earlier assessments in 2008 and 2005 showed no statistically significant differences at the jurisdictional level.

To review the statistical significance of differences in test performance between jurisdictions, a pair-wise comparison of scale score average was conducted. Table 4.3 records the results from this comparison. While arrows pointing upwards indicate that a jurisdictional average (for the state or territory in the header row) was significantly higher than one it was compared with (the state or territory listed in the first column), arrows pointing downward show that it was significantly lower. Dots illustrate comparisons that showed no statistically significant difference.

[11] Statistically significant differences in ICT Literacy scores have a probability below 5 per cent ($p < 0.05$) that the difference was due to the combined sampling and measurement error in the estimates. (See the NAP – ICT Literacy Technical Report 2014 for details.)

Table 4.2 Means and mean differences with confidence intervals in Year 6 for ICT Literacy scores, nationally and by state and territory in 2014, 2011, 2008 and 2005

	2014	2011	2008	2005	Difference (2014–2011)	Difference (2014–2008)	Difference (2014–2005)
New South Wales	412 (±12.0)	445 (±12.5)	413 (±14.5)	405 (±12.9)	**–33** (±19.0)	0 (±23.3)	8 (±23.9)
Victoria	437 (±9.6)	448 (±9.3)	447 (±15.1)	424 (±13.7)	–11 (±15.5)	–10 (±22.5)	13 (±23.2)
Queensland	393 (±13.7)	415 (±14.0)	392 (±11.8)	370 (±12.3)	**–21** (±21.0)	1 (±22.6)	24 (±24.4)
Western Australia	404 (±13.2)	424 (±13.5)	403 (±11.5)	379 (±10.8)	–19 (±20.5)	1 (±22.2)	**25** (±23.4)
South Australia	421 (±10.3)	436 (±10.3)	439 (±12.5)	412 (±11.4)	–15 (±16.5)	–17 (±21.2)	9 (±22.2)
Tasmania	385 (±15.1)	405 (±12.4)	408 (±16.4)	404 (±19.4)	–19 (±21.0)	–23 (±26.1)	–19 (±29.4)
ACT	429 (±26.0)	466 (±22.8)	472 (±13.9)	428 (±22.1)	**–36** (±35.5)	**–43** (±32.5)	1 (±37.7)
Northern Territory	361 (±20.5)	367 (±37.5)	364 (±49.8)	346 (±53.7)	–6 (±43.5)	–3 (±55.6)	15 (±59.7)
Australia	413 (±5.7)	435 (±5.7)	419 (±6.9)	400 (±6.3)	**–22** (±11.3)	–6 (±16.3)	13 (±18.2)

Confidence intervals (1.96*SE) are reported in brackets. Statistically significant differences are in **bold**.
Because results are rounded to the nearest whole number, some differences may appear inconsistent.

Table 4.3 Pair-wise comparisons of Year 6 mean performance on the ICT Literacy scale between states and territories in 2014

	Mean		VIC	ACT	SA	NSW	WA	QLD	TAS	NT
Victoria	437	(±9.6)		●	▲	▲	▲	▲	▲	▲
ACT	429	(±26.0)	●		●	●	●	▲	▲	▲
South Australia	421	(±10.3)	▼	●		●	▲	▲	▲	▲
New South Wales	412	(±12.0)	▼	●	●		●	▲	▲	▲
Western Australia	404	(±13.2)	▼	●	▼	●		●	●	▲
Queensland	393	(±13.7)	▼	▼	▼	▼	●		●	▲
Tasmania	385	(±15.1)	▼	▼	▼	▼	●	●		●
Northern Territory	361	(±20.5)	▼	▼	▼	▼	▼	▼	●	

▲ Mean scale score significantly higher than in comparison state or territory
● Mean scale score not significantly different from comparison state or territory
▼ Mean scale score significantly lower than in comparison state or territory

The results show that Year 6 students in Victoria had significantly higher average scores than all other jurisdictions except ACT. The average score of ACT students were significantly higher than those for Queensland, Tasmania and the Northern Territory. Year 6 student performance in South Australia and New South Wales was significantly higher than in Queensland, Tasmania and the Northern Territory; Year 6 students in South Australia also had significantly higher scores than those in Western Australia. Average scores among Year 6 students in Queensland and Tasmania were significantly lower than in Victoria, ACT, South Australia and New South Wales. The average score recorded for the Northern Territory was significantly lower than in all other jurisdictions except Tasmania.

Comparison of states and territories in Year 10

Table 4.4 presents the average scale scores of Year 10 students with their confidence intervals for each state and territory and at the national level in comparison with the results

from the previous ICT Literacy assessments in 2011, 2008 and 2005. At the national level, the average scale score among Year 10 students was 39 points lower than in the previous assessment in 2011, which is a statistically significant difference. Statistically significant decreases in test performances were recorded for New South Wales (–53 score points), Victoria (–36), Queensland (–49) and ACT (–47).

Table 4.4 Means and mean differences with confidence intervals in Year 10 for ICT Literacy scores, nationally and by state and territory in 2014, 2011, 2008 and 2005

	2014	2011	2008	2005	Difference (2014–2011)	Difference (2014–2008)	Difference (2014–2005)
New South Wales	512 (±13.7)	565 (±12.8)	564 (±13.7)	551 (±13.1)	**–53** (±20.3)	**–52** (±23.7)	**–39** (±24.8)
Victoria	532 (±14.3)	568 (±12.5)	569 (±18.1)	565 (±9.8)	**–36** (±20.5)	**–36** (±26.8)	**–33** (±23.6)
Queensland	504 (±16.8)	553 (±9.5)	549 (±14.0)	547 (±11.6)	**–49** (±20.9)	**–44** (±25.8)	**–42** (±26.0)
Western Australia	539 (±11.8)	548 (±10.8)	559 (±12.1)	535 (±11.8)	–10 (±17.8)	–20 (±21.8)	4 (±23.2)
South Australia	532 (±15.8)	552 (±14.8)	560 (±11.5)	547 (±11.0)	–20 (±23.0)	**–29** (±23.8)	–16 (±25.1)
Tasmania	514 (±15.6)	534 (±15.5)	539 (±16.3)	538 (±11.8)	–19 (±23.3)	–25 (±26.4)	–24 (±25.3)
ACT	536 (±26.2)	582 (±16.1)	598 (±14.5)	572 (±17.8)	**–47** (±31.7)	**–62** (±32.9)	**–36** (±35.5)
Northern Territory	501 (±19.9)	490 (±49.5)	466 (±71.5)	515 (±28.2)	11 (±53.9)	34 (±75.5)	–15 (±38.1)
Australia	520 (±6.7)	559 (±5.7)	560 (±7.1)	551 (±5.7)	**–39** (±11.8)	**–40** (±16.8)	**–31** (±18.3)

Confidence intervals (1.96*SE) are reported in brackets. Statistically significant differences are in **bold**.
Because results are rounded to the nearest whole number, some differences may appear inconsistent.

At the national level, statistically significant decreases in student performance were also found in comparison with the results from 2008 (–40 score points) and 2005 (–31). At the jurisdictional level, in comparison with 2008, significantly lower average scores were recorded for New South Wales (–52), Victoria (–36), Queensland (–44), South Australia (–29) and ACT (–62). In comparison with 2005, at the jurisdictional level the results show significant decreases in performance in New South Wales (–39), Victoria (–33), Queensland (–42) and ACT (–36).

Statistical significant differences in test performance between jurisdictions among Year 10 students were reviewed through a pair-wise comparison of scale score averages, which are recorded in Table 4.5.

The results show that Year 10 students in Western Australia performed significantly better than those in Tasmania, New South Wales, Queensland and the Northern Territory. The average scores of Year 10 students in ACT, Victoria and South Australia were significantly higher than those in Queensland and the Northern Territory; Year 10 students in Victoria also had significantly higher average scores than those in New South Wales. Year 10 student performance in Queensland and the Northern Territory was significantly lower than in Western Australia, Victoria, ACT and South Australia.

Table 4.5 Pair-wise comparisons of Year 10 mean performance on the ICT Literacy scale between states and territories in 2014

	Mean		WA	ACT	VIC	SA	TAS	NSW	QLD	NT
Western Australia	539	(±11.8)		●	●	●	▲	▲	▲	▲
ACT	536	(±26.2)	●		●	●	●	●	▲	▲
Victoria	532	(±14.3)	●	●		●	●	▲	▲	▲
South Australia	532	(±15.8)	●	●	●		●	●	▲	▲
Tasmania	514	(±15.6)	▼	●	●	●		●	●	●
New South Wales	512	(±13.7)	▼	●	▼	●	●		●	●
Queensland	504	(±16.8)	▼	▼	▼	▼	●	●		●
Northern Territory	501	(±19.9)	▼	▼	▼	▼	●	●	●	

▲ Mean scale score significantly higher than in comparison state or territory
● Mean scale score not significantly different from comparison state or territory
▼ Mean scale score significantly lower than in comparison state or territory

Percentages attaining the proficient standard

This section will describe the percentages of students at both year levels performing at or above the proficient standards. As described in chapter 3, after the first national ICT Literacy assessment in 2005, six proficiency levels were established that encompass different described levels of students' ICT literacy and also define the proficient standards for each year level. The Proficient Standard for Year 6 was reached if students performed at Proficiency Level 3 or above, while the one for Year 10 was reached if students had scores corresponding to Proficiency Level 4 or above (see more details in chapter 3). The proficient standards are also the key performance measure (KPM) of ICT literacy achievement (ACARA, 2013).

Year 6 students attaining the proficient standard

Table 4.6 shows the percentages of Year 6 students who perform at or above the proficient standard for this year level. At the national level, 55 per cent of Year 6 students reached the proficient standard. Across jurisdictions, these percentages ranged from 43 per cent in the Northern Territory to 64 per cent in Victoria. Compared with the previous national ICT Literacy assessments, there was a statistically significant decrease at the national level compared with 2011 (–6 percentage points), while the percentage of Year 6 students reaching the proficient standard was significantly higher than in 2005 (+7 percentage points). Both in New South Wales and ACT, the percentages of Year 6 students performing at or above the proficient standard were significantly lower than in 2011 (–11 and –15 percentage points respectively); for ACT they were also lower compared with the assessment in 2008 (–17 percentage points).

Table 4.6 Percentages of Year 6 students attaining the proficient standard on the ICT Literacy scale, nationally and by state and territory in 2014, 2011, 2008 and 2005

	2014	2011	2008	2005	Difference (2014–2011)	Difference (2014–2008)	Difference (2014–2005)
New South Wales	55 (±4.9)	66 (±4.1)	55 (±5.7)	51 (±6.6)	**–11** (±6.9)	1 (±9.0)	5 (±10.1)
Victoria	64 (±4.5)	64 (±3.8)	66 (±6.5)	58 (±6.3)	1 (±6.5)	–2 (±9.2)	7 (±9.6)
Queensland	48 (±5.8)	55 (±4.8)	48 (±5.3)	38 (±5.3)	–7 (±7.9)	0 (±8.9)	**10** (±9.3)
Western Australia	52 (±4.8)	59 (±5.5)	51 (±4.1)	40 (±5.4)	–7 (±8.1)	1 (±8.6)	**12** (±9.8)
South Australia	59 (±4.3)	62 (±4.9)	64 (±5.3)	52 (±5.0)	–3 (±7.1)	–6 (±8.5)	7 (±8.8)
Tasmania	46 (±5.4)	51 (±5.5)	52 (±7.0)	49 (±9.0)	–6 (±8.0)	–6 (±9.8)	–3 (±11.6)
ACT	58 (±10.6)	74 (±8.3)	75 (±6.6)	58 (±12.5)	**–15** (±13.8)	**–17** (±13.4)	0 (±17.4)
Northern Territory	43 (±6.3)	42 (±9.2)	42 (±10.6)	36 (±10.0)	0 (±11.4)	1 (±12.9)	7 (±12.6)
Australia	55 (±2.5)	62 (±2.0)	57 (±2.8)	49 (±3.0)	**–6** (±4.2)	–1 (±6.1)	**7** (±6.9)

Confidence intervals (1.96*SE) are reported in brackets. Statistically significant differences are in **bold**.
Because results are rounded to the nearest whole number, some differences may appear inconsistent.

The percentages of Year 6 students reaching the proficient standard in comparison with previous assessments are also graphically displayed in Figure 4.1.

Table 4.7 shows pair-wise comparisons of the percentages of students at or above the Proficient Standard for Year 6. The percentage of Victorian Year 6 students attaining the standard was significantly higher than in New South Wales, Western Australia, Queensland, Tasmania and the Northern Territory, but no statistically significant differences were recorded compared with South Australia and ACT. The percentage of Year 6 students performing at or above the Proficient Standard in the Northern Territory was significantly lower than those in all jurisdictions except Queensland and Tasmania.

Table 4.7 Pair-wise comparisons of percentages of Year 6 students at or above the proficient standard between states and territories in 2014

	Students attaining Proficient Standard (%)		VIC	SA	ACT	NSW	WA	QLD	TAS	NT
Victoria	64	(±4.5)		●	●	▲	▲	▲	▲	▲
South Australia	59	(±4.3)	●		●	●	▲	▲	▲	▲
ACT	58	(±10.6)	●	●		●	●	●	▲	▲
New South Wales	55	(±4.9)	▼	●	●		●	●	▲	▲
Western Australia	52	(±4.8)	▼	▼	●	●		●	●	▲
Queensland	48	(±5.8)	▼	▼	●	●	●		●	●
Tasmania	46	(±5.4)	▼	▼	▼	▼	●	●		●
Northern Territory	43	(±6.3)	▼	▼	▼	▼	▼	●	●	

▲ Percentage significantly higher than in comparison state or territory
● Percentage not significantly different from comparison state or territory
▼ Percentage significantly lower than in comparison state or territory

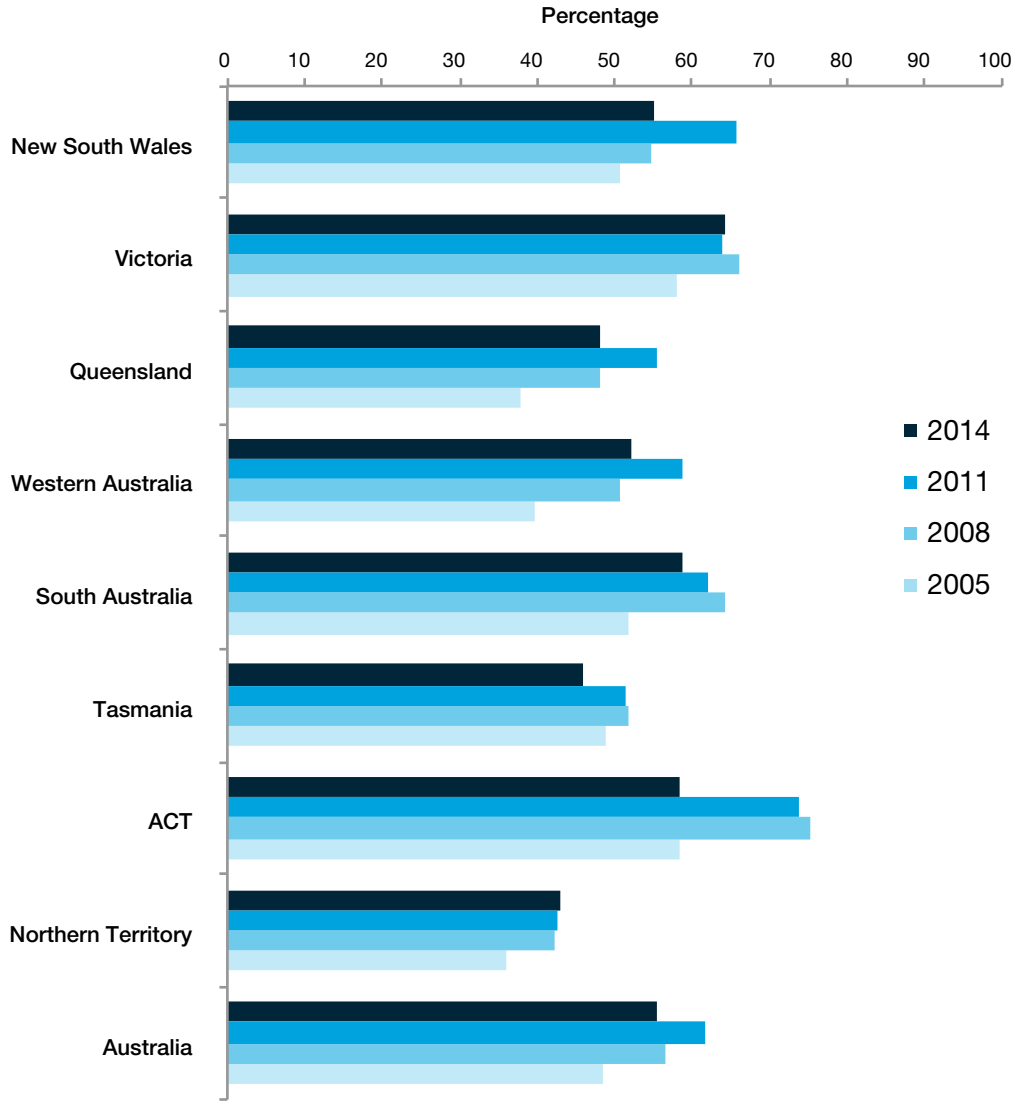


Figure 4.1 Percentages of Year 6 students at or above the Proficient Standard for Year 6, nationally and by state and territory in 2014, 2011, 2008 and 2005

Year 10 Students attaining the proficient standard

The percentages of Year 10 students attaining the proficient standard are described in Table 4.8, in comparison with those reported in previous assessments. At the national level, 52 per cent of Year 10 performed at or above the proficient standard. When comparing this proportion across states and territories, the lowest percentage was recorded for the Northern Territory (43%), while the highest jurisdictional percentage was found in ACT (60%).

The national percentage of Year 10 students attaining the proficient standard for this year level was significantly lower than in the previous assessments in 2011 (–13 percentage points), in 2008 (–14) and in 2005 (–9). At the jurisdictional level, statistical significant decreases in comparison with all three previous assessments were recorded in Victoria and Queensland. The percentage of Year 10 students performing at or above the proficient standard in ACT and New South Wales was significantly lower when compared with the national assessment in 2008 and 2011.

Table 4.8 Percentages of Year 10 students attaining the proficient standard on the ICT Literacy scale, nationally and by state and territory in 2014, 2011, 2008 and 2005

	2014	2011	2008	2005	Difference (2014–2011)	Difference (2014–2008)	Difference (2014–2005)
New South Wales	50 (±5.5)	66 (±5.3)	67 (±5.4)	61 (±7.6)	**–16** (±8.3)	**–17** (±9.6)	–11 (±11.5)
Victoria	55 (±5.9)	68 (±4.9)	70 (±6.7)	67 (±4.8)	**–13** (±8.1)	**–15** (±10.1)	**–11** (±9.5)
Queensland	47 (±5.6)	63 (±4.3)	62 (±6.2)	60 (±7.4)	**–16** (±7.5)	**–15** (±9.7)	**–13** (±11.0)
Western Australia	57 (±5.8)	61 (±4.0)	65 (±5.9)	56 (±6.1)	–4 (±7.9)	–8 (±10.1)	1 (±10.8)
South Australia	57 (±5.9)	63 (±5.6)	65 (±4.9)	61 (±5.4)	–6 (±8.7)	–7 (±9.3)	–4 (±10.0)
Tasmania	51 (±5.8)	54 (±7.1)	58 (±7.4)	56 (±6.4)	–4 (±9.7)	–7 (±11.0)	–6 (±10.9)
ACT	60 (±9.1)	72 (±7.0)	77 (±6.1)	66 (±11.4)	**–12** (±11.8)	**–17** (±11.9)	–5 (±15.5)
Northern Territory	43 (±9.1)	48 (±8.8)	46 (±13.4)	49 (±13.2)	–5 (±13.0)	–3 (±17.4)	–5 (±17.7)
Australia	52 (±2.5)	65 (±2.3)	66 (±3.0)	61 (±3.1)	**–13** (±4.5)	**–14** (±6.5)	**–9** (±7.3)

Confidence intervals (1.96*SE) are reported in brackets. Statistically significant differences are in **bold**.
Because results are rounded to the nearest whole number, some differences may appear inconsistent.

Table 4.9 records pair-wise comparisons between the jurisdictional percentages of students at or above the Proficient Standard for Year 10. The percentages of Year 10 students attaining the standard in both Queensland and Northern Territory were significantly lower than those in all other jurisdictions except for Tasmania and New South Wales, while there were no statistically significant differences between the proportions of students attaining the proficient standard in ACT, South Australia, Western Australia, Victoria, Tasmania and New South Wales.

Table 4.9 Pair-wise comparisons of percentages of Year 10 students at or above the proficient standard between states and territories in 2014

	Students attaining Proficient Standard (%)		ACT	SA	WA	VIC	TAS	NSW	QLD	NT
ACT	60	(±9.1)		●	●	●	●	●	▲	▲
South Australia	57	(±5.9)	●		●	●	●	●	▲	▲
Western Australia	57	(±5.8)	●	●		●	●	●	▲	▲
Victoria	55	(±5.9)	●	●	●		●	●	▲	▲
Tasmania	51	(±5.8)	●	●	●	●		●	●	●
New South Wales	50	(±5.5)	●	●	●	●	●		●	●
Queensland	47	(±5.6)	▼	▼	▼	▼	●	●		●
Northern Territory	43	(±9.1)	▼	▼	▼	▼	●	●	●	

▲ Percentage significantly higher than in comparison state or territory
● Percentage not significantly different from comparison state or territory
▼ Percentage significantly lower than in comparison state or territory

The percentages of Year 10 students reaching the proficient standards in comparison with previous assessments are also graphically displayed in Figure 4.2.

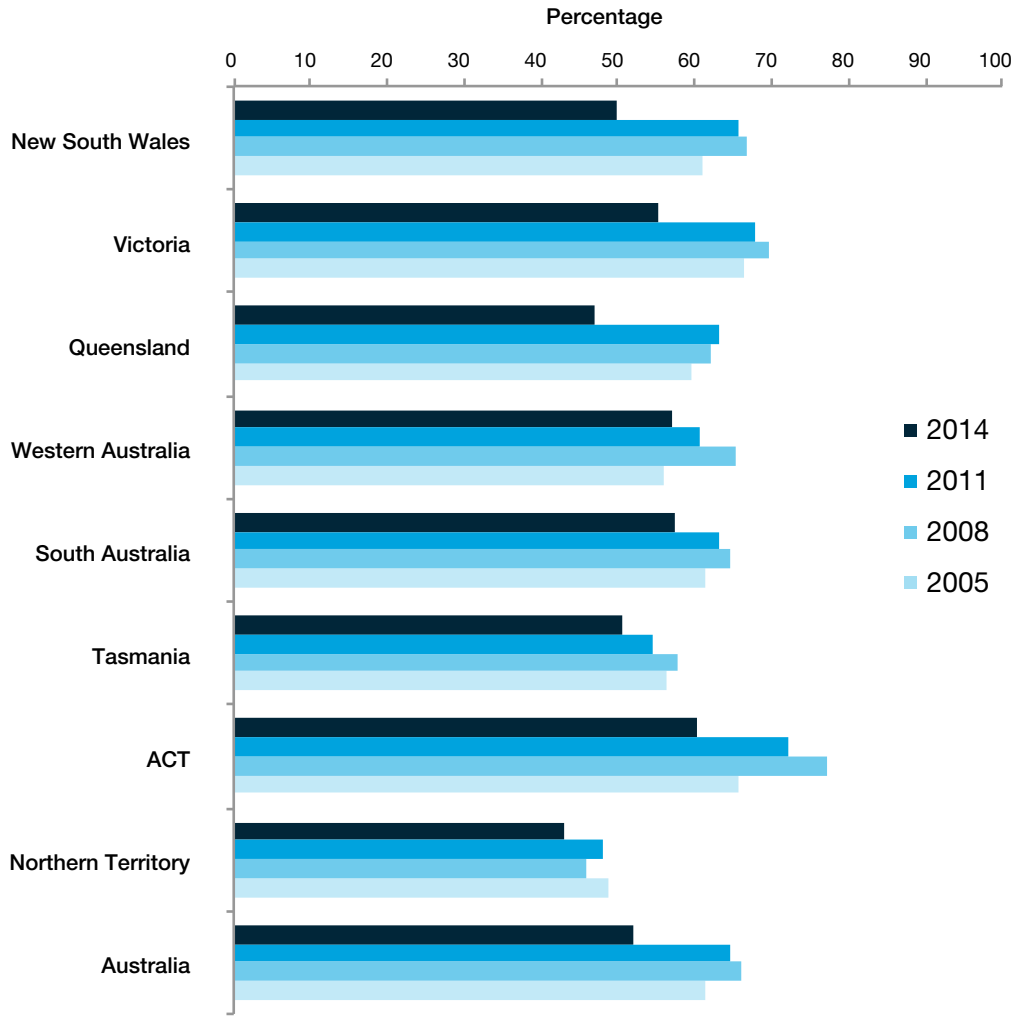


Figure 4.2 Percentages of Year 10 students at or above the Proficient Standard for Year 10, nationally and by state and territory in 2014, 2011, 2008 and 2005

Percentages of students at proficiency levels

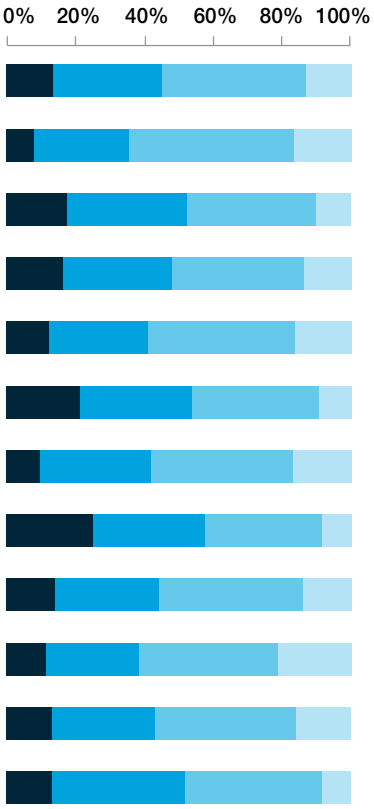
The NAP – ICT Literacy proficiency levels were described in detail in chapter 3 as well as presenting the national distribution of students across these levels. A large majority of Year 6 students performed at levels 2 and 3 (73%), while about three-quarters of Year 10 students (76%) had ICT Literacy scores corresponding to levels 3 and 4. This section will provide further details on the distribution of students at both year levels across proficiency levels in comparison with previous assessments in 2011, 2008 and 2005.

The distribution of Year 6 students across proficiency levels

Table 4.10 shows the percentages of Year 6 students at levels 1, 2, 3 and the combined levels 4, 5 and 6 in comparison with the results from the assessments in 2011, 2008 and 2005. Levels 5 and 6 were combined with Level 4 due to the small numbers of students with scores at these levels.

Table 4.10 Percentage distribution of Year 6 students over proficiency levels by state and territory in 2014 and nationally in 2014, 2011, 2008 and 2005

	Level 1	Level 2	Level 3	Level 4 & above
2014				
New South Wales	13 (±3.7)	31 (±3.9)	42 (±4.7)	13 (±2.4)
Victoria	8 (±2.1)	28 (±4.0)	48 (±4.1)	17 (±3.0)
Queensland	18 (±4.5)	34 (±4.2)	38 (±5.7)	10 (±2.7)
Western Australia	16 (±4.4)	32 (±4.7)	38 (±4.0)	14 (±3.4)
South Australia	13 (±3.3)	29 (±4.0)	43 (±3.5)	16 (±3.3)
Tasmania	21 (±5.2)	33 (±3.6)	36 (±5.2)	9 (±2.9)
ACT	10 (±4.4)	32 (±8.1)	41 (±6.0)	17 (±8.4)
Northern Territory	25 (±8.0)	32 (±5.8)	34 (±7.3)	9 (±5.7)
Australia 2014	14 (±1.9)	31 (±2.4)	42 (±2.5)	14 (±1.2)
Australia 2011	11 (±1.6)	27 (±1.7)	40 (±2.0)	21 (±1.9)
Australia 2008	13 (±1.7)	30 (±2.1)	41 (±2.3)	16 (±1.7)
Australia 2005	13 (±1.5)	39 (±2.3)	41 (±2.7)	8 (±1.5)



Confidence intervals (1.96*SE) are reported in brackets.
Estimates for small jurisdictions are based on few cases and should be treated with caution.
Because results are rounded to the nearest whole number, some totals may appear inconsistent.

Fourteen per cent of Australian Year 6 students performed at Level 1. This percentage ranged from 8 per cent in Victoria to 25 per cent in the Northern Territory. The proportion of students performing at Level 2 was 31 per cent at the national level and ranged from 28 per cent in Victoria to 34 per cent in Queensland. Students at Level 3 represented 42 per cent nationally; the lowest percentage was found in the Northern Territory (34%) and the highest percentage in Victoria (48%). The national percentage of students in Level 4 or above was 14 per cent; across jurisdictions the highest percentages were recorded in ACT and Victoria (17%), and the lowest percentages in Tasmania and the Northern Territory (9%).

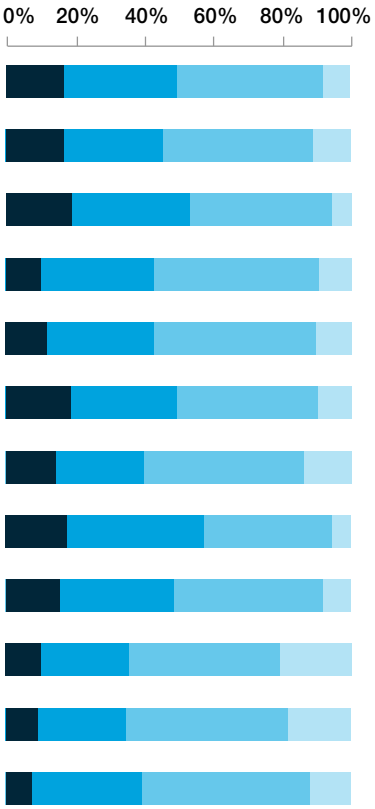
Compared with previous assessments, the proportions were roughly equal for levels 1, 2 and 3, but there was a more noticeable decrease in the percentage of Year 6 students performing at Level 4 or above – from 21 per cent in 2011 to 14 per cent in 2014. This corresponds to the statistically significant decrease in the national average of Year 6 students' score.

Distribution of Year 10 students across proficiency levels

The percentages of Year 10 students at levels 1 or 2, 3 and 4 and levels 5 or 6 are recorded in Table 4.11. Levels 1 and 2 as well levels 5 and 6 were displayed as combined groups due to the small numbers of students in the lowest and highest levels among Year 10 students.

Table 4.11 Percentage distribution of Year 10 students over proficiency levels, nationally and by state and territory in 2014 and nationally in 2014, 2011, 2008 and 2005

	Level 2 & below	Level 3	Level 4	Level 5 & above
2014				
New South Wales	16 (±4.0)	34 (±4.4)	42 (±5.3)	8 (±3.2)
Victoria	12 (±3.7)	33 (±5.3)	43 (±4.2)	12 (±3.4)
Queensland	19 (±6.0)	34 (±5.3)	41 (±5.1)	6 (±2.1)
Western Australia	9 (±3.1)	34 (±4.0)	48 (±5.4)	10 (±2.9)
South Australia	11 (±3.6)	32 (±4.7)	46 (±5.0)	11 (±3.5)
Tasmania	18 (±5.1)	32 (±4.5)	41 (±5.1)	10 (±3.3)
ACT	14 (±7.3)	26 (±7.1)	46 (±7.3)	14 (±6.2)
Northern Territory	17 (±8.4)	40 (±10.4)	37 (±7.6)	6 (±6.1)
Australia 2014	15 (±2.0)	33 (±2.1)	43 (±2.0)	9 (±1.4)
Australia 2011	10 (±1.3)	25 (±1.8)	44 (±2.4)	21 (±1.6)
Australia 2008	9 (±1.7)	26 (±2.2)	47 (±3.0)	19 (±2.4)
Australia 2005	7 (±1.2)	32 (±2.9)	49 (±2.7)	12 (±1.5)



Confidence intervals (1.96*SE) are reported in brackets.
Estimates for small jurisdictions are based on few cases and should be treated with caution.
Because results are rounded to the nearest whole number, some totals may appear inconsistent.

Fifteen per cent of Australian Year 10 students had test scores corresponding to the lowest proficiency levels 1 and 2. Across jurisdictions, the lowest percentage was recorded in Western Australia (9%) and the highest in Queensland (19%). About one-third of Year 10 students in Australia performed at Level 3. This percentage ranged across jurisdictions from 26 per cent in ACT to 40 per cent in the Northern Territory. The largest proportion of Year 10 students at the national level performed at Level 4 (43%), with jurisdictional percentages ranging from 37 per cent in the Northern Territory to 48 per cent in Western Australia. Less than one-tenth of Australian Year 10 students (9%) had test scores corresponding to the two highest proficiency levels 5 and 6. The lowest percentages for this group of students were found in Queensland and the Northern Territory (6%), while the highest percentage was recorded in ACT (14%).

Compared with previous assessments, Proficiency Level 4 continues to be the one at which almost half of Australian Year 10 students perform (with roughly the same proportion as in 2011). However, there has been a noticeable decrease in the percentage of students performing at the highest two proficiency levels – from 21 per cent in 2011 to 9 per cent in 2014 – and a corresponding increase in the proportion of Year 10 students at lower proficiency levels. This corresponds to the earlier findings about a statistically significant decrease in the national average score.

ICT literacy by student background

This section describes the association between student performance and background variables. Data on student background were collected from school records. For some of the variables, in particular on parental education and occupation, there are considerable proportions of missing data which vary across jurisdictions. Even though higher percentages of valid data were recorded compared with previous assessments, some of the results in this section need to be interpreted with some caution. Given changes in the proportion of missing data from previous cycles, comparisons over time by student background will be limited to those variables with sufficiently low percentages of missing data at this and previous assessments.

Differences in ICT literacy between males and females

Table 4.12 shows the average scale scores of male and female students in Year 6 and Year 10 at the national level and within states and territories. It also shows comparisons at the national level with results from previous assessments.

Table 4.12 Mean performance of males and females in Year 6 and Year 10 on the ICT Literacy scale by state and territory in 2014, and comparison of national means in 2014 with 2011, 2008 and 2005

	Year 6			Year 10		
	Males	Females	Differences (males – females)	Males	Females	Differences (males – females)
New South Wales	400 (±16.0)	425 (±13.3)	**–26** (±17.8)	492 (±18.9)	534 (±14.7)	**–41** (±23.5)
Victoria	430 (±10.6)	443 (±11.7)	**–13** (±11.3)	518 (±21.3)	549 (±14.6)	**–31** (±23.7)
Queensland	379 (±17.6)	408 (±14.5)	**–28** (±16.4)	497 (±17.9)	512 (±21.2)	–15 (±19.4)
Western Australia	391 (±16.7)	417 (±16.3)	**–26** (±20.4)	529 (±15.3)	549 (±13.2)	**–20** (±16.7)
South Australia	409 (±17.3)	433 (±11.3)	**–25** (±20.2)	516 (±19.3)	547 (±15.5)	**–31** (±16.5)
Tasmania	377 (±22.9)	394 (±20.8)	–17 (±31.5)	507 (±18.1)	523 (±18.9)	–16 (±20.2)
ACT	421 (±27.0)	436 (±27.8)	–15 (±17.2)	524 (±34.6)	548 (±31.2)	–24 (±40.6)
Northern Territory	360 (±24.9)	371 (±40.3)	–11 (±41.9)	497 (±23.8)	506 (±27.1)	–9 (±31.7)
Australia 2014	402 (±7.2)	424 (±6.4)	**–23** (±7.6)	506 (±9.0)	535 (±7.4)	**–29** (±10.3)
Australia 2011	425 (±7.2)	446 (±6.7)	**–22** (±7.7)	553 (±7.3)	566 (±7.5)	**–14** (±9.3)
Australia 2008	410 (±7.3)	429 (±9.0)	**–19** (±8.9)	554 (±9.1)	570 (±7.1)	**–16** (±9.8)
Australia 2005	393 (±9.2)	407 (±6.5)	**–15** (±11.3)	546 (±7.6)	555 (±6.9)	–9 (±10.3)
Difference (2014–2011)	**–23** (±12.9)	**–22** (±12.1)	–1 (±13.4)	**–47** (±14.0)	**–31** (±13.1)	–15 (±15.9)
Difference (2014–2008)	–8 (±17.1)	–4 (±17.6)	–4 (±18.0)	**–48** (±18.7)	**–35** (±17.1)	–13 (±19.7)
Difference (2014–2005)	9 (±19.9)	17 (±18.5)	–8 (±21.0)	**–40** (±19.9)	**–20** (±19.0)	–20 (±21.7)

Confidence intervals (1.96*SE) are reported in brackets. Statistically significant differences are in **bold**.
Because results are rounded to the nearest whole number, some differences may appear inconsistent.

Table 4.12 illustrates that females have significantly higher test scores than male students at both year levels. Among Year 6 students, the male average score was 23 score points lower than among females; among Year 10 students, the difference was 29 score points.

Statistically significant differences between males and females in Year 6 were recorded for New South Wales (–26), Victoria (–13), Queensland (–28), Western Australia (–26) and South Australia (–25). In Year 10, statistically significant differences in favour of female students were recorded in New South Wales (–41), Victoria (–31), Western Australia (–20) and South Australia (–31).

Compared with previous assessments, among Year 6 students there were roughly similar and statistically significant decreases since 2011, with a similar difference in performance between the two gender groups. Among Year 10 students, there was a noticeably larger decrease in performance since 2011 among males (–47) than among females (–31); however, both score points differences were statistically significant. As a result, the differences in performance between males and females in 2014 appears to be larger than in all previous assessments; however, the difference between the performance gaps in 2014 and all previous assessments is not statistically significant.

Table 4.13 National percentages of males and females in Year 6 and Year 10 attaining the proficient standards on the ITC Literacy scale in 2014, 2011, 2008 and 2005

	2014	2011	2008	2005	Difference (2014–2011)	Difference (2014–2008)	Difference (2014–2005)
Year 6							
Males	51 (±3.3)	58 (±2.7)	52 (±3.0)	45 (±4.9)	**–7** (±5.1)	–1 (±6.7)	6 (±8.3)
Females	60 (±2.9)	66 (±2.5)	62 (±3.6)	52 (±4.1)	**–6** (±4.6)	–2 (±6.6)	**8** (±7.5)
Year 10							
Males	47 (±3.4)	62 (±2.7)	63 (±3.9)	60 (±4.2)	**–15** (±5.6)	**–16** (±7.7)	**–13** (±8.6)
Females	58 (±3.3)	67 (±3.3)	70 (±3.2)	63 (±3.5)	**–10** (±5.2)	**–12** (±6.5)	–5 (±7.4)

Confidence intervals (1.96*SE) are reported in brackets. Statistically significant differences are in **bold**.
Because results are rounded to the nearest whole number, some differences may appear inconsistent.

The national percentages of Year 6 and Year 10 males and females attaining the proficient standard are shown in Table 4.13. While in 2014, 51 per cent of male Year 6 students obtained scores at or above the proficient standard, the corresponding percentage for females was 60 per cent. Compared with the previous assessment in 2011, the proportion decreased significantly among males and females (–7 and –6 percentage points). There were no statistically significant changes since 2008, and compared with 2005 the percentage of female students attaining the proficient standard was significantly higher (+8 percentage points).

Among Year 10 students, 47 per cent of males and 58 per cent of females reached the proficient standard. Compared with previous assessments, the percentages among males and females were significantly lower compared with 2011 (–15 and –10 percentage points respectively), and 2008 (–16 and –12 percentage points respectively). Compared with 2005, a significant decrease (–13 percentage points) was recorded only among males.

Differences in ICT literacy by indigenous status

Since 2011, data on indigenous status were collected in both year levels from school records. While in 2011 there were still relatively high levels of missing information, for the NAP – ICT Literacy 2014 assessment the percentage of students where this information was

not stated or unknown was relatively low.[12] Due to these changes in the proportion of valid data, no direct comparisons with the previous assessment will be presented. Table 4.14 displays the average scale scores for Indigenous and non-Indigenous students, as well as the respective percentages of students attaining the proficient standard at both year levels.

Table 4.14 Mean scores and percentages attaining the proficient standards for Indigenous and non-Indigenous Year 6 and Year 10 students on the ICT Literacy scale in 2014

	Mean	Percentage
Year 6		
Non–Indigenous students	417 (±5.5)	57 (±2.5)
Indigenous students	318 (±19.8)	22 (±8.1)
Difference (Non–Indigenous – Indigenous)	**99** (±20.3)	**35** (±8.2)
Year 10		
Non–Indigenous students	522 (±6.6)	53 (±2.6)
Indigenous students	428 (±26.5)	20 (±8.8)
Difference (Non–Indigenous – Indigenous)	**94** (±25.4)	**32** (±9.1)

Confidence intervals (1.96*SE) are reported in brackets. Statistically significant differences are in **bold**. Because results are rounded to the nearest whole number, some differences may appear inconsistent.

The results show considerable differences between Indigenous and non-Indigenous students at both year levels. In Year 6, Indigenous students had test scores that were much lower (318) than those of non-Indigenous students (417), which constitutes a statistically significant difference of 99 score points. While 57 per cent of non-Indigenous Year 6 students attained the proficient standard, this was the case for only 22 per cent of Indigenous students at this year level. In Year 10, Indigenous students had a mean test score of 428 points compared with a much higher average score among non-Indigenous students; the difference was statistically significant with 94 score points. While among non-Indigenous Year 10 students, 53 per cent performed at or above the proficient standard, only 20 per cent of Indigenous students had test scores corresponding to this level.

Differences in ICT literacy by language background

Data on language backgrounds were collected in both year levels from school records to distinguish between students who only speak English at home and those who speak at least one other language at home. At both year levels, only low proportions of students had missing information on language background in the 2014 assessment. However, due to considerably higher percentages of students with missing information, in particular among Year 10 students in the 2011 assessments, it is not appropriate to make direct comparisons over time for these results.[13] Table 4.15 displays the average scale scores for students who speak only English at home and those who speak another language at both year levels, as well as the corresponding percentage of students attaining the proficient standard.

[12] In NAP – ICT Literacy 2014, among Year 6 students 2 per cent had missing information, while in Year 10 this was the case for 4 per cent. The corresponding percentages in 2011 were 6 per cent (Year 6) and 8 per cent (Year 10).

[13] In 2014, at both year levels, for only 3 per cent of assessed students language background was not stated or was unknown. The corresponding percentages in the 2011 assessment were 5 per cent in Year 6 and 9 per cent in Year 10.

Table 4.15 Mean scores and percentages attaining the proficient standards for Year 6 and Year 10 students on the ICT Literacy scale by language spoken at home in 2014

	Mean	Percentage
Year 6		
Only English spoken at home	412 (±6.2)	55 (±2.7)
At least one other language spoken at home	417 (±15.2)	58 (±5.5)
Difference (Other – English)	–5 (±16.5)	–3 (±5.8)
Year 10		
Only English spoken at home	520 (±7.2)	52 (±2.7)
At least one other language spoken at home	520 (±16.9)	51 (±6.1)
Difference (Other – English)	0 (±18.1)	1 (±6.7)

Confidence intervals (1.96*SE) are reported in brackets.
Because results are rounded to the nearest whole number, some differences may appear inconsistent.

At both year levels, there were no statistically significant differences in test performance between students who speak English at home and those who speak other languages. These findings are generally similar to those in the previous assessment conducted in 2011.

Differences in ICT literacy by country of birth

Schools participating in the assessment provided data on students' country of birth to distinguish between those who were born in Australia and those who were born overseas. In 2014, relatively few students had missing information on country of birth at both year levels. This was different in 2011, when much higher proportions of students with missing information were recorded, and therefore it would not be appropriate to provide direct comparisons of results by country of birth.[14] The scale score averages in the ICT Literacy assessment for students born in Australia and those born overseas at both year levels are displayed in Table 4.16, together with the percentage of students in each group attaining the corresponding proficient standard at each year level.

Table 4.16 Mean scores and percentages attaining the proficient standards for Year 6 and Year 10 students on the ICT Literacy scale by country of birth in 2014

	Mean	Percentage
Year 6		
Born in Australia	412 (±5.9)	55 (±2.6)
Born overseas	420 (±15.0)	60 (±6.6)
Difference (Overseas – Australia)	8 (±15.4)	5 (±6.6)
Year 10		
Born in Australia	521 (±6.7)	53 (±2.6)
Born overseas	513 (±13.1)	48 (±5.2)
Difference (Overseas – Australia)	–8 (±12.5)	–5 (±5.2)

Confidence intervals (1.96*SE) are reported in brackets.
Because results are rounded to the nearest whole number, some differences may appear inconsistent.

[14] In 2014, for 1 per cent of assessed Year 6 students and 0.5 per cent of Year 10 students, no information on their country of birth was available. The corresponding percentages in the 2011 assessment were 5 per cent in Year 6 and 9 per cent in Year 10.

At both year levels in the 2014 ICT Literacy assessment, no statistically significant differences between mean test scores of students in the two groups were recorded. Also, there were no statistically significant differences between the percentages attaining the proficient standards across the two comparison groups. This was different in the 2011 assessment, where significant differences in test scores among Year 10 students were observed, with students born in Australia outperforming those who were born overseas.

Differences in ICT literacy by geographic location

Students assessed in 2014 were grouped into three categories according to the geographic location of their schools: metropolitan, provincial and remote. In previous assessments, this information was available for all students at both year levels. Table 4.17 shows the mean scale scores on the ICT Literacy scale and the percentage of students attaining the Year 6 and Year 10 proficient standards by geographic location of the schools in comparison with the previous assessments in 2005, 2008 and 2011. Arrows between adjacent columns indicate whether there was a statistically significant difference between students in the corresponding location groups, with arrows pointing to the right indicating that the mean score in the left column is significantly higher than in the right column.

Table 4.17 Mean scores and percentages attaining the proficient standards for Year 6 and Year 10 on the ICT Literacy scale by geographic location in 2014 in comparison with 2005, 2008 and 2011

	Year 6					Year 10				
	Metropolitan		Provincial		Remote	Metropolitan		Provincial		Remote
Mean 2014	421 (±6.3)	>	395 (±12.6)	>	336 (±20.0)	526 (±7.8)	>	504 (±15.5)	>	479 (±11.1)
Mean 2011	448 (±6.8)	>	404 (±8.6)		381 (±44.8)	569 (±6.4)	>	536 (±12.5)		483 (±63.3)
Mean 2008	432 (±7.8)	>	394 (±13.1)		354 (±58.7)	569 (±8.0)	>	550 (±12.4)	>	490 (±41.4)
Mean 2005	408 (±8.2)	>	386 (±9.7)	>	345 (±47.9)	555 (±7.3)	>	545 (±12.0)		504 (±23.2)
Mean difference (2014 – 2011)	**–27** (±12.1)		–8 (±17.2)		–45 (±49.7)	**–42** (±12.8)		**–33** (±21.4)		–4 (±64.7)
Mean difference (2014 – 2008)	–11 (±17.0)		1 (±22.8)		–18 (±63.5)	**–42** (±17.7)		**–46** (±24.1)		–11 (±45.0)
Mean difference (2014 – 2005)	13 (±19.1)		9 (±22.6)		–9 (±54.3)	**–28** (±19.3)		**–41** (±25.3)		–25 (±30.3)
At or above proficiency standard 2014	58 (±2.9)		48 (±5.1)		35 (±5.8)	54 (±3.0)		47 (±4.7)		32 (±15.6)
At or above proficiency standard 2011	66 (±2.3)		51 (±3.2)		45 (±20.9)	67 (±2.5)		58 (±4.9)		47 (±15.7)
At or above proficiency standard 2008	61 (±3.3)		48 (±5.7)		38 (±12.7)	69 (±3.3)		62 (±5.6)		45 (±10.6)
At or above proficiency standard 2005	52 (±3.8)		43 (±5.5)		33 (±18.9)	63 (±4.1)		59 (±5.7)		46 (±9.7)
Difference in percentage (2014 – 2011)	**–8** (±4.5)		–2 (±6.6)		–10 (±21.8)	**–13** (±4.9)		**–11** (±7.3)		–15 (±23.1)
Difference in percentage (2014 – 2008)	–3 (±6.5)		1 (±9.1)		–4 (±14.3)	**–15** (±6.9)		**–15** (±8.9)		–12 (±20.4)
Difference in percentage (2014 – 2005)	7 (±7.4)		6 (±9.5)		2 (±20.1)	**–9** (±8.0)		**–12** (±9.6)		–13 (±20.2)

Confidence intervals (1.96*SE) are reported in brackets. Statistically significant differences between cycles are in **bold**.
> Mean score on the left is larger than mean score on the right.
Because results are rounded to the nearest whole number, some differences may appear inconsistent.

The results show that at both year levels, students at metropolitan schools have significantly higher average test scores than those enrolled at provincial schools, who, in turn, had significantly higher mean test scores than those from remote schools. At both year levels, percentages of students attaining the proficient standards were highest among metropolitan students and lowest among those studying at remote schools. Similar findings had been recorded in previous assessments, in particular regarding differences between students at metropolitan and provincial schools.

Compared with previous assessments, Year 6 students at metropolitan schools performed in 2014 significantly lower than in 2011. At Year 10, both at metropolitan and provincial schools, statistically significant decreases in mean test scores as well as in the percentage of students attaining the proficient standard were recorded for the 2014 assessment in comparison with all previous assessments. No significant differences in test performance were found when comparing Year 10 results of students in remote schools with those from previous assessments.

Differences in ICT literacy by parental occupation

School records provided data on parental occupation for students assessed in NAP – ICT Literacy 2014. The information was recorded in five different categories following an agreed classification endorsed by MCEECDYA: (1) senior managers and professionals; (2) Other managers and associate professionals; (3) Tradespeople and skilled office, sales and service staff; (4) Unskilled labourers, office, sales and service staff; and (5) parents not in paid work in the last 12 months. Furthermore, for a substantial number of students no data were reported.[15] Whenever information was available for two parents, the higher-coded occupation was used for reporting. Table 4.18 shows the mean scale scores on the ICT Literacy scale and the percentages attaining the proficient standard in Year 6 and Year 10 for students with parents in the six reporting categories (which include students with parents for which this information was not stated or was unknown).

Table 4.18 Mean scores and percentages for Year 6 and Year 10 students attaining the proficient standards on the ICT Literacy scale by categories of parental occupation in 2014

Highest parental occupation	Mean		Percentage	
	Year 6	Year 10	Year 6	Year 10
Senior managers & professionals	456 (±7.6)	555 (±9.4)	72 (±4.0)	65 (±4.5)
Other managers & associate professionals	431 (±8.3)	532 (±9.0)	63 (±5.0)	56 (±4.1)
Tradespeople & skilled office, sales & service staff	408 (±8.7)	515 (±10.5)	52 (±4.2)	50 (±5.5)
Unskilled labourers, office, sales & service staff	377 (±11.9)	485 (±15.3)	42 (±4.9)	40 (±6.0)
Not in paid work in last 12 months	343 (±16.4)	451 (±17.9)	30 (±7.4)	29 (±6.1)
Not stated or unknown	375 (±17.0)	506 (±12.6)	41 (±6.6)	44 (±6.0)

Confidence intervals (1.96*SE) are reported in brackets.

[15] At the national level, 10 per cent of Year 6 students and 11 per cent of Year 10 had missing data on parental occupation. There was considerable variation across jurisdictions in the proportion of missing information and results should be interpreted with caution.

At both year levels, large differences in test scores were recorded across parental occupation groups. Year 6 students with parents who were senior managers or professionals had test scores that were 79 score points higher than those with parents in the category for unskilled labourers, office, sales or service staff. Among Year 10 students, the difference between students in these two groups was 70 score points. While 72 per cent of Year 6 students with parents who were senior managers or professionals attained the proficient standard, this percentage was 42 per cent among those with parents who were unskilled labourers, office, sales or service staff. The corresponding percentages at Year 10 were 65 per cent and 40 per cent.

Differences in ICT literacy by parental education

Information on the highest-attained educational level of parents of students assessed in 2014 was collected from school records. The information was reported using seven categories following a classification endorsed by MCEECDYA: (1) Bachelor degree or above; (2) Advanced Diploma/Diploma; (3) Certificate I to IV (including trade certificate); (4) Year 12 or equivalent; (5) Year 11 or equivalent; (6) Year 10 or equivalent; and (7) Year 9 or equivalent or below. Furthermore, for a substantial number of students no data were available.[16] Whenever information was available for two parents, the higher-coded occupation was used for reporting. Table 4.19 shows the mean scale scores on the ICT Literacy scale and the percentage of students attaining the proficient standard in Year 6 and Year 10 for students with parents in the eight reporting categories (which include students with parents for which this information was not stated or was unknown).

Table 4.19 Mean scores and percentages for Year 6 and Year 10 students attaining the proficient standards on the ICT Literacy scale by categories of parental education in 2014

Highest parental educational level	Mean		Percentage	
	Year 6	Year 10	Year 6	Year 10
Bachelor degree or above	457 (±6.8)	561 (±9.6)	73 (±3.7)	69 (±4.3)
Advanced Diploma/Diploma	416 (±9.4)	520 (±10.9)	56 (±5.3)	51 (±5.3)
Certificate I to IV (incl. trade cert.)	394 (±8.6)	503 (±10.4)	47 (±4.1)	45 (±4.3)
Year 12 or equivalent	387 (±11.6)	503 (±17.4)	44 (±6.1)	48 (±7.8)
Year 11 or equivalent	373 (±21.0)	486 (±19.5)	40 (±9.3)	39 (±8.1)
Year 10 or equivalent	347 (±16.9)	465 (±23.8)	30 (±7.2)	32 (±7.7)
Year 9 or equivalent or below	357 (±38.6)	468 (±28.0)	39 (±14.1)	32 (±12.2)
Not stated or unknown	380 (±15.9)	513 (±14.1)	44 (±6.9)	48 (±7.1)

Confidence intervals (1.96*SE) are reported in brackets.

The results show large differences in ICT Literacy mean scores across categories of parental education. Year 6 students with at least one parent who had attained a Bachelor degree or above, had average scores that were 100 score points higher than those of students whose parents had a parental education of Year 9 or below. The corresponding difference between these two groups among Year 10 students was 93 score points. While 73 per cent of Year 6 students with at least one parent who had studied and graduated at a university attained the

[16] At the national level, for 7 per cent of Year 6 students and 10 per cent of Year 10 students, parental education was not stated or was unknown. There was considerable variation across jurisdictions in the proportion of missing information, and results should be interpreted with caution.

proficient standard, this percentage was much lower with 39 per cent among students with parents who had their highest educational qualification recorded as Year 9 or below. Among Year 10 students, the corresponding percentages were 69 per cent and 32 per cent.

Summary

As in previous NAP – ICT Literacy assessments, the increases in mean test scores from Year 6 to Year 10 were equivalent to more than a standard deviation. The differences between the two year levels were relatively similar across states and territories. There were statistically significant decreases in test performance at both year levels since the last assessment in 2011. While in Year 6 the mean test scores were 22 score points lower than in the previous assessment, among Year 10 students the decrease was 39 score points. Significant decreases in test performance since 2011 among Year 6 students were recorded for New South Wales, Queensland and ACT. Among Year 10 students, mean test performance decreased significantly in New South Wales, Victoria, Queensland and ACT.

While among Year 6 students no significant differences were found compared with the assessments in 2008 and 2005, the average performance among Year 10 students was also significantly lower than in 2008 and 2005. The national percentage of students attaining the Proficient Standard for Year 6 decreased between 2011 and 2014 from 62 to 55 per cent, and the students who attained the Proficient Standard for Year 10 decreased from 65 to 52 per cent.

Statistically significant differences between male and female students were recorded at both levels in most of the larger jurisdictions, with female students performing higher than male students. These findings are similar to those in previous assessments. Students in both gender groups had significantly lower mean test scores than in 2011. Similar to results from the previous assessments, Indigenous students performed considerably lower than non-Indigenous students: while among non-Indigenous students more than half of the students attained the proficient standard at both year levels, only every fifth student from Indigenous background performed at or above the proficient standard.

No statistically significant differences were found between students who spoke English at home and those who spoke at least one other language. There were also no differences in mean performance between students born in Australia and those who were born overseas. As in the previous assessments, statistically significant differences were recorded between geographic location groups, with metropolitan students having the highest and students at remote schools having the lowest achievement scores. However, these performance differences might partly be due to differences in factors related to the socioeconomic family background associated with geographic location.

Large differences in performance were recorded at both year levels across categories of parental occupation and parental education. While two-thirds or more of students with parents who were senior managers or professionals performed at or above the proficient standard, only about two out of five students attained this standard among students with parents who were unskilled labourers, office, sales or service staff. Similarly, more than two-thirds among students with parents having a university qualification attained the proficient standard, while only two out of five (or less) achieved scores at this level among students whose parents had an educational level of Year 9 or below.

Chapter 5: Student use of ICT

In addition to the assessment tools, NAP – ICT Literacy 2014 included a questionnaire asking about students' use of ICT at home and at school, their experience of using ICT and their access to ICT resources. This computer-based questionnaire was administered following the ICT Literacy assessment. Results from the questionnaire provide information about familiarity with, access to and use of ICT by students in Australia.

Background

Household access to ICT

Over more than three decades there has been rapid growth in the availability and use of computer-based information and communication technology (ICT). The use of digital information and communication technology has become ubiquitous in a short space of time and permeates many occupations and most homes. The most recent survey of household use of information technology in Australia, conducted in 2012 and 2013, indicates that 83 per cent of households had access to the internet at home (up from 64% in 2006–7), and 77 per cent of households had broadband access to the internet (up from 56% in 2006–7) (ABS, 2014). Almost every household with children under 15 years of age had access to the internet at home (96%, which was up from 81% in 2006–7). In 2012–13, more than four out of five households (81%) accessed the internet at home every day and a further 16 per cent of households accessed the internet at home at least weekly (ABS, 2014). Internet access varied among states and territories (from a low of 78% to a high of 89%) and was associated with household income.

Australian student use of ICT in comparison with other countries

The IEA International Computer and Information Literacy Study (ICILS) conducted in 2013 showed that a high percentage of Australian Year 8 students (87%) used computers at home at least once each week (Fraillon, Ainley, Schulz, Friedman & Gebhardt, 2014). This was not the highest percentage among the participating countries as eight countries had percentages of frequent users above 90 per cent. However, Australia had the highest percentage of students who used computers at school at least once a week (81%), followed by Poland (79%) and the Slovak Republic (77%). These results suggest that school use of computer technology is more prevalent in Australia than in other countries.

It is also evident from the ICILS data that Australian Year 8 students, along with those from Thailand and the Russian Federation, reported a higher frequency of using computers for study purposes than the average across participating ICILS countries (De Bortoli, Buckley, Underwood, O'Grady & Gebhardt, 2014). Australian Year 8 students also reported lower frequencies than the ICILS average for using the internet for social communication or to exchange information. There was no significant difference between Australian students and the average for ICILS countries in the frequency of computer use for recreation. It appears that Australian students use computer technology more than their peers in other countries for study and less than their peers in other countries for communication.

It is possible to use the Australian data reported by ICILS (De Bortoli et al., 2014) to elaborate what is involved in the term 'study purposes'. The study purposes that were most frequently reported by Australian students as involving ICT application at least once per month were utilitarian: preparing reports or essays (45%), preparing presentations (44%) and completing worksheets or exercises (39%). Interestingly, for these three purposes, the study recorded also the largest differences between the Australian percentage and the international average percentage (24 and 25 percentage points). Students also reported completing tests as a fairly widespread monthly activity (33%). However, among the less utilitarian applications there was relatively frequent use of computers, on an at least monthly basis, for working with other students in their own school (40%) and organising their time and work (30%). Writing about their own learning was reported by one in five students (19%), and wider communication with students from other schools was reported as a monthly occurrence by one in eight students (13%).

ICILS also revealed some differences among Australian students in computer use (De Bortoli et al., 2014). Female students were more frequent users of computers for study purposes than male students. Socioeconomic status also appeared to be positively related to the more frequent use of the computers for study purposes. Furthermore, students in metropolitan locations used computers more frequently for study purposes than students in non-metropolitan locations. With regard to internet use, female students were more likely than male students to use this medium for social communication, and socioeconomic status appeared to be negatively related to the use of the internet for information exchange.

The percentage of Year 8 students reporting using computers in every – or almost every – lesson in information technology or computer subjects was higher in Australia (58%) than across ICILS countries (56%). Across other subject areas, computers were used less frequently: 42 per cent of Australian students reported computer use in every – or almost every – lesson in the humanities, and 34 per cent reported this for science and English. The subject areas in which computers were less frequently being used in every or almost every lesson were creative arts (14%), languages other than English (24%) and mathematics (24%) (De Bortoli et al., 2014).

ICILS included a measure that assessed the extent to which students attributed learning about ICT at school (Fraillon et al., 2014). Australia had the highest mean scale score, suggesting that Australian students attributed learning about ICT to school more frequently than in other countries. In contrast, in Korea and Germany students had the lowest mean scale scores and were least disposed to attribute their learning about ICT to school. The difference in scale scores between Australia and Germany was equivalent to 0.7 standard deviation units, and between Australia and Korea equivalent to 0.8 standard deviation units. Both of these differences were quite large.

The Australian ICILS results suggest that Australian lower secondary students are more frequent users of ICT for study purposes than their peers in other countries and that they attribute, to a greater extent than their peers in other countries, their learning about ICT use to teaching at their schools.

Just as there has been widespread adoption of ICT across the community, there has been a corresponding growth in the availability and use of ICT in schools and school systems. According to ICILS, in Australia every three students had access to one computer compared with the international average of 18 students per computer. Norway was the only country to have a better student–computer ratio, with one computer available for every two students. Internationally, the least common computer resource available was tablet computers. However, Australia had the highest percentage of schools with tablet computers available to students (64%) (De Bortoli et al., 2014). In addition to this, ICILS reported that 94 per cent of Australian teachers reported using ICT for teaching in their Year 8 reference class, and teachers in Australia (along with those in Chile) reported the strongest emphasis on developing student expertise in using ICT.

These perspectives are consistent with reviews such as the report for the United States Department of Education that documented the policies and practices adopted in 22 countries (including Australia) to encourage the educational application of ICT (Bakia, Murphy, Anderson & Trinidad, 2011). The report highlights the role of Australia's 'Digital Education Revolution', as well as initiatives at state and territory level, in supporting changes in teaching and learning in Australian schools. Similarly, the IEA Second International Technology in Education Study (SITES), based on data from 2006, indicated that Australian science and mathematics teachers were relatively frequent users of ICT compared with their counterparts in other countries (Ainley, Eveleigh, Freeman & O'Malley, 2010).

Computer familiarity

Experience of using ICT

Table 5.1 records the length of time for which students in Year 6 and Year 10 reported using computers. It shows that 86 per cent of Year 6 students and 96 per cent of Year 10 students indicated having three years' experience or more of using computers. These data illustrate that almost all students assessed in 2014 were familiar with computers and were experienced in using them. However, the data do not reveal anything about the nature of that previous experience.

Table 5.1 Distributions of students' years of experience of using computers in 2014 shown as percentages for each category

How long have you been using computers?	Year 6	Year 10
Never or less than one year	4 (±0.7)	2 (±0.5)
At least one year, but less than three years	10 (±1.0)	3 (±0.8)
At least three years, but less than five years	22 (±1.7)	11 (±1.0)
At least five years, but less than seven years	30 (±1.7)	25 (±1.4)
Seven years or more	34 (±2.0)	60 (±1.9)

Confidence intervals (1.96*SE) are reported in brackets.
Because results are rounded to the nearest whole number, some totals may appear inconsistent.

The extent of familiarity with computer technology is evident in the data recorded in Table 5.2. In 2014, 64 per cent of Year 6 students and 84 per cent of Year 10 students had five or more years' experience of using computers. Although there have been changes in the definitions of the categories, it does seem that the percentage of experienced computer users has grown since the inception of this program. In 2005, 54 per cent of Year 6 students and 64 per cent of Year 10 students had been using computers for more than five years.

Table 5.2 Percentages of students with more than five years' experience using computers in 2014, 2011, 2008 and 2005

	2014[a]	2011	2008	2005
Year 6	64 (±1.9)	62 (±1.6)	56 (±2.3)	54 (±2.7)
Year 10	84 (±1.3)	76 (±1.5)	70 (±2.0)	64 (±2.3)

[a] In 2014, five years of experience was included, while in previous cycles only students with more than 5 years experience were counted.
Confidence intervals (1.96*SE) are reported in brackets.

Differences in experience with computers by jurisdiction and socioeconomic group (based on parental occupation) are shown in Table 5.3. At Year 6, South Australia had the highest percentage of students (67%) with five or more years' experience using computers, while the lowest percentage was recorded for the Northern Territory (58%). At Year 10, there was little variation in the percentage of students with five or more years' experience with computers, with the range being from 81 per cent in Western Australia to 88 per cent in South Australia and Tasmania.

Table 5.3 Percentages of students with more than five years' experience using computers by state or territory and parental occupation in 2014

	Year 6	Year 10
State or territory		
New South Wales	66 (±4.0)	85 (±2.9)
Victoria	66 (±3.4)	85 (±2.7)
Queensland	59 (±4.3)	82 (±2.6)
Western Australia	61 (±4.2)	81 (±2.9)
South Australia	67 (±3.8)	88 (±2.2)
Tasmania	59 (±5.4)	88 (±3.3)
ACT	61 (±6.8)	86 (±3.6)
Northern Territory	58 (±4.8)	82 (±4.8)
Parental occupation		
Senior managers & professionals	70 (±4.0)	89 (±2.2)
Other managers & associate professionals	65 (±3.1)	88 (±2.4)
Tradespeople & skilled office, sales & service staff	63 (±3.2)	82 (±3.1)
Unskilled labourers, office, sales & service staff	59 (±4.5)	80 (±4.4)
Not in paid work	59 (±5.7)	77 (±7.1)
Missing data on socioeconomic group	59 (±4.5)	79 (±3.7)
Difference (Senior – Unskilled)	**11** (±6.1)	**10** (±4.7)

Confidence intervals (1.96*SE) are reported in brackets. Significant differences are in **bold**.
Because results are rounded to the nearest whole number, some differences may appear inconsistent.

Table 5.3 also shows the differences in the percentages with five or more years of computer experience among groups based on parental occupation. As expected, among both Year 6 and Year 10 students the percentage of students with this level of computer experience were higher in the group of student whose parents were senior managers or professionals (70% in Year 6 and 89% in Year 10) than among students whose parents were in unskilled manual office and sales occupations (59% in Year 6 and 80% in Year 10).

Access to computer resources

The survey results indicate that in 2014 most Australian students in Year 6 and Year 10 had access to computer resources at home. The data in Table 5.4 show that only 4 per cent of Year 6 students and 2 per cent of Year 10 students had no computers at home. More than half of the students (52% at Year 6 and 66% at Year 10) reported having three or more computers (desktop, laptop or tablet) in their homes. Chapter 6 presents an analysis of the associations between access to resources and ICT literacy.

Table 5.4 Distributions of availability of computers at home in 2014

Number of devices	Desktop computers		Laptop computers		Tablet computers		Total computers	
	Year 6	Year 10	Year 6	Year 10	Year 6	Year 10	Year 6	Year 10
None	21 (±1.4)	25 (±1.5)	24 (±1.5)	12 (±1.2)	8 (±1.1)	13 (±1.3)	4 (±0.8)	2 (±0.6)
One	47 (±1.7)	49 (±1.9)	31 (±1.7)	23 (±1.5)	21 (±1.6)	30 (±1.8)	20 (±1.5)	11 (±1.3)
Two	16 (±1.3)	16 (±1.2)	21 (±1.4)	26 (±1.6)	21 (±1.5)	23 (±1.4)	25 (±1.5)	20 (±1.6)
Three or more	16 (±1.5)	10 (±1.3)	24 (±1.8)	39 (±2.1)	49 (±2.0)	34 (±1.8)	52 (±2.0)	66 (±1.9)

Confidence intervals (1.96*SE) are reported in brackets.
Because results are rounded to the nearest whole number, some totals may appear inconsistent.

Frequency of use

Results from the student survey conducted as part of NAP – ICT Literacy in 2014 confirm the general belief that Australian students are frequent users of computer technology. The frequency of computer use at home and at school is recorded in Table 5.5. It shows the distribution across categories of usage at home and at school. In general, it is evident that Year 10 students were more frequent users of computer technology than Year 6 students, and that for both Year 6 and Year 10 students, computers were used more frequently at home than at school.

Table 5.5 Percentage frequencies of computer use at home and at school for Year 6 and Year 10 students in 2014

	Year 6		Year 10	
How often do you use computers in these places?	**Home**	**School**	**Home**	**School**
2014				
Less than once a week or never	16 (±1.4)	16 (±2.0)	9 (±1.1)	9 (±1.7)
A few times each week	29 (±1.6)	50 (±2.9)	14 (±1.6)	26 (±2.8)
Almost every day	23 (±1.5)	20 (±2.0)	18 (±1.3)	22 (±1.8)
Every day	18 (±1.2)	8 (±1.2)	26 (±1.6)	18 (±1.6)
Several times every day	15 (±1.4)	6 (±1.2)	33 (±2.0)	26 (±2.7)
Summary measures				
Almost every day or more – 2014	56 (±2.1)	34 (±3.2)	77 (±2.1)	65 (±3.5)
Almost every day or more – 2011	60 (±2.0)	27 (±2.7)	82 (±1.3)	51 (±2.5)
Almost every day or more – 2008	55 (±1.9)	20 (±2.5)	75 (±1.7)	27 (±2.1)

Confidence intervals (1.96*SE) are reported in brackets.
Because results are rounded to the nearest whole number, some totals may appear inconsistent.

It can be seen from Table 5.5 that 77 per cent of Year 10 students reported using a computer at home almost every day, every day or several times every day (which we will call daily use). Among Year 6 students the corresponding figure was 56 per cent. Sixty-five per cent of Year 10 students reported using computers daily at school. The corresponding figure for Year 6 students was 34 per cent. This represents a higher percentage of daily use for Year 10 than for Year 6 students. The data in Table 5.5 also indicate that daily home use of computers was reported as much more frequent than daily school use.

It is possible to compare the percentage of students who reported using computers daily in 2014 with the corresponding percentages in 2011. These data indicate a decrease in the percentage of students using computers daily at home and at school. The percentage using computers daily at home decreased from 60 per cent to 56 per cent among Year 6 students, and from 82 per cent to 77 per cent among Year 10 students. The percentage of daily computer use at school increased from 27 per cent to 34 per cent among Year 6 students, and from 51 per cent to 65 per cent among Year 10 students. It appears that the percentage of students using computers daily at home had declined a little since 2011, but that the percentage using computers daily at school had increased.

Differences in the frequencies of computer use

The percentage of students who reported daily use of computers provides convenient summary measures of frequency of computer use for comparisons among groups of students. Overall, 56 per cent of Year 6 students and 77 per cent of Year 10 students were daily computer users at home. Correspondingly, 34 per cent of Year 6 students and 65 per cent of Year 10 students were frequent computer users at school. Comparisons among groups of students are recorded in Table 5.6.

Table 5.6 Percentage of Year 6 and Year 10 students using computers almost every day or more at home and at school by background in 2014

	Year 6		Year 10	
	Home	School	Home	School
Gender				
Males	57 (±2.2)	36 (±3.5)	76 (±2.8)	64 (±4.3)
Females	54 (±3.1)	33 (±3.6)	78 (±2.5)	66 (±4.1)
Difference (Males – Females)	3 (±3.6)	**3** (±3.2)	–2 (±3.0)	–2 (±4.4)
Indigenous status				
Indigenous	51 (±5.8)	33 (±9.3)	52 (±9.0)	60 (±7.9)
Non–Indigenous	56 (±2.2)	34 (±3.4)	77 (±2.2)	65 (±3.7)
Missing	57 (±8.3)	37 (±12.7)	87 (±7.5)	81 (±14.4)
Difference (Indigenous – Non–Indigenous)	–5 (±6.3)	–1 (±9.6)	**–26** (±9.2)	–4 (±8.0)
Geographic location				
Metropolitan	59 (±2.4)	35 (±3.9)	80 (±2.3)	66 (±4.1)
Provincial	47 (±3.7)	34 (±5.9)	67 (±3.9)	63 (±7.2)
Remote	46 (±11.3)	33 (±13.1)	64 (±8.5)	57 (±32.7)
Difference (Metropolitan – Provincial)	**11** (±4.4)	1 (±7.1)	**14** (±4.6)	2 (±8.4)
Difference (Provincial – Remote)	1 (±11.5)	1 (±14.7)	2 (±9.4)	6 (±33.5)
Language at home				
English	54 (±2.3)	36 (±3.6)	74 (±2.4)	64 (±3.7)
Other than English	60 (±4.0)	31 (±5.0)	85 (±2.9)	68 (±5.3)
Missing language at home data	54 (±9.7)	25 (±12.0)	81 (±7.6)	59 (±13.6)
Difference (English – Other)	**–6** (±4.3)	4 (±5.4)	**–11** (±3.4)	–3 (±5.2)
Parental occupation				
Senior managers & professionals	61 (±3.5)	40 (±5.2)	83 (±3.0)	71 (±4.7)
Other managers & associate professionals	57 (±3.6)	37 (±5.2)	79 (±3.0)	69 (±4.3)
Tradespeople & skilled office, sales & service staff	51 (±3.5)	32 (±4.6)	75 (±3.8)	61 (±5.7)
Unskilled labourers, office, sales & service staff	53 (±5.4)	29 (±4.4)	70 (±5.6)	57 (±5.3)
Not in paid work	54 (±6.5)	30 (±6.3)	70 (±6.3)	60 (±8.9)
Missing parental occupation data	53 (±4.7)	30 (±5.5)	72 (±4.4)	63 (±6.2)
Difference (Senior – Unskilled)	**8** (±6.4)	**12** (±6.4)	**13** (±5.9)	**14** (±6.1)
State or territory				
Northern Territory	47 (±10.3)	34 (±11.2)	64 (±9.0)	76 (±12.4)
Western Australia	55 (±4.7)	31 (±7.1)	75 (±6.5)	53 (±7.1)
South Australia	58 (±4.0)	42 (±7.4)	87 (±3.6)	90 (±3.3)
ACT	60 (±8.2)	34 (±10.4)	82 (±5.6)	60 (±11.0)
Tasmania	56 (±3.1)	52 (±5.6)	69 (±6.1)	66 (±8.4)
Victoria	55 (±4.2)	45 (±7.3)	78 (±4.9)	64 (±7.9)
New South Wales	59 (±4.4)	31 (±6.9)	76 (±4.3)	59 (±8.9)
Queensland	51 (±4.4)	26 (±5.6)	75 (±4.3)	72 (±3.8)

Confidence intervals (1.96*SE) are reported in brackets. Significant differences are in **bold**.
Because results are rounded to the nearest whole number, some differences may appear inconsistent.

There were no significant differences between females and males in the percentage who reported daily computer use, either among Year 6 or Year 10 students or in terms of home or school use. There were also no significant differences in terms of daily computer use between Indigenous and non-Indigenous students at Year 6, but there were significant differences for home use in Year 10. At Year 10, the percentage of non-Indigenous students

who were daily computer users at home was 77 per cent compared with 52 per cent of Indigenous students. This represents a difference of 25 percentage points (similar to findings from the 2011 survey). The emergence of an apparent gap in home computer use between Indigenous and non-Indigenous students in secondary school is a matter that deserves further investigation.

There were differences in the percentages of daily computer users among different geographic locations at home but not at school. Fifty-nine per cent of metropolitan Year 6 students were daily computer users at home compared with 47 per cent of students in provincial locations. At Year 10, 80 per cent of metropolitan students were daily computer users compared with 67 per cent of provincial students. For both Year 6 and Year 10, the percentage of remote students who were daily computer users was similar to the percentage of provincial students, but the uncertainty of the estimates is too great (because the numbers are small) to be certain about the differences. There were no differences in percentages of daily school use of computers associated with location.

At Year 6 and Year 10, the percentage of students who were daily computer users was higher among students who mainly spoke a language other than English at home than among English-speaking students (by six and 11 percentage points respectively). There were no significant differences between these groups for daily computer use at school.

Table 5.6 also shows that the percentage of students who were daily computer users was higher among the highest (senior managers or professionals) and lowest (unskilled manual, office and sales) occupation groups. This was evident for Year 6 and Year 10 and for both home and school use.

There were differences among jurisdictions in the percentage of students who reported daily computer use at home and school and at both year levels. In general, the jurisdictional differences were larger for school use than home use. For home use at Year 6, the percentages ranged from 47 per cent (Northern Territory) to 60 per cent (ACT), and at Year 10 they ranged from 64 per cent (Northern Territory) to 87 per cent (South Australia). For school use at Year 6, the range was from 26 per cent (Queensland) to 52 per cent (Tasmania) and at Year 10, from 53 per cent (Western Australia) to 90 per cent (South Australia).

Using computer applications

The computer-based student questionnaire asked students to indicate the extent to which they used different types of computer applications. Based on a review of the literature in this area and analyses conducted with data from previous NAP – ICT Literacy assessments, these were structured to cover four areas: computer-based study utilities, computer-based entertainment applications, computer-based communication, and technological computer tasks. Students were asked to indicate the frequency with which they used each of the applications at home and at school. A series of exploratory and confirmatory factor analyses were conducted separately for Year 6 and Year 10 with regard to home use and school use as four distinct sets of analyses. The results were consistent across all four sets of analyses and confirmed largely the expected dimensional structure. Only two of the items did not consistently fit the expected structure which determined the construction of scales that were derived from this item set. Details of the method and the results are reported and discussed in the NAP – ICT Literacy 2014 Technical Report.

Table 5.7 Frequency percentages of use of computer-based study utilities in 2014

How often do you do each of the following:	Year 6			Year 10		
	Rarely	Occasionally	Frequently	Rarely	Occasionally	Frequently
Home						
Search the Internet for information for study or school work	15 (±1.4)	50 (±2.0)	35 (±2.1)	8 (±1.2)	38 (±2.2)	54 (±2.3)
Use word–processing software to write documents	33 (±2.2)	50 (±2.1)	17 (±1.3)	14 (±1.4)	52 (±1.8)	33 (±2.2)
Use spreadsheets to draw a graph or perform calculations	65 (±1.8)	27 (±1.6)	8 (±0.9)	64 (±2.2)	31 (±2.0)	5 (±0.9)
Use mathematics, language or other learning programs on a computer	41 (±2.0)	41 (±1.8)	18 (±1.5)	63 (±2.0)	27 (±1.5)	9 (±1.2)
Create presentations for school projects	39 (±2.3)	50 (±2.1)	11 (±1.1)	26 (±1.9)	63 (±1.9)	10 (±1.0)
Contribute written material or digital products to online content	50 (±2.0)	36 (±1.8)	14 (±1.3)	46 (±1.8)	37 (±1.6)	17 (±1.3)
School						
Search the Internet for information for study or school work	6 (±1.1)	56 (±2.7)	38 (±2.7)	5 (±1.2)	31 (±3.0)	65 (±3.4)
Use word–processing software to write documents	15 (±1.6)	61 (±2.2)	24 (±1.8)	8 (±1.3)	40 (±2.8)	52 (±3.1)
Use spreadsheets to draw a graph or perform calculations	46 (±2.1)	43 (±2.0)	11 (±1.2)	47 (±2.5)	45 (±2.4)	8 (±1.2)
Use mathematics, language or other learning programs on a computer	20 (±1.8)	56 (±1.8)	24 (±1.9)	46 (±2.4)	40 (±2.0)	14 (±1.6)
Create presentations for school projects	22 (±1.9)	62 (±1.9)	17 (±1.5)	17 (±2.0)	66 (±1.8)	16 (±1.6)
Contribute written material or digital products to online content	45 (±2.0)	43 (±1.8)	13 (±1.3)	49 (±2.1)	36 (±1.7)	15 (±1.7)

Confidence intervals (1.96*SE) are reported in brackets.
Rarely = less than once a month or never
Occasionally = between a few times a week and once a month
Frequently = almost every day or more
Because results are rounded to the nearest whole number, some totals may appear inconsistent.

The frequencies with which all students in both Year 6 and Year 10 reported using these applications are recorded in tables 5.7, 5.8, 5.9 and 5.10. For presentation in these tables, the six response categories have been collapsed to three reporting categories: rarely (less than once per month or never), occasionally (between a few times per week and once a month) and frequently (almost every day or more frequently).

Looking across the tables 5.7 to 5.10, it appears that in terms of home use, the most frequently used applications were those concerned with entertainment, followed by communication and study utilities. In terms of school use, the most frequently used applications were study utilities, with the other categories of application being considerably less frequent. Study utilities were used with similar frequency at home and school.

Study utilities

Table 5.7 shows data regarding the frequency of use of various study utilities. Study utilities were frequently used by students at home and at school. Over 50 per cent of Year 10 students reported frequently searching the internet for information for study or school work (54% at home and 65% at school). These percentages are notably higher than the corresponding figures for NAP – ICT Literacy 2011 (41% and 44%, respectively). Among Year 6 students, 35 per cent reported to frequently search for information on the internet for study or school work at home, and 38 per cent at school. These percentages are also higher than those reported in 2011 (29% and 28%, respectively). Students also reported frequently using word-processing software to write documents. Thirty-three per cent of Year 10 students reported frequent use of this utility at home and 52 per cent reported being frequent users at school. Smaller percentages reported the frequent creation of presentations for school projects using computer technology either at home (11% of Year 6 students and 10% of Year 10 students) or at school (17% of Year 6 students and 16% of Year 10 students). Higher percentages of frequent users were recorded among Year 6 compared with Year 10 students for: mathematics, language or other learning programs at home (18% compared with 9%) or at school (24% compared with 14%). Only small percentages of students reported the use of spreadsheets to draw a graph or perform calculations at home (8% in Year 6 and 5% in Year 10) or at school (11% in Year 6 and 8% in Year 10). These results are similar to those reported in NAP – ICT Literacy in 2011, although there appears to have been an increase in the percentage of students frequently searching the internet for information for study or school work.

Entertainment

Not surprisingly, students reported using computer-based entertainment applications more frequently at home than at school among students at both year levels. The corresponding data are recorded in Table 5.8.

Table 5.8 Frequency percentages of use of computer-based entertainment applications in 2014

How often do you do each of the following:	Year 6			Year 10		
	Rarely	Occasionally	Frequently	Rarely	Occasionally	Frequently
Home						
Download games and/or other software applications from the internet	38 (±1.9)	41 (±1.8)	21 (±1.7)	33 (±1.6)	45 (±1.7)	22 (±1.7)
Download or stream videos, music and/or podcasts from the internet	27 (±1.5)	38 (±1.6)	35 (±2.0)	16 (±1.4)	38 (±1.7)	46 (±1.8)
Play games on a computer	8 (±0.9)	30 (±1.6)	62 (±1.7)	13 (±1.3)	30 (±1.7)	58 (±1.8)
Use software to create sounds/music, movies or animations	47 (±1.8)	32 (±1.5)	21 (±1.4)	57 (±2.0)	25 (±1.8)	18 (±1.5)
Use a computer to listen to music or watch DVDs	30 (±1.7)	38 (±1.8)	32 (±1.8)	16 (±1.2)	33 (±2.0)	51 (±2.2)
Buy and install apps from an app store	31 (±1.7)	47 (±1.6)	22 (±1.5)	34 (±1.8)	48 (±1.8)	18 (±1.7)
School						
Download games and/or other software applications from the internet	87 (±1.5)	10 (±1.2)	4 (±0.6)	79 (±2.1)	16 (±1.7)	5 (±0.9)
Download or stream videos, music and/or podcasts from the internet	77 (±1.8)	18 (±1.5)	5 (±0.7)	70 (±2.1)	21 (±1.6)	9 (±1.1)
Play games on a computer	53 (±2.5)	37 (±2.2)	10 (±1.4)	55 (±2.0)	27 (±1.5)	18 (±1.6)
Use software to create sounds/music, movies or animations	65 (±2.2)	29 (±1.9)	6 (±0.9)	71 (±2.4)	22 (±2.2)	7 (±1.0)
Use a computer to listen to music or watch DVDs	76 (±2.0)	19 (±1.7)	5 (±0.8)	56 (±2.5)	23 (±1.7)	21 (±2.0)
Buy and install apps from an app store	89 (±1.7)	7 (±1.4)	4 (±0.8)	80 (±2.0)	14 (±1.5)	6 (±1.0)

Confidence intervals (1.96*SE) are reported in brackets.
Rarely = less than once a month or never
Occasionally = between a few times a week and once a month
Frequently = almost every day or more
(Items in italics are not included in scale)
Because results are rounded to the nearest whole number, some totals may appear inconsistent.

Among Year 6 students, the highest reported percentage of frequent use at home was found for playing games on a computer (62%). This represented a substantial increase over the percentage reported in NAP – ICT Literacy 2011 (42%). The next highest percentage was recorded for downloading or streaming videos, music or podcasts from the web (35%), which also suggests an increase compared with the figure observed in NAP – ICT Literacy 2011 (21%). Frequent use of a computer to listen to music or watch DVDs was also quite prevalent (32%) but similar to the results from NAP – ICT Literacy 2011 (29%).

Among Year 10 students, the highest reported percentage of frequent users at home was recorded for playing games on a computer (58%). This percentage is far higher than the one reported in NAP – ICT Literacy 2011 (29%). Using a computer to listen to music or watch DVDs was also a frequently reported application (51%) and similar to the results from the NAP – ICT Literacy survey in 2011 (50%). Downloading or streaming videos, music and/or podcasts from the internet was reported as a frequent application among a similar percentage of Year 10 students (46%) and there were no substantial increases in use of this application since 2011 (42%).

Downloading games and/or other software applications from the internet was reported as being frequently done by 21 per cent of Year 6 students and 22 per cent of Year 10 students. These figures were quite similar to those reported in 2011 (18% in Year 6 and 20% in Year 10). There were only small percentages of students who reported frequent use of software to create sounds/music, movies or animations (21% in Year 6 and 18% in Year 10). Very low percentages (10% or less) of frequent use were reported among students at both year levels for most entertainment applications at school. Twenty-one per cent of Year 10 students reported that they frequently listened to music or watched DVDs using a computer at school, and 18 per cent of Year 10 students reported that they frequently used a computer to play games at school. Both of these percentages represent increases over the corresponding 2011 figures (4% and 9%, respectively).

Communication

Overall, communication was the group of applications of computer technology reported as being most frequently used by students. Table 5.9 shows the percentage of students in each of the three categories. As for the previous set of applications, the presentation of results focuses on home use because frequent school use is not very prevalent.

In terms of home use, the applications that involved the highest percentages of frequent users were emailing or ‘chatting’. Thirty per cent of Year 6 students and 55 per cent of Year 10 students reported being frequent users of these applications. Both percentages were a little lower than those reported in NAP – ICT Literacy 2011 (38% and 64%, respectively). Searching the internet at home for information that was not for study or school work was reported as frequently by 28 per cent of Year 6 students and 58 per cent of Year 10 students. These were similar to the percentages reported in NAP – ICT Literacy 2011 (27% and 52%, respectively).

Table 5.9 Frequency percentages of use of computer-based communication purposes in 2014

How often do you do each of the following:	Year 6			Year 10		
	Rarely	Occasionally	Frequently	Rarely	Occasionally	Frequently
Home						
Search the internet for information that is not for study or school work	27 (±1.8)	45 (±1.8)	28 (±1.7)	10 (±1.5)	32 (±1.7)	58 (±2.0)
Use a computer for emailing or 'chatting'	40 (±1.8)	29 (±1.5)	30 (±1.5)	20 (±1.7)	26 (±1.6)	55 (±2.1)
Write or reply to blogs or forum threads	74 (±1.9)	18 (±1.5)	8 (±1.1)	70 (±1.6)	16 (±1.4)	13 (±1.1)
Use voice or video chat such as Skype to communicate with people online	46 (±2.1)	31 (±1.8)	23 (±1.8)	49 (±2.1)	29 (±1.5)	21 (±2.0)
Upload text, images or video to an online profile	51 (±1.8)	31 (±1.5)	17 (±1.2)	37 (±1.7)	43 (±1.6)	19 (±1.3)
Edit digital photos or other images on a computer	56 (±1.8)	32 (±1.5)	13 (±1.2)	52 (±1.7)	36 (±1.8)	12 (±1.2)
Communicate with others using social media	40 (±2.0)	25 (±1.4)	35 (±2.0)	11 (±1.1)	17 (±1.1)	72 (±1.6)
School						
Search the internet for information that is not for study or school work	59 (±1.8)	29 (±1.6)	13 (±1.2)	38 (±2.3)	38 (±1.9)	24 (±1.9)
Use a computer for emailing or 'chatting'	77 (±1.8)	18 (±1.6)	5 (±0.8)	58 (±2.5)	25 (±1.6)	17 (±1.9)
Write or reply to blogs or forum threads	85 (±1.8)	11 (±1.5)	4 (±0.8)	86 (±1.5)	9 (±1.2)	5 (±0.7)
Use voice or video chat such as Skype to communicate with people online	91 (±0.9)	6 (±0.7)	3 (±0.6)	88 (±1.5)	8 (±1.1)	4 (±0.8)
Upload text, images or video to an online profile	86 (±1.3)	10 (±1.0)	4 (±0.7)	84 (±1.7)	11 (±1.2)	5 (±0.9)
Edit digital photos or other images on a computer	76 (±1.6)	19 (±1.4)	5 (±0.7)	70 (±2.0)	24 (±1.9)	6 (±0.7)
Communicate with others using social media	90 (±1.1)	6 (±0.8)	4 (±0.6)	67 (±2.3)	14 (±1.3)	19 (±1.8)

Confidence intervals (1.96*SE) are reported in brackets.
Rarely = less than once a month or never
Occasionally = between a few times a week and once a month
Frequently = almost every day or more
(Items in italics are not included in scale)
Because results are rounded to the nearest whole number, some totals may appear inconsistent.

Other applications in this group for which students reported their frequency of use at home included using voice or video chat (such as Skype™) to communicate with people online (23% of Year 6 and 21% of Year 10 students were frequent users), uploading text, images or video to an online profile (17% of Year 6 and 19% of Year 10 students were frequent users), and writing or replying to blogs or forum threads (8% of Year 6 and 13% of Year 10 students). Editing digital photos or other images on a computer was a frequent home activity reported by 13 per cent of Year 6 and 12 per cent of Year 10 students.

With regard to school use, frequent searching the internet for information that is not for study or school work was reported by more than 10 per cent of students (13% in Year 6 and 24% in Year 10). For most other applications, 10 per cent or fewer students reported frequent use of communication-related applications at school. A somewhat higher percentage of school use was recorded for Year 10 students (17%) for using the computer for emailing or chatting.

Technological computer tasks

As recorded in Table 5.10, only small percentages of students reported frequent use of technological computer tasks at home or at school. Fourteen per cent of Year 6 students and 11 per cent of Year 10 students reported that they frequently used a computer at home to remix or edit music or video to produce digital content. Ten per cent of Year 6 students and 11 per cent of Year 10 students reported that at home they frequently used software to find and get rid of computer viruses. Eleven per cent of Year 6 students and eight per cent of Year 10 students reported that they frequently used drawing, painting or graphics programs at home. For the other listed applications, eight per cent of students or fewer reported frequent use at home. At school, the percentages of frequent use for all six technological computer tasks were below 6 per cent.

Table 5.10 Frequency percentages of use of technological computer tasks in 2014

How often do you do each of the following:	Year 6			Year 10		
	Rarely	Occasionally	Frequently	Rarely	Occasionally	Frequently
Home						
Write computer programs or macros (e.g. Logo, Basic or Pascal)	78 (±1.4)	14 (±1.1)	8 (±1.0)	80 (±1.5)	13 (±1.3)	7 (±1.0)
Upload media you have created to the internet	75 (±1.6)	16 (±1.3)	8 (±1.0)	75 (±1.5)	18 (±1.3)	7 (±0.8)
Construct websites	87 (±1.3)	8 (±0.8)	5 (±0.8)	89 (±1.3)	7 (±1.0)	4 (±0.7)
Use drawing, painting or graphics programs	59 (±2.1)	31 (±1.7)	11 (±1.0)	69 (±1.6)	24 (±1.5)	8 (±1.0)
Use software to find and get rid of computer viruses	69 (±1.7)	21 (±1.4)	10 (±1.2)	62 (±1.9)	27 (±1.6)	11 (±1.2)
Remix or edit music, video, images or text to produce digital content	60 (±1.9)	26 (±1.5)	14 (±1.4)	66 (±1.5)	23 (±1.4)	11 (±1.1)
School						
Write computer programs or macros (e.g. Logo, Basic or Pascal)	87 (±1.3)	10 (±1.0)	3 (±0.7)	83 (±1.7)	13 (±1.4)	4 (±0.8)
Upload media you have created to the internet	90 (±1.4)	7 (±1.2)	3 (±0.6)	88 (±1.3)	9 (±1.1)	3 (±0.7)
Construct websites	88 (±1.9)	9 (±1.6)	3 (±0.6)	89 (±1.4)	8 (±1.1)	3 (±0.6)
Use drawing, painting or graphics programs	69 (±1.8)	27 (±1.5)	4 (±0.7)	71 (±1.5)	23 (±1.4)	6 (±0.8)
Use software to find and get rid of computer viruses	88 (±1.3)	8 (±0.9)	4 (±0.7)	85 (±1.4)	11 (±1.2)	5 (±0.8)
Remix or edit music, video, images or text to produce digital content	87 (±1.4)	9 (±1.0)	4 (±0.8)	82 (±1.6)	14 (±1.3)	4 (±0.8)

Confidence intervals (1.96*SE) are reported in brackets.
Rarely = less than once a month or never
Occasionally = between a few times a week and once a month
Frequently = almost every day or more
Because results are rounded to the nearest whole number, some totals may appear inconsistent.

Comparing use between males and females and between year levels

In order to compare the use of different types of applications by different subgroups of students, a set of four scales were derived for home and school use. These were based on the list of items described in the previous section. Item response theory was used to derive weighted likelihood estimates for each scale. These scale scores were transformed to a metric where the national mean score for Year 6 students was 50 with a standard deviation of 10. The scaling analyses and procedures for these items, as well as information about reliabilities, are detailed in the NAP – ICT Literacy 2014 Technical Report.

Table 5.11 Mean scores on indices of home use of types of computer applications for male and female students in Year 6 and Year 10, 2014

Home use	All students	Males	Females	Difference (Males – Females)
Year 6				
Study utilities	50.0 (±0.5)	49.8 (±0.6)	50.2 (±0.5)	–0.4 (±0.7)
Entertainment use	50.0 (±0.4)	51.1 (±0.6)	48.9 (±0.5)	**2.3** (±0.7)
Communication	50.0 (±0.4)	49.9 (±0.5)	50.1 (±0.5)	–0.2 (±0.7)
Computer technology	50.0 (±0.4)	50.9 (±0.6)	49.2 (±0.5)	**1.7** (±0.7)
Year 10				
Study utilities	51.4 (±0.5)	51.1 (±0.7)	51.7 (±0.5)	–0.6 (±0.9)
Entertainment use	51.4 (±0.4)	52.6 (±0.5)	50.2 (±0.5)	**2.4** (±0.7)
Communication	54.0 (±0.3)	54.2 (±0.5)	53.7 (±0.4)	0.5 (±0.7)
Computer technology	48.8 (±0.4)	50.4 (±0.6)	47.1 (±0.6)	**3.2** (±0.8)
Difference (Year 10 – Year 6)				
Study utilities	**1.4** (±0.6)	**1.3** (±1.0)	**1.5** (±0.7)	–0.1 (±1.2)
Entertainment use	**1.4** (±0.6)	**1.5** (±0.8)	**1.3** (±0.7)	0.2 (±1.0)
Communication	**4.0** (±0.5)	**4.3** (±0.7)	**3.6** (±0.7)	0.7 (±1.0)
Computer technology	**–1.2** (±0.6)	–0.5 (±0.8)	**–2.0** (±0.7)	**1.5** (±1.0)

Confidence intervals (1.96*SE) are reported in brackets. Statistically significant differences are in **bold**. Because results are rounded to the nearest whole number, some differences may appear inconsistent.

Table 5.11 records the scale scores for the frequency of home use of computer applications. The data indicate that Year 10 students reported more frequent home use of communication than Year 6 students (the difference was 4.0 score points or two-fifths of a standard deviation). There was also more frequent home use of entertainment and study utilities for Year 10 than for Year 6 students (but the difference was only 1.4 scale score points). There was less frequent home use of computer technology applications by Year 10 than by Year 6 students. The pattern of difference was similar to that reported on the same four scales in NAP – ICT Literacy 2011. There did not appear to be any difference between females and males in the use of communication applications, entertainment applications or study utilities at home. Among female students, those in Year 10 reported less frequent use of computer technology applications than those in Year 6, while there was no statistically significant difference across year levels among male students.

Table 5.12 records the corresponding scale scores for the frequency of school use of the four groups of computer applications. There was rather greater frequency of use of communication applications at Year 10 than at Year 6 (the difference was equivalent to two-fifths of a standard deviation), and a somewhat smaller difference regarding the frequency of use of entertainment utilities (equivalent to a quarter of a standard deviation). There were two interaction effects. While there was no statistically significant difference between males and females in Year 6 in the frequency of use of entertainment utilities, in Year 10 the average score of male students was 2.2 score points above those for female students (a difference equivalent to about one-fifth of a standard deviation). In addition, there was a small but statistically significant increase in scale scores reflecting the frequency of use of computer technology applications between Year 6 and Year 10 among male students (one-eighth of a standard deviation), but a small albeit statistically significant decrease among female students (one-tenth of a standard deviation).

Table 5.12 Mean scores on indices of school use of types of computer applications for male and female students in Year 6 and Year 10, 2014

Home use	All students	Males	Females	Difference (Males – Females)
Year 6				
Study utilities	50.0 (±0.5)	50.4 (±0.6)	49.7 (±0.5)	**0.7** (±0.6)
Entertainment use	50.0 (±0.5)	50.0 (±0.6)	50.0 (±0.6)	–0.1 (±0.7)
Communication	50.0 (±0.4)	50.3 (±0.7)	49.7 (±0.5)	0.7 (±0.8)
Computer technology	50.0 (±0.5)	50.4 (±0.7)	49.7 (±0.5)	**0.7** (±0.7)
Year 10				
Study utilities	50.7 (±0.7)	51.1 (±0.9)	50.3 (±0.8)	0.9 (±1.1)
Entertainment use	52.6 (±0.7)	53.7 (±0.9)	51.5 (±0.8)	**2.2** (±1.1)
Communication	54.0 (±0.6)	54.5 (±0.8)	53.4 (±0.8)	**1.0** (±0.9)
Computer technology	50.2 (±0.5)	51.5 (±0.6)	48.7 (±0.7)	**2.8** (±0.8)
Difference (Year 10 – Year 6)				
Study utilities	0.7 (±0.8)	0.8 (±1.1)	0.6 (±0.9)	0.1 (±1.2)
Entertainment use	**2.6** (±0.8)	**3.7** (±1.1)	**1.4** (±1.0)	**2.3** (±1.3)
Communication	**4.0** (±0.8)	**4.1** (±1.0)	**3.8** (±0.9)	0.3 (±1.2)
Computer technology	0.2 (±0.7)	**1.2** (±0.9)	**–0.9** (±0.8)	**2.1** (±1.1)

Confidence intervals (1.96*SE) are reported in brackets. Statistically significant differences are in **bold**. Because results are rounded to the nearest whole number, some differences may appear inconsistent.

ICT at school

For the first time, NAP – ICT Literacy 2014 investigated learning about and using ICT at school as part of a national survey. Students were asked to report whether they had learned about specified ICT issues (ethical use of digital information, safe use of computer technology, and information search processes) at school, and the extent to which they used computers for school-related purposes. They also indicated the frequency with which they used computers for various school purposes.

Learning about ICT

Table 5.13 shows the percentage of Year 6 and Year 10 students who indicated that they had learned about specified ICT issues. Generally a majority of students reported that they had learned about these issues at school. Although factor analyses of these items did not reveal different subdimensions, it is possible to identify groups of items in terms of similar content areas.

Table 5.13 Percentages of students attributing ICT learning to school

At school, have you learned about the following issues?	Year 6	Year 10
The need to provide references to content from web pages that you include in school work	73 (±1.9)	89 (±1.3)
The need to know whether you have copyright permission to download music or video	66 (±1.9)	71 (±1.7)
The problems of using software to copy computer files for free that you otherwise would have to pay for	53 (±2.0)	58 (±1.5)
Checking the credentials of software patches before downloading and accepting them	51 (±2.2)	48 (±1.8)
Changing your password for internet services regularly	62 (±2.0)	73 (±1.7)
Reporting spam to an authority	62 (±1.9)	55 (±1.9)
Reading licence or usage agreements before you click on 'I agree' to install new software	66 (±1.9)	61 (±1.9)
Keeping anti–virus software up to date	48 (±2.1)	53 (±2.0)
How to decide where to look for information about an unfamiliar topic	74 (±1.8)	74 (±1.8)
How to look for different types of digital information on a topic	74 (±1.6)	74 (±1.7)

Confidence intervals (1.96*SE) are reported in brackets.

One of the areas covered concerned the ethical use of digital resources. Eighty-nine per cent of Year 10 students reported that they had learned about 'the need to provide references to content from web pages that you include in school work'. The corresponding percentage of Year 6 students was 73 per cent. Seventy-one per cent of Year 10 students and 66 per cent of Year 6 students reported that they had learned at school about the 'need to know whether you have copyright permission to download music or video'. Fifty-eight per cent of Year 10 students and 53 per cent of Year 6 students said that they had learned at school about 'problems of using software to copy computer files for free that you otherwise would have to pay for'. One interpretation of these data is the conclusion that a majority of Australian students claimed to have learned about these topics at school. However, there were substantial proportions of students who did not report having learned about these issues. Hence, the less positive interpretation is that too many students had not learned, or did not remember to have learned, about issues related to the ethical use of digital resources at school.

Another area that was covered concerned safe working with computer technology. Seventy-three per cent of Year 10 students and 62 per cent of Year 6 students reported that they had learned at school about 'changing your password for internet services regularly'. Sixty-one per cent of Year 10 students and 66 per cent of Year 6 students reported having learned about 'reading licence or usage agreements' before installing new software. A little more than half of the students (55% of Year 10 and 62% of Year 6) had learned about 'reporting spam to an authority'. Around half of the students (53% of Year 10 and 48% of Year 6) reported having learned at school about 'keeping anti-virus software up to date'.

A third area that encompassed just two items concerned using computer technology to search for information. Approximately three-quarters of the students from both Year 6 and Year 10 reported that they had learned at school about 'how to decide where to look for information about an unfamiliar topic' (74% at both year levels) and 'how to look for different types of digital information on a topic' (74% at both year levels).

School purposes and computer technology

The student questionnaire asked students to indicate the frequency with which they used computers for various school purposes. Their responses are summarised in Table 5.14. When presenting these data, the discussion will focus on the percentages of students reporting using computers for the purpose 'at least once a week'.

Two of the listed purposes concerned assessment-related uses. Thirty-nine per cent of students at both year levels reported that they used computers for 'completing worksheets or exercises' at least once a week, and 24 per cent of Year 6 and 30 per cent of Year 10 students indicated that they used computers for 'completing tests or assessments' at least once a week.

Two other purposes concerned collaboration among students. More than a third (37%) of the students at both year levels reported that they used computers at least once a week for 'working with other students from your own school', and about one-tenth of the students (9% in Year 6 and 11% in Year 10) indicated that they used computers at least once a week for 'working with other students from other schools'.

Table 5.14 Frequency of using computers for school-related purposes

How often do you use computers for the following school-related purposes?	Never	Less than once a month	At least once a month but not every week	At least once a week
Year 6				
Preparing reports or essays	25 (±1.7)	27 (±1.5)	32 (±1.7)	16 (±1.5)
Preparing presentations	9 (±1.1)	31 (±1.7)	42 (±2.1)	18 (±1.8)
Working with other students from your own school	11 (±1.3)	21 (±1.8)	30 (±1.6)	37 (±2.1)
Working with other students from other schools	61 (±1.9)	21 (±1.5)	10 (±1.0)	9 (±1.0)
Completing worksheets or exercises	13 (±1.3)	20 (±1.6)	28 (±1.6)	39 (±1.8)
Organising your program of work on a topic using a learning management system	47 (±1.7)	24 (±1.5)	19 (±1.4)	10 (±1.0)
Reflecting on your learning experiences	46 (±2.4)	23 (±1.5)	19 (±1.6)	11 (±1.4)
Completing tests or assessments	12 (±1.2)	28 (±1.9)	36 (±1.9)	24 (±1.8)
Using online learning programs such as Mathletics	15 (±1.3)	21 (±2.0)	29 (±1.8)	35 (±3.2)
Using data logging tools as part of an investigation	45 (±2.1)	25 (±1.6)	20 (±1.4)	10 (±1.1)
Year 10				
Preparing reports or essays	6 (±0.9)	14 (±1.3)	40 (±1.7)	40 (±2.1)
Preparing presentations	3 (±0.6)	19 (±1.5)	49 (±1.9)	29 (±1.8)
Working with other students from your own school	7 (±0.9)	19 (±1.8)	38 (±1.9)	37 (±2.2)
Working with other students from other schools	59 (±2.2)	18 (±1.3)	11 (±1.1)	11 (±1.1)
Completing worksheets or exercises	8 (±1.1)	20 (±1.5)	33 (±1.5)	39 (±2.3)
Organising your program of work on a topic using a learning management system	36 (±2.5)	24 (±1.6)	23 (±1.7)	16 (±1.7)
Reflecting on your learning experiences	55 (±2.1)	21 (±1.6)	16 (±1.4)	9 (±1.2)
Completing tests or assessments	8 (±0.9)	22 (±1.5)	40 (±1.8)	30 (±1.8)
Using online learning programs such as Mathletics	36 (±2.8)	30 (±1.9)	22 (±1.8)	12 (±1.4)
Using data logging tools as part of an investigation	45 (±2.4)	25 (±1.5)	20 (±1.4)	10 (±1.1)

Confidence intervals (1.96*SE) are reported in brackets.
Because results are rounded to the nearest whole number, some totals may appear inconsistent.

There were four purposes listed that involved the use of computer utilities for school work of various kinds. Sixteen per cent among Year 6 and 40 per cent among Year 10 students reported using computers on a weekly basis for 'preparing reports or essays'. The percentages of students who reported that they used computers on a weekly basis for 'preparing presentations' were 18 per cent in Year 6 and 29 per cent in Year 10. While in Year 6, about a third of the students (35%) indicated that they used 'online learning programs such as Mathletics', this percentage was much lower among Year 10 students (12%). At both year levels, only one out of ten students (10%) reported using 'data logging tools as part of an investigation' at least once a week.

Two of the purposes were of a rather meta-cognitive nature. Ten per cent among Year 6 and 16 per cent among Year 10 students reported that they used computers for organising their 'program of work on a topic using a learning management system' at least once a week. When asked about using computers for 'reflecting on (their) learning experiences', frequent use of at least once a week was reported by 11 per cent of Year 6 and 9 per cent of Year 10 students.

Differences between year levels and between males and females regarding the use of ICT at school

To examine differences in ICT use at school between male and female students and between Year 6 and Year 10 students in a more comprehensive way, the analysis was based on comparisons using three scales derived from the items reflecting use of ICT at school. The first scale was based on the ten items presented in Table 5.13, where students reported whether or not they had learned about certain aspects of ICT use at school. It is intended to reflect the overall attribution to schools as a source of learning about ICT. The second and third scales reflect frequency of ICT use for school purposes. While the second scale focuses on common learning practices (completing worksheets or exercises, working with other students from your own school, preparing reports or essays, preparing presentations, using data logging tools as part of an investigation), the third scale reflects special study purposes (completing tests or assessments, using online learning programs such as Mathletics, organising your program of work on a topic using a learning management system, reflecting on your learning experiences, working with other students from other schools).

All three scales were derived using item response theory to generate weighted likelihood estimates for each scale. These scale scores were transformed to a metric where the national mean score for Year 6 students was 50, with a standard deviation of 10. The scaling analyses and procedures for these items, as well as information about scale reliabilities are detailed in the NAP – ICT Literacy 2014 Technical Report.

The results of the analyses are reported in Table 5.15. We focus firstly on the comparison of results for all students in Year 10 compared with all students in Year 6. In those results it can be seen that ICT use for common learning purposes was greater in Year 10 than in Year 6 (the difference was equivalent to about half a standard deviation), but that ICT use for special learning purposes was greater in Year 6 than in Year 10 (the difference was equivalent to about one-fifth of a standard deviation). There was a small difference in the learning of ICT at school, with Year 10 having a higher average score than Year 6 students (with a difference equivalent to about one-tenth of a standard deviation).

Table 5.15 Scale scores for computer use for school-related purposes by gender and year level

School use	All students	Males	Females	Difference (Males – Females)
Year 6				
ICT learning at school	50.0 (±0.5)	50.3 (±0.7)	49.7 (±0.5)	0.5 (±0.7)
ICT use for common learning practices	50.0 (±0.4)	49.1 (±0.5)	50.9 (±0.6)	**–1.7** (±0.7)
ICT use for special study purposes	50.0 (±0.4)	50.0 (±0.5)	50.0 (±0.5)	0.0 (±0.7)
Year 10				
ICT learning at school	51.5 (±0.4)	51.2 (±0.6)	51.8 (±0.6)	–0.5 (±0.8)
ICT use for common learning practices	54.5 (±0.5)	53.7 (±0.7)	55.4 (±0.6)	**–1.7** (±0.8)
ICT use for special study purposes	47.9 (±0.6)	48.8 (±0.9)	46.8 (±0.8)	**2.0** (±1.2)
Difference (Year 10 – Year 6)				
ICT learning at school	**1.5** (±0.7)	**0.9** (±0.9)	**2.0** (±0.8)	**–1.1** (±1.1)
ICT use for common learning practices	**4.5** (±0.7)	**4.6** (±0.9)	**4.6** (±0.8)	0.0 (±1.1)
ICT use for special study purposes	**–2.1** (±0.7)	**–1.2** (±1.0)	**–3.2** (±1.0)	**2.0** (±1.4)

Confidence intervals (1.96*SE) are reported in brackets. Statistically significant differences are in **bold**.
Because results are rounded to the nearest whole number, some differences may appear inconsistent.

In terms of differences between female and male students, it can be seen that in both Year 6 and Year 10, female students reported more frequent use of ICT for common learning purposes. In Year 10, but not in Year 6, male students indicated more frequent use of ICT for special study purposes.

Conclusion

The results from NAP – ICT Literacy 2014 show a small decline in the frequency of computer use at home between 2011 and 2014, and an increase in the frequency of computer use at school over the same period. The decrease in students' reported use of computers outside of school could be a result of their increased use of mobile technology devices during the same period. There are differences in the prevalence of frequent computer use at home (but not at school) between metropolitan and non-metropolitan locations at both year levels, as well as between Indigenous and non-Indigenous students in Year 10 (but not in Year 6). The results also show differences across student groups according to parental occupation in Year 10. Generally, these results suggest that there were background-related differences in opportunities for students to become part of the digital world.

It is also evident that there were differences in the way students reported using different types of computer applications. Those patterns of use differ between home use and school use, between Year 6 and Year 10, and between males and females. Generally, students reported the use of study utilities with similar frequency at home and at school, but students in Year 10 reported more frequent use of these types of application than those in Year 6. Communication applications were reported to be more frequently used at home than at school, and were reported as more frequently used by Year 10 students than by Year 6 students. The use of entertainment applications was reported to be more frequent at home than at school.

With regard to the use of ICT at school, most students at both year levels indicated that they had learned about a number of ICT-related topics at school. However, there were substantial proportions of students who did not report (or did not remember) to have learned about many of these topics. Most students reported less than weekly frequencies of computer use for school-related purposes, but the use of ICT for common learning practices was more frequently reported by Year 10 students than by those in Year 6.

Chapter 6: Student perceptions of ICT

In addition to collecting data on familiarity and use of ICT, the NAP – ICTL 2014 student questionnaire was designed to measure student perceptions of ICT. The aspects included in this section include students' interest and enjoyment of working with ICT, their views on the importance of working with computers and their confidence in undertaking ICT-related tasks (in the literature this is often referred to as 'self-efficacy').

There is evidence that interest in and enjoyment of a learning area can enhance the achievement of learners (Pekrun, Goetz, Titz & Perry, 2002). With regard to ICT, numerous studies have shown that ICT use has the potential of increasing the sense of enjoyment given the diverse range of opportunities for students to use virtual environments and multiple representations of information (Dede, Ketelhut, Clarke, Nelson & Bowman, 2005; Lajoie & Azevedo, 2006). Data from the 2013 IEA Computer and Information Literacy Study (ICILS) have confirmed high levels of interest and enjoyment in using computers among lower-secondary students (Fraillon, Ainley, Schulz, Friedman & Gebhardt, 2014). According to Bandura (1993), students' confidence in their abilities with regard to a specific learning area tends to increase performance and perseverance, and there is evidence that higher levels of ICT self-efficacy are associated with learning outcomes related to this area (Moos & Azevedo, 2009; OECD, 2010; Fraillon et al., 2014).

Based on data from NAP – ICT Literacy 2014, this chapter will describe students' levels of interest and enjoyment as well as their ICT self-efficacy in comparison with results from the previous assessment. In addition, it will present results regarding students' perceptions about the importance of working with computers that were not measured in previous cycles of NAP – ICT Literacy. The last section of the chapter includes multivariate analyses exploring the relationship between students' ICT literacy, self-efficacy, interest and enjoyment, and perceptions of the importance of using computers as well as their associations with background variables.

Student interest in and enjoyment of working with computers

The NAP – ICT Literacy 2014 student questionnaire included two questions asking students to rate their agreement ('strongly agree', 'agree', 'disagree' and 'strongly disagree') with ten different statements. While the first of the two questions had already been included in the previous assessment in 2011, and had been used to derive a scale of 'interest in and

enjoyment of using ICT', the second question, which mainly focused on recognising the importance of using computers, was new to the 2014 assessment. Factor analyses showed that four items from the first question and one item of the second question represented interest in and enjoyment in working with computers, while the other five items (one old and four new items) reflected students' recognition of the importance of working with computers.

Table 6.1 shows the category percentages for the five items measuring interest in and enjoyment of working with computers, as well as the percentages of agreement (combining the responses in the categories 'strongly agree' and 'agree'). For four of the items, the percentages of agreement are compared with those obtained in NAP – ICT Literacy 2011.

Table 6.1 Year 6 and Year 10 category percentages for students' interest in and enjoyment of working with computers in 2014, and percentages of agreement in comparison with 2011

	Strongly disagree	Disagree	Agree	Strongly agree	Agree 2014#	Agree 2011#	Difference
Year 6							
I think playing or working with a computer is fun	1 (±0.4)	6 (±0.9)	48 (±1.8)	44 (±1.9)	92 (±1.0)	95 (±0.9)	–3 (±1.3)
I use a computer because I am interested in the technology	6 (±0.9)	29 (±1.7)	40 (±1.6)	25 (±1.7)	65 (±2.0)	65 (±2.1)	0 (±2.9)
I like learning how to do new things using a computer	3 (±0.6)	11 (±1.0)	49 (±1.7)	37 (±2.0)	86 (±1.2)	87 (±1.3)	–1 (±1.8)
I am always looking for new ways to do things using a computer	5 (±0.8)	20 (±1.4)	41 (±1.6)	34 (±1.9)	74 (±1.8)	78 (±1.5)	**–4** (±2.4)
I like using a computer to find new ways to do things##	4 (±0.6)	15 (±1.3)	47 (±1.5)	35 (±1.6)	82 (±1.5)	N/A	N/A
Year 10							
I think playing or working with a computer is fun	2 (±0.6)	11 (±1.2)	56 (±1.7)	31 (±1.9)	87 (±1.4)	90 (±0.9)	**–3** (±1.7)
I use a computer because I am interested in the technology	7 (±1.0)	34 (±1.5)	40 (±1.2)	19 (±1.3)	58 (±1.6)	59 (±1.7)	0 (±2.3)
I like learning how to do new things using a computer	5 (±0.9)	20 (±1.5)	51 (±1.7)	24 (±1.4)	75 (±1.8)	78 (±1.3)	–2 (±2.2)
I am always looking for new ways to do things using a computer	6 (±1.1)	31 (±1.6)	40 (±1.6)	22 (±1.7)	62 (±1.7)	64 (±1.7)	–2 (±2.4)
I like using a computer to find new ways to do things##	3 (±0.8)	19 (±1.3)	52 (±1.9)	25 (±1.7)	77 (±1.7)	N/A	N/A

Confidence intervals (1.96*SE) are reported in brackets. Statistically significant differences are in **bold**.
Percentage of students who agreed or strongly agreed
Item not included in 2011 survey.
Because results are rounded to the nearest whole number, some totals or differences may appear inconsistent.

The results show that at both year levels, majorities of students express high levels of interest and enjoyment in working with computers. The statement 'I think playing or working with a computer is fun' attracted the highest levels of agreement in Year 6 (92%) as well as in Year 10 (87%). These percentages were slightly but significantly lower than in the previous survey in 2011 (95% in Year 6 and 90% in Year 10). The lowest levels of agreement were recorded for the statement 'I use a computer because I am interested in the technology', with 65 per cent in Year 6 and 58 per cent in Year 10. Similar levels of agreement were observed in 2011 (65% in Year 6 and 59% in Year 10). Most other statements had attracted

similar percentages of agreement as in the previous survey; only the statement 'I am always looking for new ways to do things using a computer' had significantly lower percentages of agreement among Year 6 students in 2014 (74%) compared with 2011 (78%).

The five items measuring students' interest and enjoyment in using computers were used to derive a scale with satisfactory reliabilities (Cronbach's alpha[17]) of 0.73 at Year 6 and 0.78 at Year 10. Scale scores were derived by applying item response theory (IRT) and converted to a metric with a mean score of 50 and standard deviation of 10 at Year 6. Higher scale scores indicate higher levels of interest in and enjoyment of working with computers. Further details on the scaling analysis and methodology are presented in the NAP – ICT Literacy 2014 Technical Report. Table 6.2 reports scale score averages at Year 6 and Year 10, overall as well as among males and females at each year level.

Table 6.2 Year 6 and Year 10 scale score averages for students' interest in and enjoyment of working with computers overall and by gender in 2014

	Year 6	Year 10	Difference (Year 10 – Year 6)
All students	50.0 (±0.5)	47.0 (±0.5)	**–3.0** (±0.7)
Males	52.0 (±0.6)	49.3 (±0.6)	**–2.7** (±0.8)
Females	48.0 (±0.5)	44.5 (±0.6)	**–3.5** (±0.8)
Difference (Males – Females)	**4.0** (±0.6)	**4.8** (±0.8)	0.8 (±1.0)

Confidence intervals (1.96*SE) are reported in brackets. Statistically significant differences are in **bold**.
Because results are rounded to the nearest whole number, some differences may appear inconsistent.

The results show higher levels of interest and enjoyment among males than among females at both year levels. The scale score differences were moderate and statistically significant, with 4 score points in Year 6 (more than a third of a standard deviation) and almost 4.8 score points in Year 10 (equivalent to almost half a standard deviation). The results also show that Year 6 students expressed higher levels of interest and enjoyment in using computers than those in Year 10—overall the difference was statistically significant with 3 score points (almost one-third of a standard deviation). Both among male and females students, the average score for interest and enjoyment in using computers was higher in Year 6 than in Year 10.

To illustrate the associations between this scale and ICT literacy, test score averages were compared across three equal groups of students (tertile groups or thirds) which represent low, medium and high levels of students' interest and enjoyment in using computers. Icons between columns indicate to which extent there were statistically significant differences between test score averages in adjacent thirds (the group with low was compared with medium and medium was compared with high interest and enjoyment in using computers). Arrows pointing to the left indicate that ICT Literacy scores were higher in the group, with higher levels of interest and enjoyment, while arrows pointing to the right signal the reverse. Equal signs indicate that there were no statistically significant differences between the test score averages.

[17] Cronbach's alpha is a measure of **internal consistency**—that is, how closely related a set of items are as a group. Cronbach's alpha is a function of the number of test items and the average intercorrelation among the items.

Table 6.3 Year 6 and Year 10 ICT literacy by tertile groups of students' interest in and enjoyment of working with computers in 2014

School use	Low tertile group		Medium tertile group		High tertile group
Year 6					
All students	404 (±7.8)	<	415 (±7.2)	<	424 (±7.3)
Males	379 (±11.0)	<	403 (±10.2)	<	419 (±9.2)
Females	420 (±9.0)	=	426 (±9.1)	=	433 (±9.6)
Year 10					
All students	507 (±9.3)	<	522 (±8.6)	<	538 (±8.1)
Males	473 (±15.3)	<	501 (±11.7)	<	535 (±9.9)
Females	530 (±9.1)	<	543 (±10.4)	=	543 (±12.9)

Confidence intervals (1.96*SE) are reported in brackets.
< Left-hand group has lower mean than right-hand group
= No significant difference between means of two adjacent tertiles
> Left-hand group has higher mean than right-hand group

Table 6.3 shows that there are positive associations between ICT literacy and interest and enjoyment in working with computers at both year levels. In Year 6, the average test score in the tertile groups with the highest level of interest and enjoyment in working with computers was 20 score points higher than in the low tertile group; in Year 10 the difference was 31 score points. The test score average in the medium tertile group was about halfway between the low and high groups, which suggests linear relationships at both year levels, and overall, at both levels, differences between adjacent groups were statistically significant.

The Table also displays these associations for male and female students at both year levels, which appear to be stronger among male students than among females. In Year 6, the difference in average test scores between lowest and highest thirds for males was 40 score points, while among females the difference was only 13 score points. At Year 6, the differences between adjacent groups were statistically significant among male students, but this was not the case when comparing the same tertile groups of female students. Among male students in Year 10, the difference between low and high tertile group test score averages was 62 score points, while it was only 12 score points among females in Year 10. At this year level there was no difference in test score averages between the medium and high tertile groups among females, while the difference was statistically significant for the comparison between low and medium groups.

Student recognition of the importance of working with computers

Table 6.4 records the category percentages at both year levels for the five items asking about students' recognition of the importance of working with computers, as well as the combined percentages of the agreement categories 'strongly agree' and 'agree'. For one item, the percentages of agreement are also compared with those obtained in NAP – ICT Literacy 2011.

Table 6.4 Year 6 and Year 10 category percentages for students' recognition of the importance of working with computers in 2014, and percentages of agreement in comparison with 2011

	Strongly disagree	Disagree	Agree	Strongly agree	Agree 2014#	Agree 2011#	Difference
Year 6							
It is very important to me to work with a computer	3 (±0.5)	21 (±1.7)	56 (±1.6)	20 (±1.5)	77 (±1.9)	81 (±1.6)	**-4** (±2.5)
I like using computers because they help me improve the quality of my work##	2 (±0.6)	16 (±1.2)	50 (±1.5)	32 (±1.8)	82 (±1.3)	N/A	N/A
I like using computers because they make work easier##	2 (±0.4)	14 (±1.2)	45 (±1.7)	38 (±1.8)	83 (±1.3)	N/A	N/A
I enjoy using computers because they help me work with others##	5 (±0.8)	29 (±1.7)	45 (±1.9)	21 (±1.5)	66 (±1.8)	N/A	N/A
I enjoy using computers because they help me communicate with my friends##	6 (±0.8)	20 (±1.5)	39 (±1.6)	35 (±1.7)	74 (±1.7)	N/A	N/A
Year 10							
It is very important to me to work with a computer	2 (±0.6)	19 (±1.6)	55 (±1.8)	23 (±1.7)	79 (±1.7)	80 (±1.4)	-1 (±2.2)
I like using computers because they help me improve the quality of my work##	2 (±0.5)	11 (±1.1)	53 (±1.7)	34 (±1.8)	87 (±1.4)	N/A	N/A
I like using computers because they make work easier##	1 (±0.4)	9 (±1.1)	49 (±1.8)	40 (±1.9)	89 (±1.2)	N/A	N/A
I enjoy using computers because they help me work with others##	4 (±0.6)	30 (±2.0)	46 (±1.8)	20 (±1.5)	66 (±2.1)	N/A	N/A
I enjoy using computers because they help me communicate with my friends##	3 (±0.7)	13 (±1.1)	43 (±1.7)	41 (±2.1)	84 (±1.4)	N/A	N/A

Confidence intervals (1.96*SE) are reported in brackets. Statistically significant differences are in **bold**.

Percentage of students who agreed or strongly agreed

Item not included in 2011 survey.

Because results are rounded to the nearest whole number, some totals or differences may appear inconsistent.

Majorities of students at both year levels express agreement with statements indicating that they find it important to work with computers, or that they like or enjoy using computers because of the help they provide students in completing specified tasks. The highest percentages of agreement at both year levels were recorded for the statement 'I like using computers because they make work easier', which was endorsed by 83 per cent in Year 6 and by 89 per cent in Year 10. The lowest percentages of agreement (66% of agreement in both year levels) were observed for the statement 'I enjoy using computers because they help me work with others'. For the statement 'It is very important to me to work with a computer', which was endorsed by 77 per cent of Year 6 and 79 per cent of Year 10 students, it was possible to compare the results with the previous survey. While in Year 10 there was no statistically significant difference, the percentage in 2014 among Year 6 students was significantly lower (by 4 percentage points) than in 2011.

The five items reflecting students' recognition of the importance of using computers formed a reliable scale, with reliabilities (Cronbach's alpha) of 0.82 at Year 6 and 0.87 at Year 10. The IRT scale scores are again reported on a metric with a mean score of 50 and standard deviation of 10 among Year 6 students. Higher scale scores indicate higher levels of recognition of the importance of working with computers. The NAP – ICT Literacy 2014 Technical Report further provides details on the scaling analysis and methodology. Table 6.5 records the average scale scores at both year levels, overall and for males and females.

Table 6.5 Year 6 and Year 10 scale score averages for students' recognition of the importance of working with computers overall and by gender in 2014

	Year 6	Year 10	Difference (Year 10 – Year 6)
All students	50.0 (±0.4)	51.5 (±0.5)	**1.5** (±0.7)
Males	51.6 (±0.6)	52.1 (±0.6)	0.5 (±0.9)
Females	48.4 (±0.5)	50.8 (±0.6)	**2.3** (±0.8)
Difference (Males – Females)	**3.2** (±0.6)	**1.3** (±0.8)	**-1.8** (±1.0)

Confidence intervals (1.96*SE) are reported in brackets. Statistically significant differences are in **bold**.
Because results are rounded to the nearest whole number, some differences may appear inconsistent.

The results show that, as well as having higher levels of interest in and enjoyment of using computers, male students also tend to have higher levels of recognition regarding the importance of computers than females. Statistically significant differences between males and females were observed among students at both year levels. However, the difference is significantly larger among Year 6 (3.2 score points) than among Year 10 students (1.3 score points). Furthermore, while there was only a small but significant difference across year levels (1.5 score points), this difference was only statistically significant among females (2.3 score points). These results suggest that female students in Year 10 have higher levels of recognition regarding the importance of working with computers than those in Year 6, while there are no differences across year levels among males.

Table 6.6 Year 6 and Year 10 ICT literacy by tertile groups of students' recognition of the importance of working with computers in 2014

	Low tertile group		Medium tertile group		High tertile group
Year 6					
All students	409 (±7.8)	=	414 (±7.5)	=	421 (±7.5)
Males	391 (±10.2)	=	401 (±10.2)	<	414 (±9.3)
Females	422 (±9.5)	=	426 (±9.7)	=	430 (±10.1)
Year 10					
All students	507 (±8.9)	<	519 (±9.3)	<	541 (±7.4)
Males	486 (±13.5)	=	503 (±13.7)	<	533 (±9.9)
Females	527 (±9.9)	=	536 (±10.5)	<	550 (±10.8)

Confidence intervals (1.96*SE) are reported in brackets.
< Left-hand group has lower mean than right-hand group
= No significant difference between means of two adjacent tertiles
> Left-hand group has higher mean than right-hand group

Table 6.6 shows the ICT Literacy test scores within tertile groups according to students' recognition of the importance of working with computers. Among Year 6 students, no association was found and the differences between tertile groups were not statistically significant, except between the medium and high tertile groups for male students. In Year 10, statistically significant differences between adjacent tertile groups were recorded—the score point average in the highest third was 34 points higher than in the lowest one. However, the difference between the high and the medium tertile groups (22 score points) was much larger than between the low and the medium groups (12 score points). This suggests that the association was not linear, but rather stronger among students with higher levels of recognition of the importance of working with computers. This pattern was similar among males and females; in both groups, the differences between lowest and medium tertile groups were not statistically significant.

Student ICT self-efficacy

The NAP – ICT Literacy 2014 student questionnaire included a question asking about how confident students felt to do nine specific tasks. Response categories were: 'I don't know what this means', 'I know what this means but I cannot do it', 'I can do this with a bit of effort', 'I can do this easily by myself'. A question with eight of these tasks was also included in the NAP – ICT Literacy 2011 survey.

Table 6.7 Category percentages for responses to questions about self-efficacy in using ICT in 2014, and in comparison with 2011

	2014				2011	
	I don't know what this means	I know what this means but I cannot do it	I can do this with a bit of effort	I can do this easily by myself	I can do this easily by myself	Difference
Year 6						
Use software to find and get rid of computer viruses	7 (±0.9)	45 (±1.9)	27 (±1.5)	21 (±1.6)	21 (±1.6)	0 (±1.6)
Edit digital photographs or other graphic images	4 (±0.6)	16 (±1.4)	36 (±1.8)	45 (±2.0)	44 (±1.8)	0 (±1.8)
Create a database (e.g. using Microsoft Access, FileMaker)	24 (±1.6)	30 (±1.4)	25 (±1.4)	21 (±1.7)	23 (±1.6)	**–3** (±1.6)
Use a spreadsheet to plot a graph	17 (±1.4)	20 (±1.5)	31 (±1.5)	32 (±2.0)	27 (±2.0)	**5** (±2.0)
Download music from the internet	3 (±0.5)	16 (±1.2)	22 (±1.3)	59 (±1.5)	60 (±1.8)	–1 (±1.8)
Create a multimedia presentation (with sound, pictures, video)	7 (±0.9)	16 (±1.3)	29 (±1.6)	48 (±2.4)	46 (±1.8)	1 (±1.8)
Construct a web page	11 (±1.0)	46 (±1.9)	25 (±1.4)	18 (±1.8)	19 (±1.8)	–1 (±1.8)
Upload files (images, audio/video and text) to a website	7 (±1.0)	27 (±1.8)	26 (±1.4)	41 (±1.9)	46 (±1.9)	**–6** (±1.9)
Use social media[#]	5 (±0.7)	19 (±1.4)	13 (±1.3)	63 (±1.9)	N/A	N/A
Year 10						
Use software to find and get rid of computer viruses	3 (±0.8)	30 (±1.6)	34 (±1.6)	34 (±1.8)	40 (±1.8)	**–6** (±1.8)
Edit digital photographs or other graphic images	1 (±0.5)	10 (±1.0)	38 (±1.6)	50 (±1.7)	58 (±1.8)	**–8** (±1.8)
Create a database (e.g. using Microsoft Access, FileMaker)	21 (±1.4)	35 (±1.6)	27 (±1.6)	16 (±1.3)	19 (±1.4)	**–3** (±1.4)
Use a spreadsheet to plot a graph	5 (±0.9)	15 (±1.2)	40 (±1.9)	40 (±2.4)	35 (±2.1)	**5** (±2.1)
Download music from the internet	1 (±0.4)	5 (±0.8)	14 (±1.3)	80 (±1.6)	83 (±1.4)	**–3** (±1.4)
Create a multimedia presentation (with sound, pictures, video)	2 (±0.5)	8 (±1.2)	27 (±1.6)	63 (±2.0)	62 (±1.8)	1 (±1.8)
Construct a web page	6 (±0.8)	42 (±1.9)	35 (±1.8)	18 (±1.4)	16 (±1.2)	**2** (±1.2)
Upload files (images, audio/video and text) to a website	2 (±0.5)	11 (±1.2)	22 (±1.5)	65 (±2.0)	72 (±1.6)	**–6** (±1.6)
Use social media[#]	2 (±0.5)	3 (±0.6)	7 (±0.9)	89 (±1.3)	N/A	N/A

Confidence intervals (1.96*SE) are reported in brackets. Statistically significant differences are in **bold**.

[#] Item not included in 2011 survey.

Because results are rounded to the nearest whole number, some totals or differences may appear inconsistent.

Table 6.7 shows the percentages of responses in each category for the nine items reflecting students' ICT self-efficacy. In addition, for the eight items already included in the 2011 survey, it shows a comparison of percentages for the highest category ('I can do this easily by myself') and the differences in percentage points.

In Year 6, most students expressed confidence in using social media—63 per cent thought they could do this easily by themselves, and another 13 per cent thought they could do this with some effort. This also applied to downloading music from the internet—59 per cent thought they could do this easily by themselves, and another 22 per cent thought they could do this with some effort. The lowest levels of confidence were recorded for constructing a web page, where 18 per cent thought they could do this easily by themselves, creating a database (21%) and using software to find and get rid of computer viruses (21%).

Among Year 10 students, the highest levels of confidence to undertake the task easily were observed for using social media (89%), downloading music from the internet (80%), uploading files to a website (65%) and creating a multimedia presentation (63%). Low levels of confidence, with less than a fifth of students expressing confidence, were recorded for creating a database (16%) and constructing a web page (18%).

When comparing student responses across year levels, the percentage of students who believe they can do the tasks easily increase between Year 6 and Year 10 for most listed tasks, in particular for downloading music from the internet or using social media. However, there is no difference in the percentage of confident students with regard to the task of constructing a web page, and a significantly lower proportion of Year 10 students than Year 6 students expressed confidence in easily creating a database.

For eight tasks it is possible to compare these results with those from the previous survey in 2011. In Year 6, there are few changes in the percentage of confident students, with somewhat (significantly) lower proportions for creating a database and uploading files to a website and a higher proportion regarding the task of using a spreadsheet. Among Year 10 students, significantly lower percentages of (entirely) confident students were observed for using anti-virus software (–6 percentage points), editing photographs (–8), uploading files to a website (–6), creating a database (–3) and downloading media from the internet (–3). As in Year 6, there was a higher proportion of students responding that they could easily use a spreadsheet or plot a graph (+5 percentage points).

The nine items were used to derive an IRT-based scale with reliabilities (Cronbach's alpha) of 0.82 in Year 6 and 0.80 in Year 10. Based on the eight common items between the 2011 and 2014 surveys in this scale, the scale was equated to the one established in 2011, which was set to a metric with a mean of 50 and a standard deviation of 10 for Year 6 students in 2011. Higher scale scores indicate higher levels of ICT self-efficacy.

Table 6.8 Year 6 and Year 10 scale score averages for ICT self-efficacy overall and by gender in 2014, in comparison with results from 2011

	Year 6	Year 10	Difference (Year 10 – Year 6)
2014			
All students	49.9 (±0.5)	54.3 (±0.4)	**4.4** (±0.6)
Males	50.8 (±0.6)	55.0 (±0.6)	**4.2** (±0.8)
Females	48.9 (±0.6)	53.5 (±0.5)	**4.6** (±0.8)
Difference (Males – Females)	**1.8** (±0.6)	**1.5** (±0.8)	–0.3 (±1.0)
2011			
All students	50.0 (±0.4)	54.4 (±0.3)	**4.4** (±0.5)
Males	50.5 (±0.6)	54.9 (±0.5)	**4.5** (±0.8)
Females	49.5 (±0.5)	53.8 (±0.4)	**4.3** (±0.6)
Difference (Males – Females)	**0.9** (±0.8)	**1.1** (±0.7)	0.2 (±1.0)
Difference (2014 – 2011)			
All students	–0.1 (±0.6)	–0.1 (±0.5)	0.0 (±0.8)
Males	0.3 (±0.9)	0.1 (±0.7)	0.3 (±1.1)
Females	–0.6 (±0.7)	–0.3 (±0.7)	–0.3 (±1.0)
Difference (Males – Females)	0.9 (±1.0)	0.4 (±1.0)	0.5 (±1.4)

Confidence intervals (1.96*SE) are reported in brackets. Statistically significant differences are in **bold**.
Because results are rounded to the nearest whole number, some differences may appear inconsistent.

Table 6.8 presents the scale average scores overall by gender and in comparison with the results from the survey in 2011. The results show a higher score average among Year 10 students when compared with those in Year 6. The difference of 4.4 score points is statistically significant. At both year levels, males tend to express higher levels of confidence in undertaking ICT-related tasks than females. The differences are statistically significant, with 1.8 score points in Year 6 and 1.5 score points in Year 10.

When comparing scale score averages between 2011 and 2014, no statistically significant changes were recorded. When comparing these results with those from the previous Table 6.7, where we noted some significant changes in the percentages of students in the category reflecting the highest level of confidence for a number of tasks, it should be taken into account that the overall scale is based on all items as well as all categories. The comparison of scale score averages suggests that the overall level of ICT self-efficacy among Year 6 and Year 10 remained unchanged since 2011.

Table 6.9 Year 6 and Year 10 ICT literacy by tertile groups of self-efficacy in using ICT in 2014

	Low tertile group		Medium tertile group		High tertile group
Year 6					
All students	382 (±7.7)	<	423 (±6.7)	<	440 (±6.9)
Males	366 (±10.5)	<	410 (±10.0)	<	431 (±8.3)
Females	396 (±9.4)	<	434 (±7.6)	<	451 (±9.9)
Year 10					
All students	477 (±9.5)	<	537 (±7.1)	<	553 (±8.0)
Males	447 (±12.3)	<	525 (±10.5)	<	549 (±9.7)
Females	508 (±11.8)	<	547 (±8.5)	=	559 (±11.9)

Confidence intervals (1.96*SE) are reported in brackets.
< Left-hand group has lower mean than right-hand group
= No significant difference between means of two adjacent tertiles
> Left-hand group has higher mean than right-hand group

The association between ICT self-efficacy and ICT literacy is illustrated in Table 6.9, which shows the test score averages for tertile groups of ICT self-efficacy. At both year levels there were large differences between the test score averages of students in the lowest and highest third of ICT self-efficacy. In Year 6, the highest tertile group had a test score average of 58 NAP – ICT Literacy scale score points above the one recorded in the lowest group. This difference was 76 score points in Year 10, which suggests that the association was stronger in Year 10 than in Year 6. Table 6.9 also indicates that the differences were much larger between the lowest and medium tertile group, than between the medium and the highest tertile group.

When comparing the associations between ICT self-efficacy and ICT literacy among males and females, the results suggest a much stronger association among males than among females. This is particularly the case among Year 10 students: While the difference between the lowest and highest third was 102 score points among males (equivalent to one standard deviation), the difference was only 50 score points among female students.

Influences on ICT literacy

As for NAP – ICT Literacy 2011, multivariate analyses were conducted to describe how selected aspects of students' use of and attitudes to ICT were related to each other and to student background and ICT literacy. The aim of these analyses was to show a conceptual map of the relationships between the way a set of associated factors relate to each other in their contribution to ICT literacy. The factors of interest were selected because of their conceptual and empirical associations with the development of ICT literacy. The model is developed in an iterative process of selecting factors and evaluating the contribution of the various factors to the model until an 'optimal' solution is obtained. In this case, the student background factors included were: gender, geographic location, number of computers at home, years of experience using computers, and parental occupation. The ICT use and attitude factors included were: *Interest in and enjoyment of working with computers*, *Recognition of the importance of working with computers*, and *ICT self-efficacy*.

A multivariate technique called path analysis (see, for example, Kaplan, 2009) was used to estimate the strength of the relationships among these elements. The estimation was

carried out with the software package Mplus Version 7 (Muthén & Muthén, 1998–2012) as a multi-level model (student and school), which at the same time made it possible to model relationships according to the hierarchical structure of the data (with students nested within schools), to use appropriate sampling weights at the school level and to take the cluster two-stage sample design into account.

The model was similar to the one used in 2011, with the following differences. *Recognition of the importance of working with computers* was a new scale developed for use in 2014. This scaled index was added as an intermediate variable to the model (see Figure 6.1). Parental occupation was not used in 2011 because of high levels of missing data; however, the amount of missing data was sufficiently reduced in 2014 (from 22% in 2011 to 10–11% in 2014) to include parental occupation to the model. Despite this overall improvement, the percentage of missing data for parental occupation varied considerably across states and territories. It was therefore decided to include data from all students in the analysis and, for those with missing parental occupation data, to add an indicator for missing parental occupation and to replace the missing value in the original variable with the state or territory's median parental occupation code. Finally, the four scaled indices were not standardised as in 2011, but retained their original standard deviation (100 for the cognitive scale and 10 for the questionnaire scales), so that the results can be more easily compared with the bivariate analyses in other parts of this report. The conceptual path model of influences on ICT literacy is shown in Figure 6.1.

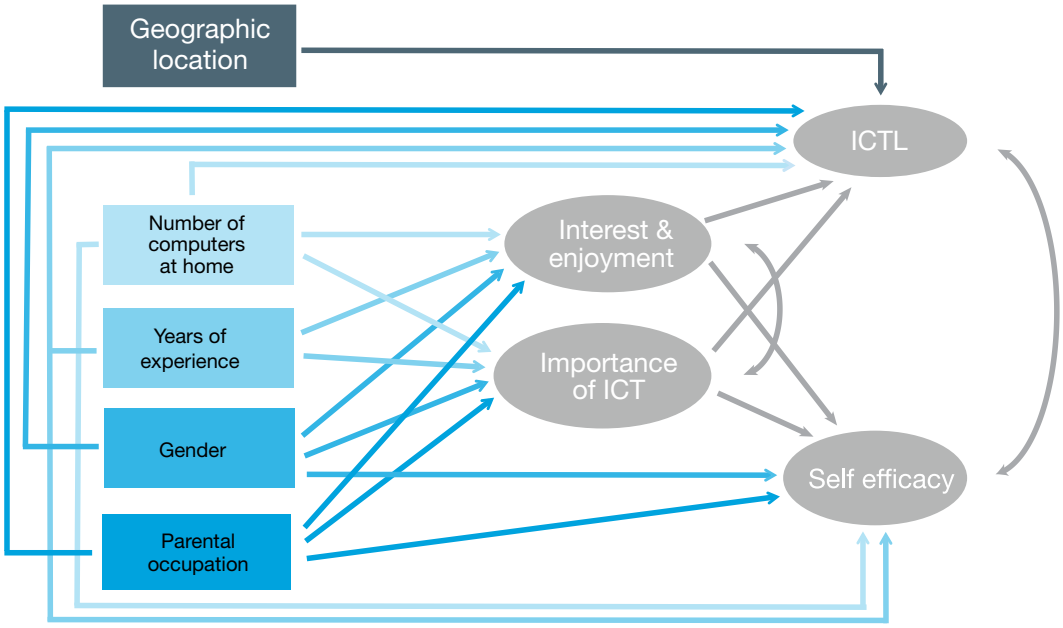


Figure 6.1 Conceptual path model of influences on ICT literacy

The model included three different blocks of variables. The first block consisted of precursors: parental occupation, gender, geographic location, number of computers at home (resources), and years of experience in using computers. The second block consisted of two intermediate variables: students' interest and enjoyment of working with ICT and students' reported recognition of the importance of working with computers. The third block consisted of two criterion (or outcome) variables: ICT literacy and ICT self-efficacy. Given that it is likely that there was a reciprocal relationship between feelings of confidence and

actual achievement, the association between ICT self-efficacy and ICT literacy is shown as a correlation without making assumptions about its causal direction. A similar relationship was assumed between the two intermediate variables. The model assumes that the precursors would affect the two outcomes directly and through their influence on interest and enjoyment. The conceptual path model is shown in Figure 6.1.

The unstandardised path coefficients (and their associated standard errors) are shown in Table 6.10. The results need to be interpreted together with Figure 6.1, which represents schematically the pattern of relationships and with coding of the variables. The following list explains the meaning of the units in each variable. The number of computers at home is the sum of the number of desktop computers, laptops and tablets. Each of these three computer types was collapsed into four categories: 0, 1, 2 or 3 (or more) before the sum was computed.

- ICT literacy — Standard deviation = 100
- Efficacy — Standard deviation = 10
- Interest and enjoyment — Standard deviation = 10
- Recognition of the importance of working with computers — Standard deviation = 10
- Gender — 1 = female, 0 = male
- Number of computers — 0–9 (including tablets)
- Years of experience — 0, 2, 4, 6, 8 (years)
- Parental occupation — 0 (not in paid work), 1, 2, 3, 4 (professional)
- Parental occupation – missing data — 1 = missing, 0 = not missing
- Metropolitan area — 1 = metropolitan, 0 = provincial or remote

Table 6.10 Path analysis of influences on ICT literacy and ICT self-efficacy

	Year 6				Year 10			
	Estimate	Standard error	T-value	P-value (2-tailed)	Estimate	Standard error	T-value	P-value (2-tailed)
Within level								
ICTL ON								
Interest and enjoyment	**1.8**	0.2	7.93	0.00	**2.1**	0.3	7.10	0.00
Importance of ICT	-0.3	0.2	-1.43	0.15	-0.1	0.2	-0.24	0.81
Female	**27.7**	3.6	7.59	0.00	**37.4**	6.3	5.97	0.00
Number of computers	**-7.1**	1.2	-5.97	0.00	-1.2	1.8	-0.65	0.52
Years of experience	**8.3**	0.8	10.21	0.00	**12.7**	1.3	9.75	0.00
Parental occupation	**16.7**	1.7	9.56	0.00	**13.4**	1.8	7.36	0.00
Parental occupation – Missing	**-34.6**	6.8	-5.10	0.00	**-19.8**	6.9	-2.88	0.00
Efficacy ON								
Interest and enjoyment	**0.2**	0.0	7.82	0.00	**0.3**	0.0	9.93	0.00
Importance of ICT	**0.1**	0.0	4.83	0.00	**0.1**	0.0	2.83	0.01
Female	-0.6	0.4	-1.53	0.13	-0.2	0.5	-0.47	0.64
Number of computers	**0.6**	0.1	4.60	0.00	**0.4**	0.1	3.55	0.00
Years of experience	**0.4**	0.1	4.68	0.00	**0.7**	0.1	6.99	0.00
Parental occupation	0.2	0.2	1.24	0.22	0.3	0.2	1.76	0.08
Parental occupation – Missing	-0.8	0.8	-1.00	0.32	-0.1	0.6	-0.12	0.91
Interest and enjoyment ON								
Female	**-4.0**	0.4	-10.76	0.00	**-5.0**	0.5	-10.97	0.00
Number of computers	**0.5**	0.1	4.41	0.00	**0.7**	0.1	4.99	0.00
Years of experience	**0.5**	0.1	6.43	0.00	**0.6**	0.1	5.84	0.00
Parental occupation	**-0.3**	0.2	-2.01	0.05	0.0	0.2	0.12	0.91
Parental occupation – Missing	0.2	0.8	0.24	0.81	1.2	0.7	1.79	0.07
Importance of ICT ON								
Female	**-3.0**	0.3	-9.37	0.00	**-1.4**	0.5	-2.68	0.01
Number of computers	**0.7**	0.1	6.95	0.00	**0.7**	0.1	5.19	0.00
Years of experience	**0.6**	0.1	7.15	0.00	**0.6**	0.1	5.65	0.00
Parental occupation	**-0.6**	0.2	-3.94	0.00	0.2	0.2	1.19	0.24
Parental occupation – Missing	**1.3**	0.6	2.07	0.04	0.6	0.9	0.62	0.54
ICTL WITH								
Efficacy	**0.15**	0.02	6.60	0.00	**0.18**	0.03	5.75	0.00
Interest and enjoyment WITH								
Importance of ICT	**0.58**	0.01	40.56	0.00	**0.60**	0.02	33.92	0.00
Between level								
ICTL ON								
Metropolitan area	11.3	6.5	1.72	0.09	0.2	6.9	0.03	0.97
Median parental occupation	**22.3**	3.7	5.98	0.00	**27.6**	5.0	5.50	0.00

The results for the model in Year 6 were generally very similar to those for Year 10. Table 6.10 shows the net effects for the variables included in the model. These results are described in terms of units of the relevant predicted variable (ICT literacy, ICT self-efficacy, recognition of the importance of working with computers, or interest in and enjoyment of working with computers).

After taking into account differences in student background variables, ICT literacy was significantly associated with interest in and enjoyment of using computers. An increase of one standard deviation in this variable (10 units) was associated with an increase of one-fifth of a standard deviation on the ICT Literacy scale. Recognition of the importance of working with computers did not have a significant effect on ICT literacy.

Each student background variable had a significant effect on ICT literacy after allowing for other influences (such as other background variables and differences in interest), except for the number of computers at home at Year 10 and geographic location of the school at both year levels. In 2011, the effect of the number of computers at home on ICT literacy was not significant in Year 6 and had a positive effect in Year 10. The change in the effect of resources at home could be due to the inclusion of tablets in the index variable in 2014, or due to the inclusion of parental occupation in the model. Both variables are related to family wealth.

The predictors described above from the two-level model explain variation between students after taking into account differences between schools. When predicting the average school achievement on the ICT Literacy scale, parental occupation was a significant predictor, while attending a school in metropolitan areas was no longer a significant factor. This suggests that the difference in performance between geographic areas is due to differences in the socioeconomic status of the families that live in these areas.

ICT self-efficacy was significantly associated with both attitude variables. Self-efficacy increased by about a quarter of a standard deviation, with an increase of one standard deviation (10 units) in the scale reflecting interest and enjoyment, and by about one-tenth of a standard deviation with an increase of one standard deviation by the scale indicating recognition of the importance of working with computers.

There was a significant, albeit small, effect of years of experience and number of computers at home on ICT self-efficacy. Self-efficacy increased by about one-tenth of a standard deviation with every two computers or two years of experience. Parental occupation had no effect on self-efficacy. While males had higher self-efficacy in bivariate analysis, the difference between males and females in self-efficacy was not significant after taking the other predictors into account.

In a two-level model, variation in intermediate or outcome variables is divided into variation in average scores between schools and variation in individual scores between students within schools. In addition, the differences between schools and the differences between students within schools are explained at each level separately. Figure 6.2 shows the percentages of variation between and within schools and the amount of these variance components that were explained by the model.

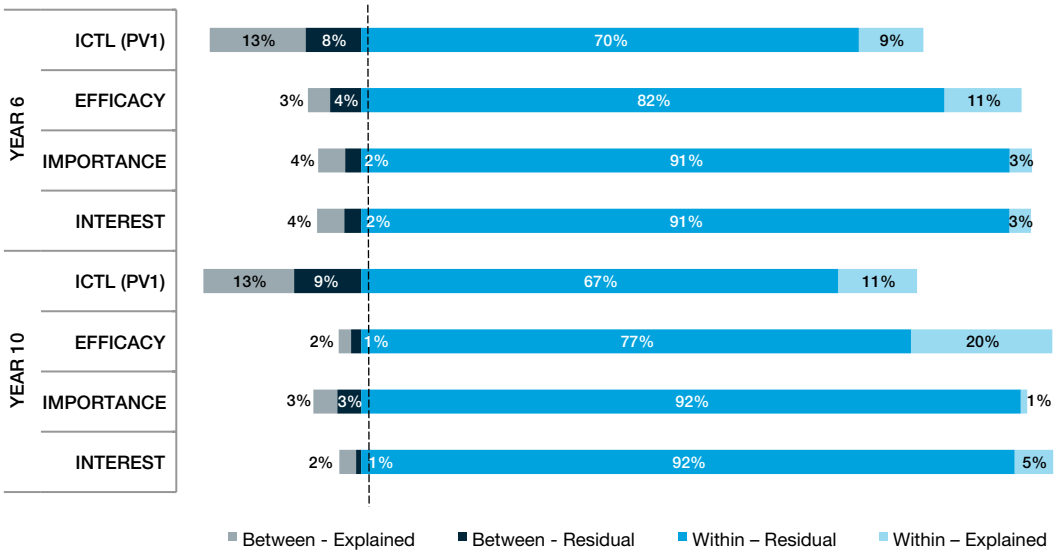


Figure 6.2 Variance decomposition and explained variance at each level of analysis

Just over 20 per cent of the total variation in ICT literacy was recorded as differences in average ICT Literacy scale scores between schools. The remaining variation in student achievement was observed between students within schools. Of the variation in average performance between schools, more than half was explained by the model. Since parental occupation was the only significant predictor at the level of the school, it can be concluded that difference in parental occupational level between schools caused most of the differences in average performance between schools. The full model explained 22 per cent of the total variation in Year 6 (13% between schools and 9% within schools) and 24 per cent in Year 10 (13% between schools and 11% within schools).

Compared with the cognitive ICT measure, the self-reported questionnaire scales showed only very small differences between schools. More than 90 per cent of the variation in scale scores was between students within schools. The model explained 14 per cent of the total variation in ICT self-efficacy in Year 6, and 22 per cent in Year 10. Only between 4 and 7 per cent of the total variance in recognition of the importance of working with computers and in interest in and enjoyment of working with computers was explained by the model at either year level.

Summary

The questionnaire data collected for NAP – ICT Literacy 2014 show that Australian Year 6 and Year 10 students continue to express interest in and enjoyment of working with computers, a factor that is positively associated with higher levels of ICT literacy. Most of them also show recognition of the importance of working with computers. Students at both year levels also expressed different levels of confidence in undertaking specific ICT tasks: while most students were very confident in undertaking tasks related to using the internet for communication and entertainment, few students showed themselves confident to conduct more complex tasks like database and website creations. Overall, similar levels of confidence were measured as in 2011. As already observed in the previous survey in 2011, males tended to enjoy and be interested in computer work more than females, and they were also more confident than females with regard to doing ICT-related tasks.

The chapter concludes with an analysis model that combined the main associations between ICT literacy, self-efficacy and attitudes, after taking into account differences in background variables between students. In this model, ICT literacy was significantly associated with interest and enjoyment in using computers, but not with recognition of the importance of working with computers, and ICT self-efficacy was positively associated with both attitude variables.

Chapter 7: Conclusion

The Australian National Assessment Program – ICT Literacy was one of the first large-scale assessment programs in ICT and has contributed to national and international developments in ICT-based assessment. The program was borne of Australia's commitment to the development of ICT literacy as an essential set of competencies for Australian children. The program was framed around the national goals for schooling specified in the 1999 Adelaide Declaration (MCEETYA, 1999) and confirmed through the goals of the 2008 Melbourne Declaration (MCEETYA, 2008). The NAP – ICT Literacy assessments pre-dated the inclusion of ICT literacy as a component of the broader suite of twenty-first century skills that reflects the broadening national and international interest in fostering digital competencies in young people.

NAP – ICT Literacy 2014 enables student achievement in this field to be monitored and compared with student achievement in the three previous assessment cycles in 2011, 2008 and 2005. In this chapter we discuss the results of NAP – ICT Literacy 2014, both in terms of what they tell us about Australian Year 6 and Year 10 students' ICT literacy in 2014 and the changes in ICT literacy since 2005. As NAP – ICT Literacy does not collect information from teachers, schools and systems about approaches to ICT literacy education, we cannot comment on associations between students' ICT literacy and their school learning contexts. However, in this chapter we do comment on possible contextual influences on students' ICT literacy.

ICT literacy in 2014

The first cycle of NAP – ICT Literacy in 2005 not only provided achievement data from nationally representative samples of students in Year 6 and Year 10, but also enabled a proficient standard to be defined for each of those year levels. Those proficient standards (which accompany a profile of ICT literacy covering both year levels) have continued as a reference against which to report student achievement and monitor changes over time.

Overall, 55 per cent of Year 6 students in 2014 reached or exceeded the Proficient Standard for Year 6 by being able to: 'generate simple general search questions and select the best information source to meet a specific purpose, retrieve information from given electronic sources to answer specific, concrete questions, assemble information in a provided simple linear order to create information products, use conventionally recognised software commands to edit and reformat information products'.

Fifty-two percent of Year 10 students reached or exceeded the Proficient Standard for Year 10 by giving evidence that they were able to: 'generate well-targeted searches for

electronic information sources and select relevant information from within sources to meet a specific purpose, create information products with simple linear structures, and use software commands to edit and reformat information products in ways that demonstrate some consideration of audience and communicative purpose'.

Although there is a difference in the average achievement of students in Year 6 and in Year 10, there is overlap between the achievements demonstrated by the two year levels. The difference in average achievement between Year 6 and Year 10 is 107 points (or just over one standard deviation) on the NAP – ICT Literacy scale. Despite this difference in average achievement, 14 per cent of Year 6 students achieved at a level above the Proficient Standard for Year 10 and 15 per cent of Year 10 students achieved at a level below the Proficient Standard for Year 6.

Changes over nine years

Although the mean performance of students in Year 6 increased steadily from 2005 to 2011 across the three assessment cycles, it decreased significantly by 22 scale points between 2011 and 2014. The mean performance of Year 6 students in 2014 was statistically significantly lower than the mean performance in 2011, but not significantly different from the mean performance in 2005 or 2008.The performance of Year 10 students had not changed significantly across the three previous NAP – ICT Literacy cycles from 2005 to 2011. However, in 2014, the mean performance of Year 10 students decreased by 39 scale points. This large decrease resulted in the 2014 mean performance being significantly lower than the mean performance in all of the previous NAP – ICT Literacy assessments.

Across the three previous cycles of NAP – ICT Literacy, the relative improvement in performance among Year 6 students compared with that of Year 10 students resulted in a decrease in the difference between the mean performances of students in Year 10 and Year 6. In 2005, the mean performance of Year 10 students was 151 scale points higher than that of Year 6 students, whereas in 2011 the corresponding difference was 124 score points. Between 2011 and 2014, the decrease in the performance of Year 10 students was larger than that of Year 6 students, and consequently the difference in the mean performance of the two groups has again become smaller. In 2014, this difference was reduced to 107 scale points.

The decrease in performance of Year 6 students between 2011 and 2014 can also be seen in the distribution of student achievement. There was a 7 percentage point decrease in the proportion of Year 6 students performing at Level 4 and increases in the proportions of students performing at each of levels 3, 2 and 1.

A similar pattern of decrease between performance of students in Year 10 between 2011 and 2014 can be seen in the 10 percentage point decrease in Year 10 students performing at Level 5 and increases in the percentage of students performing at each of levels 4, 3, 2 and 1.

Apparent decreases in performance of Year 6 students were observed in all jurisdictions, although these decreases were statistically significant only in New South Wales, Victoria and ACT. Among Year 10 students, mean test performance decreased significantly in New South Wales, Queensland and ACT, although there were non-significant apparent decreases in all other jurisdictions except the Northern Territory.

Interpreting the decline in achievement between 2011 and 2014

When considering the decrease in performance between 2011 and 2014, we first examined the data to see whether the reported change could be explained by something other than a change in students' ICT literacy as measured in 2011. Details of this investigation are provided in Chapter 2.

Investigation of NAP – ICT Literacy 2014 and 2011 suggest that the data are most likely reflecting a true change in student ICT literacy over time. As such, it is worth considering possible influences that could have contributed to this decrease.

There are many possible factors that may have contributed to the decrease in student achievement. We propose two factors for consideration.

The first change over recent years has been the increased, and now extensive, use of mobile technology devices by students in and out of school. The decrease between 2011 and 2014 in students' reported use of computers outside of school could be a result of their increased use of alternative devices during the same period. Ninety-two per cent of Year 6 students report having at least one tablet device at home, and 49 per cent report having three or more tablet devices at home. The corresponding percentages for Year 10 students are 87 per cent (at least one tablet device) and 34 per cent (three or more tablet devices). The NAP – ICT Literacy 2011 student questionnaire did not include reference to tablet devices because, at that time, they were not regarded as sufficiently widespread to warrant inclusion[18]. ICILS data collected in 2013 showed that 64 per cent of Australian schools with students in Year 8 had tablet computers available to students (De Bortoli et al., 2014).

The use of tablet devices in schools is still relatively new and there is little empirical research relating to the impact of the use of tablet devices in education (Karsenti & Fievez, 2013, p. 5). Clarke and Svanaes (2014) state that: 'monitoring exactly how the use of one-to-one tablets develops will be crucial, as this is currently missing from the literature' (p. 14). There is even less available evidence on the use of smartphones and how this could impact on ICT literacy. However, it is possible that, due to the portability opportunities to access information readily in a one-to-one context afforded by mobile technology devices, students using them may be practising fewer of the skills that have been associated with ICT literacy.

There are three other developments that may have influenced achievement in ICT literacy. Firstly, it is possible that changes in the teaching and learning with ICT have resulted in less emphasis being placed on the teaching of skills associated with ICT literacy. Secondly, it is possible that the development of ICT literacy competencies has been taken for granted in Australia where the level of access to ICT in schooling is extremely high. Thirdly, it is possible that the emergence of mobile computing technology devices has led to increased emphases in teaching and learning on different skills (such as those associated with online communication).

ICILS data from Australia provide some information relating to these possibilities. Firstly, ICILS has shown that the emphasis on teaching ICT literacy-related skills by Australian

[18] Given that the first version of the Apple iPad was released in Australia in mid-2010, it is reasonable to assume that tablet computers were far less available for student use at the time of data collection for NAP – ICT Literacy 2011 than in 2014.

teachers of Year 8 students is high – whether it is higher or lower than in previous years we do not know – and teachers and students both report that there is a strong emphasis on teaching and learning these skills (Fraillon et al., pp. 154, 216). So it is perhaps not so likely that the emphasis has been removed, but rather that it has shifted with the uptake of mobile technology devices. It is possible that this shift in emphasis may have contributed to changes in ICT literacy achievement between 2011 and 2014.

To what extent are digital divides evident?

The term 'digital divide' refers to the notion of different people in societies having varying degrees of opportunity and access to ICT (Van Dijk, 2006, p. 223). The results from NAP – ICT Literacy 2014 indicate that student backgrounds are related to ICT literacy to a similar extent in Year 6 and Year 10.

Differences in parental occupation and parental education are significantly associated with differences in ICT literacy. For example, in Year 6, 42 per cent of students whose parents were from the 'unskilled labourers, office, sales and service' occupational groups attained the proficient standard compared with 72 per cent of students whose parents were from the 'senior managers and professionals' occupational group. In Year 10, the corresponding figures are 40 per cent and 65 per cent. These differences are similar to the differences reported in NAP – ICT Literacy in the three previous cycles. Similar differences are also evident in relation to parental education. At both year levels, significantly more students whose parents were from the 'senior managers and professionals' group reported using computers almost every day, or more frequently than students whose parents were from the 'unskilled labourers, office, sales and service' occupational groups. These differences were significant for both home and school use. There is evidence of a divide linked to parental occupation, student ICT literacy and computer use, which relate to the extent to which students are being prepared with skills for a digital future.

There was also a substantial divide between the ICT literacy of Indigenous and non-Indigenous students. In Year 6, 22 per cent of Indigenous students attained the proficient standard compared with 57 per cent of non-Indigenous students. At Year 10, the corresponding percentages were 20 per cent and 53 per cent. In other words, less than half the percentage of Indigenous students attained the proficient standard in ICT literacy compared with non-Indigenous students. There were no significant differences in terms of daily computer use between Indigenous and non-Indigenous students at Year 6, but there were significant differences for home use in Year 10. At Year 10, the percentage of non-Indigenous students who were daily computer users at home was 77 per cent compared with 52 per cent of Indigenous students.

There was also evidence of differences in ICT literacy among geographic locations. On average, metropolitan students recorded higher ICT Literacy scores than students in non-metropolitan areas. The differences in the percentages in each geographic location are very similar to those reported from the three previous NAP – ICT Literacy cycles. There were differences in the percentages of daily computer users among different geographic locations at home but not at school. For both Year 6 and Year 10, the percentage of metropolitan students using computers at least daily at home was significantly higher than for students in non-metropolitan locations. There were no differences in percentages of daily school use of

computers associated with location. In this case, it appears that the digital divide between metropolitan and non-metropolitan students is restricted to home rather than school-based computer use.

How often and for what purposes are students using computers?

Students in Year 6 and Year 10 used computers more frequently at home than at school. This finding is consistent with previous cycles of NAP – ICT Literacy. One indicator of this is the percentage of students who use computers frequently (almost every day or more frequently). Fifty-six per cent of Year 6 students were frequent computer users at home compared with 27 per cent at school. Among Year 10 students, the corresponding figures were 77 per cent and 65 per cent. Study utilities (especially preparing documents and searching the internet for information) were frequently used by students at both school and home (almost equally) and in both Year 6 and Year 10 (although more frequently in Year 10 than in Year 6). Communication applications (emailing or chatting) were also frequently used by students, but much more so at home than at school, and more by Year 10 than Year 6 students. Entertainment applications (obtaining and listening to music) were also frequently used at home but rarely at school.

Across the three previous cycles of NAP – ICT Literacy from 2005 to 2011, computer use by students increased. The results from NAP – ICT Literacy 2014 show a small decline in the frequency of computer use at home between 2011 and 2014 and an increase in the frequency of computer use at school over the same period. These results might be an indication of the increased emphasis on mobile computing technology devices when using the internet.

Student perceptions about using ICT

Australian Year 6 and Year 10 students have continued to express interest in and enjoyment of working with computers, a factor that is positively associated with higher levels of ICT Literacy. Most of them also show recognition of the importance of working with computers. Students at both year levels also expressed different levels of confidence in undertaking specific ICT tasks: While most students were very confident in undertaking tasks related to using the internet for communication and entertainment, few students showed themselves confident in conducting more complex tasks like database and website creations. Overall, similar levels of confidence were measured as in 2011. As observed in the NAP – ICT Literacy 2011, male students tended to be more interested in and experienced more enjoyment in computer work, and they were also more confident than females with regard to doing ICT-related tasks. This is in contrast with student achievement in which (as for all previous cycles of NAP – ICT Literacy) the achievement of females has been higher than that of males at both Year 6 and Year 10.

Summary

Two of the challenges that concern the growing use of ICT in education, work and society are the capability of young Australians to use ICT and ensuring that all young Australians are able to benefit from ICT on an equitable basis.

The results from NAP – ICT Literacy 2014 show that there has been a decrease in the performance of students at both Year 6 and Year 10. This is in contrast with patterns of improved student performance at Year 6 and stability at Year 10 across the three previous assessment cycles. Given that NAP – ICT Literacy was conceived and developed as primarily a monitoring program, it does not collect extensive contextual data that may contribute to explanations of the recent decrease in performance. It is possible that the introduction and increasing prevalence of mobile computing technology devices since 2011 could have influenced the ways in which students are interacting with ICT, and consequently affected their ICT literacy achievement. Given that the advent of mobile computing technology devices is still relatively new, there is little empirical research into the impacts of their use on teaching and learning. With time, this burgeoning research area may shed more light on whether any decrease in performance on NAP – ICT Literacy can be attributed to the increasing prevalence of alternative mobile devices.

Despite the decrease in performance between 2011 and 2014, the general patterns of differences across the subgroups of students that participated in NAP – ICT Literacy 2014 have remained similar to those of previous assessment cycles. There remain substantial (although smaller than in previous cycles) differences in ICT literacy of Year 6 and Year 10 students, which suggests that considerable growth in ICT proficiency takes place over four years from Year 6 to Year 10. There also remains considerable variation among students within each year level in ICT literacy. Many students use ICT in a relatively limited way and this is reflected in their overall level of ICT literacy. There are differences associated with socioeconomic background, Indigenous status and remote geographic locations that deserve attention. Females have continued to perform better than males at both Year 6 and Year 10, despite male students consistently expressing higher levels of interest, enjoyment and confidence in doing ICT-related tasks.

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Appendix 1: NAP – ICT Assessment Framework

The assessment framework contents have been adapted from the complete NAP–ICT Assessment Framework document, which can be found at the Assessment frameworks page of the NAP website:
http://www.nap.edu.au/nap-sample-assessments/napsa-assessment-frameworks.html

ICT literacy definition

The definition of ICT literacy adopted by The Education Council for use in the National Assessment Program is:

> *The ability of individuals to use ICT appropriately to access, manage and evaluate information, develop new understandings, and communicate with others in order to participate effectively in society* (MCEETYA, 2005).

ICT literacy includes six processes:

- *Accessing information*—identifying the information needed and knowing how to find and retrieve information
- *Managing information*—organising and storing information for retrieval and reuse
- *Evaluating*—reflecting on the processes used to design and construct ICT solutions and making judgements regarding the integrity, relevance and usefulness of information
- *Developing new understandings*—creating information and knowledge by synthesising, adapting, applying, designing, inventing or authoring
- *Communicating*—exchanging information by sharing knowledge and creating information products to suit the audience, the context and the medium.
- *Using ICT appropriately*—making critical, reflective and strategic ICT decisions and using ICT responsibly by considering social, legal and ethical issues.

ICT literacy strands

The elements of the ICT literacy definition have been clustered into three strands: *working with information*, *creating and sharing information* and *using ICT responsibly*. These strands were developed to describe discrete constructs. Strands A and B are logical process groupings of ICT use, while Strand C focuses on understandings of responsible ICT use. The three strands of the ICT literacy domain are described below.

Strand A: Working with information

This strand includes identifying the information needed; formulating and executing a strategy to find information; making judgements about the integrity of the source and content of the

information; and organising and storing information for retrieval and reuse.

Strand B: Creating and sharing information

This strand includes adapting and authoring information; analysing and making choices about the nature of the information product; reframing and expanding existing information to develop new understandings; and collaborating and communicating with others.

Strand C: Using ICT responsibly

This strand includes understanding the capacity of ICT to impact on individuals and society, and the consequent responsibility to use and communicate information legally and ethically.

Figure A1.1 depicts the relationship between the three strands and the six ICT literacy processes. In essence, the six processes are discernible across all the strands, however, their prominence may vary among the strands.

The organisation of the framework into three strands is intended to assist with the development of assessment tasks and the subsequent interpretation of student responses to the assessment tasks.

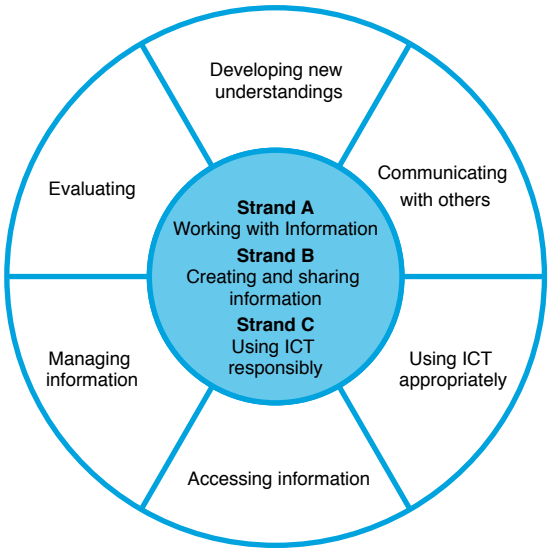

Figure A1.1 Relationship between the three strands and the six ICT literacy processes

Appendix 2: Ordered map of NAP – ICT Literacy 2014 task descriptors

Table A2.1 Ordered map of NAP – ICT Literacy 2014 task desciptors

Scale score	Level	Task descriptor	Strand
899	6	Record six points from a small, contained web environment that are relevant to a specified topic	A
861	6	Identify that an advertisement within a website was automatically generated from the terms and/or metadata found on the website or in the browser	C
782	6	Add two new levels to an online game that show evidence of careful planning regarding the use of colour	B
743	5	Apply the appropriate level of zoom to configure an online map	B
730	5	Choose a website button colour that is consistent with the web page design	B
728	5	Create realistic rules to progress between levels of a game	A
720	5	Place a website button according to interface design principles	B
715	5	Choose an appropriate format for a survey question	B
712	5	Interpret a link chart to create a link from an existing web page to a newly created web page	B
709	5	Include a clear and relevant heading on a newly created level of a game	B
698	5	Explain a weakness of a four–digit numeric passcode	C
680	5	Create a web page with control and planning of layout	B
677	5	Locate and select the graphing tool on a web page	A
673	5	Navigate a website and locate explicit information from within the site	A
666	5	Explain the benefit of using PDF files instead of TXT files	A
661	5	Include notes relevant to slides in a presentation	B
657	5	Describe a potential problem associated with sending an email to a group user list	C
655	5	Recognise automated Internet advertising based on the expression used in the text	A
653	5	Use the Cc email convention appropriately	C
651	5	Give an example of what happens to anti–virus software when it is updated	C
650	5	Add screen elements to a game with evidence of control and planning	B
650	5	Select and apply objects in a coherent way in a short animated video	B
647	4	Create a short animated video that flows due to continuity in animation technique and content	B
647	4	Select font size and style to suit a slide show presentation	B
646	4	Add levels to a learning game with content appropriate to the difficulty of each level	B
646	4	Use appropriate language to engender interest in a crowd–sourcing campaign	B
644	4	Add two new levels to an online game that show some evidence of planning in the use of colour	B
636	4	Create a presentation with some controlled use of colour	B

Scale score	Level	Task descriptor	Strand
634	4	Include the unit of measurement in a vertical axis title of a chart	B
627	4	Create a title for a web page with formatting that makes the role of the title clear	B
617	4	Copy and paste specified text from a document to a web page	B
617	4	Create a presentation with some control of layout of text and images	B
614	4	Connect a mobile device to a specified network	A
609	4	Format the text in the body of a document so that its role is clear in the document	B
608	4	Identify that an advertisement within a website was automatically generated	C
603	4	Align images on a website with clear control	B
600	4	Evaluate search results to choose the most appropriate one for a specified topic	A
593	4	Identify the hyperlink for the web page content manager	A
590	4	Explain why a graphical information display best suits a specified data format	B
581	4	Include the unit of measurement in a vertical axis title	B
578	4	Record four or five points from a small, contained web environment that are relevant to a specified topic	A
578	4	Format headings in a document so that their role is clear	B
578	4	Navigate website menus to locate a specified resource	A
576	4	Include a heading on a newly created level of a game	B
575	4	Demonstrate the importance of text contrast in an information product	B
575	4	Identify the possible impact of registration fees on users of a crowd–sourcing website	C
567	4	Navigate a simple directory tree and create a new folder in a specified location	A
565	4	Create a web–based invitation that shows evidence of planning regarding the use of colour	B
564	4	Create metadata tags to help web users find the information	A
563	4	Choose a design template to meet given criteria	B
555	4	Use a specified image to create the background for a specified web page	B
554	4	Add four specified images to a web page	B
553	4	Identify a problem of using one's own name as a username	C
551	4	Choose and click on a search result according to given criteria	A
550	4	Create a web page with some control of layout	B
546	4	Explain that software updates are intended to improve the functioning of software	C
545	4	Add screen elements to a game with some evidence of control and planning	B
544	4	Use Save As to save a file to a USB drive	A
542	4	Add two or three specified images to a web page	B
534	4	Recognise the purpose of spyware	C
530	4	Use an image to create the background for a specified web page	B
527	3	Add one of four specified images to a web page	B
526	3	Use an installation wizard to install software to a specified folder	A
523	3	Align images on a web page with some control	B
522	3	Enter the origin and destination in an online map tool	B
521	3	Explain why an online survey might be password–protected	C
519	3	Add a new web page to an existing website	B
518	3	Format some headings in a document so that their role is clear	B
515	3	Format some text in a document so that its role is clear	B
513	3	Use an image to create the background for a web page	B
507	3	Explain why a link to activate an account is sent by email rather than being displayed on screen	C
504	3	Explain the benefit of saving files before opening them	A
504	3	Create a chart title that is appropriate to the contents of the chart	B

Scale score	Level	Task descriptor	Strand
503	3	Explain an advantage of storing photos on the Internet	C
498	3	Crop an image to remove background	B
498	3	Set the horizontal graph scale on a chart to 'daily'	B
495	3	Include all relevant information when uploading a file to a video–sharing site	B
494	3	Align an online map to show both an origin and destination	B
488	3	Select and edit information and images that are relevant to the topic and target audience	A
488	3	Set horizontal graph scale to 'daily'	B
488	3	Configure an app to collect data from a specified date, time and location	B
480	3	Identify an advantage of storing data locally rather than in cloud storage	A
478	3	Use Save As to save a file to a generic location	A
476	3	Create a short animated video with a clearly specified message	B
475	3	Use a software shortcut to open an image for editing	A
466	3	Navigate to a URL presented as plain text	A
463	3	Format font so that it is easy to read as part of a short animated video	B
462	3	Select the search result most likely to provide information on a given topic	A
462	3	Adjust settings to reduce the size of a file to upload to a video–sharing site	A
459	3	Identify a benefit of saving files from the internet before running them	A
459	3	Select the best search term to connect users on a social media site	A
453	3	Recognise sponsored links in a list of search results from a search engine	C
451	3	Find an appropriate link on a page using a synonym	A
445	3	Name and save a file in an online survey builder	A
444	3	Create a chart title that refers to rainfall and data–collection period	B
444	3	Locate and click on the Edit button to edit an image	A
439	3	Identify the value in recording the source of information from websites	C
438	3	Include a relevant and identifiable title in a presentation	B
434	3	Navigate software menus and configure software settings	C
432	3	Record two or three points from a small contained web environment that are relevant to a specified topic	A
432	3	Create a short animated video with some flow in animation technique and content	B
430	3	Move an email into a relevant folder on a webmail account	A
429	3	Adjust online calendar to select date	A
427	3	Select and apply objects with some coherence in a short animated video	B
425	3	Create an appropriate title for a video file	B
424	3	Select an appropriate graph type to display rainfall data	B
422	3	Locate, evaluate and click on a hyperlink	A
416	3	Locate a file in a specified location in a directory tree	A
413	3	Set rainfall data as the source for a graph in an app	B
412	3	Select the strongest password according to length and range of character types	C
407	2	Use sorting tools to order and locate data	A
407	2	Click on the correct browser tab to access a search engine	A
405	2	Select the correct link and name from a website to reference information	B
402	2	Adjust online clock to select time	A
401	2	Tab between two pages to transfer information	A
397	2	Explain why saving a file with a generic filename may cause a problem	A
396	2	Set temperature data as the source for a graph	B
394	2	Select an appropriate graph type to display temperature data	B

Scale score	Level	Task descriptor	Strand
388	2	Add a relevant title to a web–based invitation	B
386	2	Identify a risk of opening an email from an unknown source	C
386	2	Identify the meaning of 'public' on a website privacy setting	C
383	2	Include some relevant information when uploading a file to a video–sharing site	B
380	2	Create a new email folder on a webmail account	A
378	2	Click on an icon that will provide access to stored data	A
377	2	Recognise links as advertisements on a website	A
371	2	Click on a specified hyperlink	A
367	2	Copy and paste a URL into an email message	B
363	2	Locate a data file within a directory tree based on the source of the data	A
362	2	Create a web–based invitation with a balanced layout	B
357	2	Create a web–based invitation with some planning in the use of colour	B
347	2	Modify screen settings on a tablet computer	A
340	2	Find an appropriate link on a page using a word match	A
339	2	Recognise that a four–digit numeric passcode is weak	C
334	2	Use tools (slide control) to brighten an image	B
334	2	Add and edit text within a template on a web page	B
332	2	Select an appropriate border for an invitation to a picnic	B
331	2	Explain the need to delete private data from public equipment	C
329	2	Select the most appropriate search term for a given topic	A
328	2	Identify the main purpose of a software license agreement	C
324	2	Configure an app to collect data from a specified location	B
323	2	Identify a problem with websites remembering a user's password	C
315	2	Recognise the consequence of selecting 'always use this program for this action'	A
311	2	Erase specified elements of an image	B
281	1	Click on a hyperlink in an email message	A
280	1	Use tools to rotate an image 180 degrees	B
275	1	Locate and click on a hyperlink	A
255	1	Click on the appropriate link to open an email	A
251	1	Click on a hyperlink presented in an email	A
243	1	Enter a specified username into the appropriate field	A
240	1	Click on a hyperlink to a specified website	A
230	1	Click on the appropriate link to open an attachment on an email	A
216	1	Recognise a conventional symbol used in online email displays	A
186	1	Interpret an error message to identify the probable cause of access being denied to a website	C

Appendix 3: Student questionnaire

The questions from the student questionnaire are presented on the following pages.

Q1 **How many computers and handheld devices are used regularly in your home?**
(Please use the pull-down menu to select a number for each type of device.)

	Number of devices:
Desktop computer	
Portable computer (notebook, netbook)	
Tablet device (e.g. iPad, Android)	
Games console with internet connectivity	
Mobile phone with internet connectivity	0 1 2 3 4 5 6 7 8 9 10 11 12

Q2 **How long have you been using computers?**
(Please click on only one response button.)

- Never or less than one year. ○
- At least one year but less than three years. ○
- At least three years but less than five years. ○
- At least five years but less than seven years. ○
- Seven years or more. ○

Q3 **What type of computer systems do you use in these places?**
(Please click on "None" or on as many of the other boxes on each row as apply for your use at that place.)

	Windows-based computer (PC)	*Apple Macintosh (OS)-based computer*	*Computers using Android, Linux or other operating systems*	*None*
At home	☐	☐	☐	☐
At school	☐	☐	☐	☐
At other places (e.g. local library, internet cafe, friends place or using a mobile 3G/4G network elsewhere)	☐	☐	☐	☐

Q4 **How often do you use a computer in these places?**
(Please click on only one response button in each row.)

	Several times every day	*Every day*	*Almost every day*	*A few times each week*	*Less than once a week or never*
At home	○	○	○	○	○
At School	○	○	○	○	○

Q5 **To what extent do you agree or disagree with the following statements?**
(Please click on only one response button in each row.)

	Strongly agree	*Agree*	*Disagree*	*Strongly disagree*
It is very important to me to work with a computer.	○	○	○	○
I think playing or working with a computer is fun.	○	○	○	○
I use a computer because I am interested in the technology.	○	○	○	○
I like learning how to do new things using a computer.	○	○	○	○
I am always looking for new ways to do things using a computer.	○	○	○	○

Q6 **To what extent do you agree or disagree with the following statements?**
(Please click on only one response button in each row.)

	Strongly agree	*Agree*	*Disagree*	*Strongly disagree*
I like using computers because they help me improve the quality of my work.	○	○	○	○
I like using computers because they make work easier.	○	○	○	○
I enjoy using computers because they help me to work with others.	○	○	○	○
I enjoy using computers because they help me to communicate with my friends.	○	○	○	○
I like using a computer to find new ways to do things.	○	○	○	○

Q7 **How often do you do each of the following:**
(Please use the drop down menu for each task for HOME and for SCHOOL.)

	At Home	**At School**
Search the Internet for information for study or school work.		
Use word processing software to write documents.		
Use spreadsheets to draw a graph or perform calculations.		
Use mathematics, language or other learning programs on a computer.		
Create presentations for school projects.		
Contribute written material or digital products (e.g. art work or photographic images) to on-line content.		

At least once every day
Almost every day
A few times each week
Between once a week and once a month
Less than once a month
Never

Q8**How often do you do each of the following:**
(Please use the drop down menu for each task for HOME and for SCHOOL.)

	At Home	At School
Download games and/or other software applications from the Internet.		
Watch downloaded or streamed video (for example movies, TV shows or clips).		
Play games on a computer, console or mobile device.		
Use software to create sounds/music, movies or animations.		
Use a computer to listen to music or watch DVDs.		
Buy and install apps from an app store.		

At least once every day
Almost every day
A few times each week
Between once a week and once a month
Less than once a month
Never

Q9**How often do you do each of the following:**
(Please use the drop down menu for each task for HOME and for SCHOOL.)

	At Home	At School
Search the Internet for information that is not for study or school work.		
Use a computer for emailing or 'chatting'.		
Write or reply to blogs or forum threads.		
Using voice or video chat such as Skype to communicate with people online.		
Upload text, images or video to an online profile.		
Edit digital photos or other images on a computer.		
Communicate with others using social media such as facebook, twitter, youtube or similar.		

At least once every day
Almost every day
A few times each week
Between once a week and once a month
Less than once a month
Never

Q10**How often do you do each of the following:**
(Please use the drop down menu for each task for HOME and for SCHOOL.)

	At Home	At School
Write computer programs or macros (e.g. HTML, Javascript, Java, Visual Basic, C+, iOS).		
Upload media you have created to the Internet.		
Construct websites.		
Use drawing, painting or graphics programs.		
Use software to find and get rid of computer viruses.		
Remix or edit music, video, images, or text to produce digital content.		

At least once every day
Almost every day
A few times each week
Between once a week and once a month
Less than once a month
Never

Q11 **How well can you do each of these tasks on a computer?**
(Please click on only one response button in each row.)

	I can do this easily by myself	*I can do this with a bit of effort*	*I know what this means but I cannot do it.*	*I don't know what this means*
Use software to find and get rid of computer viruses.	○	○	○	○
Edit digital photographs or other graphic images.	○	○	○	○
Create a database (e.g. using Microsoft Access, FileMaker).	○	○	○	○
Use a spreadsheet to plot a graph.	○	○	○	○
Download music from the Internet.	○	○	○	○
Create a multi-media presentation (with sound, pictures, video).	○	○	○	○
Construct a web page.	○	○	○	○
Upload files (images, audio/video and text) to a website.	○	○	○	○
Use social media (e.g. facebook, twitter).	○	○	○	○

Q12 At school, have you learned about the following issues?
(Please mark one choice in each row.)

	Yes	*No*
The need to provide references to content from web-pages that you include in your schoolwork.	○	○
The need to know whether you have copyright permission to download music or video.	○	○
The problems of using software to copy computer files for free (such as games or videos) that you otherwise would have to pay for.	○	○
Checking the credentials of software patches before downloading and accepting them.	○	○
Changing your password for internet services (e.g. email) regularly.	○	○
Reporting spam to an authority (such as a teacher or parent).	○	○
Reading licence or usage agreements before you click on 'I agree' to install new software.	○	○
Keeping anti-virus software up to date.	○	○
How to decide where to look for information about an unfamiliar topic.	○	○
How look for different types of digital information on a topic.	○	○

Q13 **How often do you use computers for the following school-related purposes?**
(Please mark one choice in each row.)

	Never	*Less than once a month*	*At least once a month but not every week*	*At least once a week*
Preparing reports or essays.	○	○	○	○
Preparing presentations.	○	○	○	○
Working with other students from your own school.	○	○	○	○
Working with other students from other schools.	○	○	○	○
Completing worksheets or exercises.	○	○	○	○
Organising your program of work on a topic using a learning management system (e.g. a Moodle).	○	○	○	○
Reflecting on your learning experiences (e.g. through a blog).	○	○	○	○
Completing tests or assessments.	○	○	○	○
Use on-line learning programs such as mathletics.	○	○	○	○
Use data logging tools as part of an investigation.	○	○	○	○

Appendix 4: Sample characteristics by state and territory

This appendix describes the background characteristics of the participating students at Year 6 and Year 10, nationally and also at state and territory level.

Chapter 2 of the report presents sample characteristics nationally (see Table 2.5), but no background variables are reported by state and territory. This appendix provides more detail than Table 2.5 by reporting background characteristics (age, gender, socio-economic background—parental occupation, socio-economic background—parental education, Indigenous status, language background, country of birth, and geographic location) by state and territory, as well as the percentage of missing data for each state and territory.

The data have been weighted to allow inferences to be made about the student populations. However, it is critical for readers to appreciate that the sample was designed only to be representative of student characteristics at the national level, not at the state or territory level. Therefore, in the tables in Appendix 4 there may be some differences from expected distributions at the state or territory level; that is, due to the level of uncertainty surrounding such estimates, there is always a margin of error.

In addition, the large amount of missing data (particularly for some states and territories and for the parental occupation and education variables among all the states and territories) must be acknowledged particularly when making inferences about the data presented in these tables. When the magnitude of the missing data is judged to be too great, no comment will be made about the findings for that state or territory, or the background variable.

Age

MCEECDYA protocols mean reporting is against year levels rather than age. However, age differences may account for some of the observed differences in performance, and systematic differences in the distribution of ages in a given year level may contribute to observed differences in assessment outcomes between states and territories. Table A4.1 shows the percentages of students in age groups in the NAP – ICT Literacy sample.

Table A4.1 Age percentages of students by year level, nationally and by state and territory

	MODE %	AGE 9 %	AGE 10 %	AGE 11 %	AGE 12 %	AGE 13 %	AGE 14 %	AGE 15 %	AGE 16 %	AGE 17 %	AGE 18 %	MISSING %
Year 6												
New South Wales	11	–	0.2	53.0	46.0	0.5	0.0	0.0	0.0	0.0	0.0	0.3
Victoria	12	–	0.2	31.9	61.4	1.7	0.0	0.0	0.0	0.0	0.0	4.8
Queensland	11	–	0.4	70.6	28.8	0.1	0.0	0.0	0.0	0.0	0.0	0.2
Western Australia	11	–	0.3	72.0	24.6	0.1	0.0	0.0	0.0	0.0	0.0	2.9
South Australia	11	–	0.1	52.8	45.6	0.4	0.0	0.0	0.0	0.0	0.0	1.1
Tasmania	12	–	0.0	25.1	74.4	0.3	0.0	0.0	0.0	0.0	0.0	0.2
ACT	12	–	0.0	47.5	51.7	0.8	0.0	0.0	0.0	0.0	0.0	0.0
Northern Territory	11	–	0.0	65.0	33.1	0.3	0.0	0.0	0.0	0.0	0.0	1.6
Australia	11	–	0.2	53.2	44.2	0.6	0.0	0.0	0.0	0.0	0.0	1.7
Year 10												
New South Wales	15	–	0.0	0.0	0.0	0.0	0.4	53.0	45.5	0.8	0.1	0.2
Victoria	16	–	0.0	0.0	0.0	0.1	0.3	33.7	58.2	2.8	0.1	4.6
Queensland	15	–	0.0	0.0	0.0	0.0	14.4	76.0	8.7	0.4	0.1	0.4
Western Australia	15	–	0.0	0.0	0.0	0.0	0.4	71.8	26.8	0.1	0.0	0.9
South Australia	15	–	0.0	0.0	0.2	2.2	3.6	52.3	39.4	0.9	0.3	1.2
Tasmania	16	–	0.0	0.0	0.0	0.0	0.5	23.4	74.4	1.6	0.0	0.0
ACT	16	–	0.0	0.0	0.0	0.0	0.0	48.1	50.5	0.8	0.0	0.7
Northern Territory	15	–	0.0	0.0	0.0	0.0	1.2	70.0	27.3	0.4	1.2	0.0
Australia	**15**	**–**	**0.0**	**0.0**	**0.0**	**0.2**	**3.6**	**54.8**	**38.6**	**1.1**	**0.1**	**1.5**

Because results are rounded to the nearest whole number, some totals may appear inconsistent.

Table A4.1 shows that at the time of the assessment, 53 per cent of Year 6 students were 11 years old and 44 per cent were 12 years old. In Year 10, 55 per cent of students were 15 years old and 39 per cent were 16 years old. There was some variation in age across the jurisdictions. In Year 6, over half of students in New South Wales (53%), Queensland (71%), Western Australia (72%), South Australia (53%) and Northern Territory (65%) were 11 years old, whereas the majority of students in Victoria (61%) and Tasmania (74%) were already 12 years old. In Year 10, over half of Year 10 students in New South Wales (53%), Queensland (76%), Western Australia (72%), South Australia (52%) and the Northern Territory (70%) were 15 years old, while majorities of students in Victoria (58%) and Tasmania (74%) were already 16 years old.

Gender

Table A4.2 presents the percentages of Year 6 and Year 10 students in the sample by gender, nationally and by state and territory.

Table A4.2 Gender – percentages of students by year level, nationally and by state and territory

	AUST %	NSW %	VIC %	QLD %	WA %	SA %	TAS %	ACT %	NT %
Year 6									
Male	50	50	50	50	50	49	50	48	49
Female	50	50	50	50	50	51	50	52	49
Missing data	0	0	0	0	0	0	0	0	2
Year 10									
Male	52	53	54	52	51	49	54	49	61
Female	48	47	46	48	49	51	46	51	39
Missing data	0	0	0	0	0	0	0	0	0

Because results are rounded to the nearest whole number, some totals may appear inconsistent.

Table A4.2 shows that there were almost equal numbers of males and females in the sample, with males comprising 50 per cent of Year 6 students and 52 per cent of Year 10 students.

Socio-economic background – parental occupation

Table A4.3 presents the percentages of Year 6 and Year 10 students in the sample by parental occupation, nationally and by state and territory.

Table A4.3 Parental occupation – percentages of students by year level, nationally and by state and territory

	AUST %	NSW %	VIC %	QLD %	WA %	SA %	TAS %	ACT %	NT %
Year 6									
Senior managers & professionals	28	28	27	27	36	26	20	45	33
Other managers & associate professionals	25	27	24	26	22	25	22	25	19
Tradespeople & skilled office, sales & service staff	24	19	29	24	20	24	23	19	33
Unskilled labourers, office, sales & service staff	16	17	14	17	14	16	23	6	11
Not in paid work in last 12 months	7	9	6	7	8	10	12	5	5
Missing data	10	5	8	11	23	16	7	16	15
Year 10									
Senior managers & professionals	27	23	27	28	36	25	21	51	32
Other managers & associate professionals	28	28	29	27	27	30	28	24	27
Tradespeople & skilled office, sales & service staff	24	25	21	26	23	21	24	20	23
Unskilled labourers, office, sales & service staff	15	18	15	14	11	15	18	3	10
Not in paid work in last 12 months	6	7	8	5	3	9	8	2	8
Missing data	11	6	7	19	16	20	10	12	9

Because results are rounded to the nearest whole number, some totals may appear inconsistent.

Table A4.3 shows that there was a high level of missing data for this variable and that the amount of missing data varied across the states and territories. At Year 6, New South Wales, Victoria and Tasmania had the lowest amount of missing data (5%, 8% and 7%, respectively), while Western Australia had the highest amount, at 23 per cent. The other jurisdictions all had missing data of around 10 to 16 per cent. At Year 10, New South Wales and Victoria again had the lowest amount of missing data (6% and 7%, respectively), while Queensland and South Australia had the highest percentages (19% and 20%, respectively). All other jurisdictions had around 9 to 16 per cent.

Nationally, at both year levels, approximately one-quarter of the students had a senior manager or professional as parent, with the highest occupational status; parents of one-quarter were employed as 'other manager or associate professional'; one-quarter as 'tradespeople and skilled office, sales and service staff'; and one-quarter were 'unskilled labourers, office, sales and service staff' or were unemployed.

As the level of missing data was so high and so variable across States and Territories, no comparisons of percentages at each category will be made.

Socio-economic background – parental education

Table A4.4 presents the percentages of Year 6 and Year 10 students in the sample by parental education, nationally and by state and territory.

Table A4.4 Parental education – percentages of students by year level, nationally and by state and territory

	AUST %	NSW %	VIC %	QLD %	WA %	SA %	TAS %	ACT %	NT %
Year 6									
Year 9 or equivalent or below	3	4	3	1	1	1	4	2	1
Year 10 or equivalent	6	6	3	7	7	5	15	4	7
Year 11 or equivalent	3	1	4	3	6	7	5	2	3
Year 12 or equivalent	11	10	11	10	11	16	8	8	8
Certificate I to IV (incl. trade cert.)	27	28	28	26	22	24	38	14	35
Advanced Diploma/ Diploma	14	14	14	17	14	12	10	14	16
Bachelor degree or above	37	37	38	36	39	35	21	54	30
Missing data	7	4	3	9	14	17	7	8	22
Year 10									
Year 9 or equivalent or below	3	3	3	2	1	5	2	3	3
Year 10 or equivalent	6	6	5	7	5	2	13	2	4
Year 11 or equivalent	4	2	8	4	5	8	3	1	6
Year 12 or equivalent	8	6	8	11	9	12	8	6	9
Certificate I to IV (incl. trade cert.)	29	33	24	30	28	27	34	21	29
Advanced Diploma / Diploma	18	19	16	17	18	19	15	20	15
Bachelor degree or above	32	31	36	29	34	28	26	47	34
Missing data	10	4	12	14	12	15	8	8	12

Because results are rounded to the nearest whole number, some totals may appear inconsistent.

Table A4.4 shows that, similar to parental occupation, there was a high level of missing data for this variable and that the amount of missing data varied considerably across the states and territories. At Year 6, New South Wales and Victoria had the lowest amount of missing data (4% and 5%, respectively), while the Northern Territory had the highest amount at 22 per cent. The other jurisdictions all had missing data of around 7 to 17 per cent. At Year 10, New South Wales, Tasmania and ACT had the lowest amount of missing data (4%, 8% and 8%, respectively), while South Australia had the highest (15%). The other jurisdictions had around 8 to 14 per cent missing data.

At both year levels, almost a third of the students had a parent with a Bachelor's degree or higher, around 15 per cent had a parent with an advanced diploma or diploma and around a quarter of the students had a parent with a TAFE or trade certificate. The remaining approximately 26 per cent of students had a parent that had completed secondary school or less.

As the level of missing data is high and variable across states and territories, no comparisons of percentages at each category will be made.

Indigenous status

Table A4.5 records the percentages of Year 6 and Year 10 students in the sample by Indigenous status, nationally and by state and territory.

Table A4.5 Indigenous status – percentages of students by year level, nationally and by state and territory

	AUST %	NSW %	VIC %	QLD %	WA %	SA %	TAS %	ACT %	NT %
Year 6									
Non–Indigenous	96	94	99	95	97	97	91	97	76
Indigenous	4	6	1	5	3	3	9	3	24
Missing data	2	4	0	0	3	4	4	0	2
Year 10									
Non–Indigenous	96	97	99	93	94	98	94	98	79
Indigenous	4	3	1	7	6	2	6	2	21
Missing data	4	0	9	1	2	13	4	2	1

Because results are rounded to the nearest whole number, some totals may appear inconsistent.

Table A4.5 shows that for both Year 6 and Year 10 students 4 per cent were identified as being of Aboriginal or Torres Strait Islander origin. At Year 6, the Northern Territory had the highest proportion of Indigenous students in their sample (24%), while Victoria had the lowest at 1 per cent. All other jurisdictions had between 3 and 9 per cent of students identified as being of Aboriginal or Torres Strait Islander origin. At Year 10, the amount of missing data was strikingly higher in South Australia, and to a somewhat lesser extent in Victoria, than for the other states and territories. Therefore, no comparisons will be made.

Language background – language other than English spoken at home

Table A4.6 records the percentages of Year 6 and Year 10 students by language background, nationally and by state and territory.

Table A4.6 Language spoken at home – percentages of students by year level, nationally and by state and territory

	AUST %	NSW %	VIC %	QLD %	WA %	SA %	TAS %	ACT %	NT %
Year 6									
Not LBOTE	79	68	80	91	76	88	96	77	64
LBOTE	21	32	20	9	24	12	4	23	36
Missing data	3	1	1	0	24	0	0	0	14
Year 10									
Not LBOTE	78	67	77	90	82	82	96	79	63
LBOTE	22	33	23	10	18	18	4	21	37
Missing data	3	1	0	1	14	2	1	1	11

Because results are rounded to the nearest whole number, some totals may appear inconsistent.

Table A4.6 shows that 21 per cent of students at Year 6 and 22 per cent of students at Year 10 came from homes in which languages other than English were spoken (in place of or in addition to English). While Queensland, South Australia, Tasmania and ACT had no missing data at Year 6, and Victoria had no missing data at Year 10, Western Australia and the Northern Territory had substantially higher levels of missing data at both year levels (24% and 14% for Years 6 and 10, respectively, for Western Australia, and 14% and 11% for Years 6 and 10, respectively, for the Northern Territory).

Country of birth

Table A4.7 displays the percentages of Year 6 and Year 10 students in the sample born in Australia and overseas, nationally and by state and territory.

Table A4.7 Country of birth – percentages of students by year level, nationally and by state and territory

	AUST %	NSW %	VIC %	QLD %	WA %	SA %	TAS %	ACT %	NT %
Year 6									
Not born in Australia	13	12	12	13	18	11	4	17	12
Born in Australia	87	88	88	87	82	89	96	83	88
Missing data	1	1	0	0	5	0	3	0	2
Year 10									
Not born in Australia	15	14	13	16	20	16	4	13	20
Born in Australia	85	86	87	84	80	84	96	87	80
Missing data	0	0	0	0	1	1	2	1	1

Because results are rounded to the nearest whole number, some totals may appear inconsistent.

Table A4.7 shows that, nationally, around 13 per cent of Year 6 students and 15 per cent of Year 10 students were born outside of Australia. The level of missing data was relatively low for this variable, with most states and territories having less than 5 per cent. Western Australia had the largest percentages of missing data for this variable at Year 6. Across the jurisdictions, Tasmania had the lowest percentage of students born outside of Australia (4% at both year levels). Western Australia and ACT had the highest proportion of students

reported to be born outside Australia in Year 6 (18% and 17%, respectively), and Western Australia and the Northern Territory had the highest in Year 10 (both 20%).

Geographic location

For the purposes of this appendix, 'geographic location' refers to whether a student attended school in a metropolitan, provincial or remote zone.

- Metropolitan zones included all State and Territory capital cities except Darwin and major urban areas with populations above 100,000 (such as Geelong, Wollongong and the Gold Coast).
- Provincial zones took in provincial cities (including Darwin) and provincial areas.
- Remote zones were areas of low accessibility, such as Katherine and Coober Pedy.

Table A4.8 presents the percentages of Year 6 and Year 10 students in the sample by geographic location of school, nationally and by state and territory.

Table A4.8 Geographic location – percentages of students by year level, nationally and by state and territory

	AUST %	NSW %	VIC %	QLD %	WA %	SA %	TAS %	ACT %	NT %
Year 6									
Metropolitan	73	76	76	68	73	71	45	100	0
Provincial	26	24	24	32	21	22	55	0	69
Remote	1	0	0	0	5	6	0	0	31
Year 10									
Metropolitan	74	78	77	69	73	76	47	100	0
Provincial	25	22	23	31	20	22	51	0	72
Remote	1	0	0	0	7	2	2	0	28

Because results are rounded to the nearest whole number, some totals may appear inconsistent.

Table A4.8 shows that 73 to 74 per cent of the students assessed attended school in metropolitan areas. About a quarter attended school in provincial areas, while only 1 per cent went to school in remote areas. There were no missing data for this variable, as it was based on the postcode of the school.

As might be expected, there were some variations among the states and territories in the distribution of students across metropolitan, provincial and remote areas. On the basis of the weighted data, all students in the ACT attend school in metropolitan areas, compared with 45 to 47 per cent of students in Tasmania, and none in the Northern Territory, as Darwin was classified as a provincial city.

The Northern Territory had the greatest number of students in remote areas (31% at Year 6 and 28% at Year 10), followed by Western Australia (5% at Year 6 and 7% at Year 10) and South Australia (6% at Year 6).

Appendix 5: Reporting of differences between scale score averages

This appendix describes methods for comparing achievement test scores across groups of students. In the report, each population estimate was accompanied by its 95 per cent confidence interval. In addition, tests of significance for the difference between estimates were provided, in order to describe the probability that differences were just a result of sampling and measurement error.

The following types of significance tests for achievement mean differences in population estimates were reported:

- between states and territories and year levels
- between student background subgroup
- across the four assessment cycles (2005, 2008, 2011 and 2014).

Mean differences between states and territories and year levels

Pair-wise comparison charts allow the comparison of population estimates between one state or territory and another, or between Year 6 and Year 10. Differences in means were considered significant when the test statistic **t** was outside the critical values ±1.96 ($\alpha = 0.05$). The **t** value is calculated by dividing the difference in means by its standard error that is given by the formula:

$$SE_{dif\_ij} = \sqrt{SE_i^2 + SE_j^2}$$

where SE_{dif_ij} is the standard error on the difference and SE_{ij} are the standard errors of the compared means *i* and *j*. The standard error on a difference can only be computed this way if the comparison is between two independent samples like states and territories or year levels. Samples are independent if they were drawn separately.

Mean differences between dependent subgroups

The formula for calculating the standard error provided above is only suitable when the subsamples being compared are independent (see OECD 2009 for more detailed information). In case of dependent subgroups, the covariance between the two standard errors needs to be taken into account and the Jackknife repeated replication (JRR) technique should be used to estimate the sampling error for mean differences. As subgroups other than state or territory and year level are dependent subsamples (for example, gender, language background and country of birth subgroups), the difference between statistics for subgroups of interest and the standard error of the difference were derived using the specialist software SPSS® Replicates Add-in that runs macros to apply JRR. Differences between subgroups were considered significant when the test statistic t was outside the critical values ±1.96 ($\alpha = 0.05$). The t value was calculated by dividing the mean difference by its standard error.

Mean differences between assessment cycles

This report also included comparisons of assessment results across cycles. As the process of equating the tests across the cycles introduces some additional error into the calculation of any test statistic, an equating error term was added to the formula for the standard error of the difference (between cycle means, for example). The computation of the equating errors is described in the Technical Report.

The value of the equating error between 2011 and 2014 is 4.010 units of the ICT Literacy scale for both Year 6 and Year 10. When testing the difference of a statistic between the two assessments, the standard error of the difference is computed as follows:

$$SE(\mu_{14} - \mu_{11}) = \sqrt{SE_{14}^2 + SE_{11}^2 + EqErr^2}$$

where μ can be any statistic in units on the NAP – ICTL scale (mean, percentile, gender difference, but not percentages) and SE is the respective standard error of this statistic.

To report the significance of differences between percentages at or above proficient standards, the equating error for each year level could not directly be applied. Therefore, the following replication method was applied to estimate the equating error for percentages at proficient standards.

For each year level cut-point that defines the corresponding proficient standard (409 for Year 6 and 529 for Year 10), a number of n replicate cut-points were generated (5000) by adding a random error component with a mean of 0 and a standard deviation equal to the estimated equating error (4.010). Percentages of students at or above each replicate cut-point (<n) were computed and an equating error for each year level was estimated as:

$$EqErr(\rho) = \sqrt{\frac{\sum(\rho_n - \rho_o)^2}{n}}$$

where ρ_o is the percentage of students at or above the proficient standard. The standard errors for the differences between percentages at or above proficient standards were calculated as:

$$SE(\rho_{14} - \rho_{11}) = \sqrt{SE(\rho_{14})^2 + SE(\rho_{11})^2 + EqErr(\rho)^2}$$

where ρ_{11} and ρ_{14} are the percentages at or above the proficient standard in 2011 and 2014, respectively.

The values of the equating errors for each student group of interest are given in Table A5.1 and Table A5.2.

Table A5.1 Equating errors for the NAP – ICTL scale between 2014 and each of the previous cycles

	2011	2008	2005
2014	4.010	6.979	8.197

Table A5.2 Equating errors for percentages between 2014 and each of the previous cycles

	Year 6			Year 10		
	2011	2008	2005	2011	2008	2005
ALL	1.348	2.453	2.887	1.492	2.652	3.133
NSW	1.355	2.524	2.982	1.756	2.939	3.438
VIC	1.391	2.444	2.872	1.276	2.401	2.859
QLD	1.120	2.166	2.569	1.323	2.538	3.045
WA	1.778	2.958	3.416	1.797	2.923	3.411
SA	1.476	2.592	3.003	1.616	2.634	3.028
TAS	1.209	2.183	2.580	1.662	2.926	3.430
ACT	1.471	2.549	2.991	1.375	2.367	2.707
NT	1.089	1.869	2.209	1.535	3.289	3.894
Females	1.274	2.374	2.832	1.183	2.372	2.866
Males	1.461	2.568	2.975	1.809	2.938	3.404
Metro	1.359	2.452	2.881	1.528	2.671	3.129
Provincial	1.364	2.526	2.982	1.343	2.588	3.144
Remote	1.269	1.693	1.859	3.360	3.933	4.281

Appendix 6: Mean scores on questionnaire indices by year level and state and territory

Table A6.1 Frequency communication – home: average scale scores and confidence intervals by state and territory

	Year 6 students	Year 10 students
New South Wales	51 (±0.8)	54 (±0.8)
Victoria	50 (±0.9)	54 (±0.5)
Queensland	49 (±1.0)	53 (±0.6)
Western Australia	50 (±0.8)	54 (±0.9)
South Australia	49 (±0.9)	54 (±0.9)
Tasmania	50 (±0.8)	53 (±1.0)
ACT	49 (±1.1)	54 (±0.8)
Northern Territory	47 (±1.2)	53 (±1.4)

Confidence intervals are reported in brackets.

Table A6.2 Frequency communication – school: average scale scores and confidence intervals by state and territory

	Year 6 students	Year 10 students
New South Wales	51 (±0.9)	54 (±1.4)
Victoria	50 (±0.8)	55 (±1.2)
Queensland	50 (±1.1)	54 (±1.2)
Western Australia	48 (±0.8)	51 (±1.4)
South Australia	50 (±1.0)	56 (±1.1)
Tasmania	52 (±1.2)	55 (±1.2)
ACT	48 (±1.6)	55 (±1.7)
Northern Territory	49 (±1.4)	57 (±2.7)

Confidence intervals are reported in brackets.

Table A6.3 Self-efficacy: average scale scores and confidence intervals by state and territory

	Year 6 students	Year 10 students
New South Wales	51 (±1.1)	55 (±1.0)
Victoria	50 (±0.9)	54 (±0.5)
Queensland	49 (±0.9)	54 (±0.8)
Western Australia	49 (±0.9)	54 (±0.9)
South Australia	49 (±1.1)	54 (±0.6)
Tasmania	49 (±1.0)	55 (±0.7)
ACT	48 (±1.4)	55 (±1.7)
Northern Territory	46 (±1.5)	54 (±2.8)

Confidence intervals are reported in brackets.

Table A6.4 Frequency entertainment – home: average scale scores and confidence intervals by state and territory

	Year 6 students	Year 10 students
New South Wales	50 (±0.9)	52 (±0.9)
Victoria	50 (±1.1)	51 (±0.7)
Queensland	49 (±0.8)	51 (±0.7)
Western Australia	50 (±1.0)	51 (±0.8)
South Australia	50 (±1.0)	52 (±0.9)
Tasmania	49 (±1.2)	51 (±1.0)
ACT	49 (±1.2)	51 (±0.8)
Northern Territory	48 (±1.8)	51 (±2.1)

Confidence intervals are reported in brackets.
Confidence intervals based formula for independent samples (no equating error)

Table A6.5 Frequency entertainment – school: average scale scores and confidence intervals by state and territory

	Year 6 students	Year 10 students
New South Wales	51 (±1.2)	53 (±1.5)
Victoria	50 (±1.0)	54 (±1.4)
Queensland	49 (±0.9)	51 (±1.1)
Western Australia	49 (±1.1)	50 (±1.5)
South Australia	51 (±1.2)	54 (±1.3)
Tasmania	50 (±1.3)	53 (±1.5)
ACT	49 (±1.9)	54 (±2.4)
Northern Territory	51 (±1.2)	56 (±2.6)

Confidence intervals are reported in brackets.

Table A6.6 ICT use for common learning practices: average scale scores and confidence intervals by state and territory

	Year 6 students	Year 10 students
New South Wales	50 (±0.9)	54 (±1.2)
Victoria	50 (±0.9)	54 (±1.0)
Queensland	50 (±1.0)	55 (±0.9)
Western Australia	50 (±1.1)	53 (±0.9)
South Australia	51 (±1.2)	57 (±0.8)
Tasmania	48 (±1.1)	54 (±0.9)
ACT	51 (±2.4)	56 (±1.8)
Northern Territory	50 (±1.5)	56 (±1.1)

Confidence intervals are reported in brackets.

Table A6.7 ICT learning at school: average scale scores and confidence intervals by state and territory

	Year 6 students	Year 10 students
New South Wales	50 (±1.0)	52 (±1.1)
Victoria	51 (±1.0)	51 (±0.7)
Queensland	49 (±1.2)	52 (±0.9)
Western Australia	49 (±1.1)	51 (±1.1)
South Australia	49 (±1.0)	51 (±0.9)
Tasmania	51 (±0.8)	53 (±1.6)
ACT	50 (±1.0)	52 (±1.8)
Northern Territory	47 (±1.2)	52 (±2.7)

Confidence intervals are reported in brackets.

Table A6.8 ICT use for special study purposes: average scale scores and confidence intervals by state and territory

	Year 6 students	Year 10 students
New South Wales	50 (±0.6)	49 (±1.5)
Victoria	50 (±1.0)	47 (±1.1)
Queensland	50 (±0.9)	48 (±1.3)
Western Australia	50 (±1.0)	48 (±1.3)
South Australia	48 (±1.2)	48 (±1.3)
Tasmania	48 (±1.0)	47 (±0.9)
ACT	50 (±1.9)	47 (±1.5)
Northern Territory	50 (±1.3)	49 (±1.2)

Confidence intervals are reported in brackets.

Table A6.9 Importance of ICT: average scale scores and confidence intervals by state and territory

	Year 6 students	Year 10 students
New South Wales	51 (±1.0)	52 (±1.1)
Victoria	49 (±0.9)	52 (±0.9)
Queensland	49 (±0.8)	51 (±1.0)
Western Australia	50 (±1.0)	50 (±0.9)
South Australia	50 (±0.8)	53 (±0.9)
Tasmania	48 (±0.7)	49 (±1.0)
ACT	49 (±1.3)	53 (±1.6)
Northern Territory	49 (±1.5)	52 (±1.1)

Confidence intervals are reported in brackets.

Table A6.10 Interest and enjoyment: average scale scores and confidence intervals by state and territory

	Year 6 students	Year 10 students
New South Wales	50 (±1.0)	47 (±1.1)
Victoria	50 (±1.0)	47 (±0.8)
Queensland	50 (±0.9)	47 (±0.9)
Western Australia	50 (±0.8)	46 (±1.1)
South Australia	50 (±0.8)	48 (±0.9)
Tasmania	48 (±0.8)	45 (±0.8)
ACT	50 (±1.3)	47 (±1.2)
Northern Territory	50 (±1.3)	48 (±1.3)

Confidence intervals are reported in brackets.

Table A6.11 Frequency technological tasks – home: average scale scores and confidence intervals by state and territory

	Year 6 students	Year 10 students
New South Wales	50 (±0.7)	49 (±0.8)
Victoria	50 (±0.8)	49 (±0.7)
Queensland	50 (±1.2)	49 (±1.0)
Western Australia	50 (±0.8)	48 (±1.0)
South Australia	49 (±1.0)	49 (±0.8)
Tasmania	49 (±1.0)	48 (±1.1)
ACT	49 (±1.1)	48 (±1.0)
Northern Territory	47 (±1.2)	50 (±1.5)

Confidence intervals are reported in brackets.

Table A6.12 Frequency technological tasks – school: average scale scores and confidence intervals by state and territory

	Year 6 students	Year 10 students
New South Wales	50 (±1.2)	50 (±1.1)
Victoria	50 (±0.7)	50 (±0.9)
Queensland	50 (±1.0)	51 (±1.0)
Western Australia	50 (±0.7)	49 (±1.1)
South Australia	49 (±1.0)	50 (±0.9)
Tasmania	50 (±1.2)	49 (±1.3)
ACT	48 (±1.5)	50 (±1.1)
Northern Territory	48 (±1.0)	52 (±1.4)

Confidence intervals are reported in brackets.

Table A6.13 Frequency utilities – home: average scale scores and confidence intervals by state and territory

	Year 6 students	Year 10 students
New South Wales	51 (±0.9)	52 (±0.9)
Victoria	50 (±1.1)	51 (±1.0)
Queensland	50 (±1.0)	51 (±1.1)
Western Australia	50 (±0.8)	50 (±0.9)
South Australia	49 (±1.3)	54 (±1.2)
Tasmania	45 (±1.2)	47 (±1.4)
ACT	51 (±1.4)	54 (±0.9)
Northern Territory	45 (±1.7)	49 (±2.0)

Confidence intervals are reported in brackets.

Table A6.14 Frequency utilities: school – average scale scores and confidence intervals by state and territory

	Year 6 students	Year 10 students
New South Wales	50 (±0.8)	49 (±1.7)
Victoria	51 (±1.2)	51 (±1.2)
Queensland	49 (±1.1)	53 (±0.7)
Western Australia	50 (±1.3)	48 (±1.5)
South Australia	52 (±1.0)	55 (±1.2)
Tasmania	50 (±1.1)	51 (±1.2)
ACT	49 (±2.6)	50 (±1.6)
Northern Territory	48 (±1.5)	53 (±0.6)

Confidence intervals are reported in brackets.